

Electrical Sector Solutions

# Volume 4: Circuit Protection

**EATON**

*Powering Business Worldwide*

**Volume 1 – Residential and Light Commercial**

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**Volume 2 – Commercial Distribution**

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**Volume 3 – Power Distribution and Control Assemblies**

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## Dimensions, Weights and Ratings

Dimensions, weights and ratings given in this catalog **are approximate and should not be used for construction purposes**. Drawings containing exact dimensions are available upon request. All listed product specifications and ratings are subject to change without notice. Photographs are representative of production units.

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These catalog pages do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Eaton Products Distributor or Sales Office. The contents of this catalog shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Eaton's Electrical Sector. The warranty contained in the contract between the parties is the sole warranty of Eaton. Any statements contained herein do not create new warranties or modify the existing warranty.





Powering Business Worldwide

**Eaton is a global leader in power distribution, power quality, control and automation, and monitoring products.**

At Eaton, we believe a reliable, efficient and safe power system is the foundation of every successful enterprise. Through innovative technologies, cutting-edge products and our highly skilled services team, we empower businesses around the world to achieve a powerful advantage.

In addition, Eaton is committed to creating and maintaining powerful customer relationships built on a foundation of excellence. From the products we manufacture to our dedicated customer service and support, we know what's important to you.

## Solutions

Eaton takes the complexity out of power systems management with a holistic and strategic approach, leveraging our industry-leading technology, solutions and services. We focus on the following three areas in all we do:

- Reliability—maintain the appropriate level of power continuity without disruption or unexpected downtime
- Efficiency—minimize energy usage, operating costs, equipment footprint and environmental impact
- Safety—identify and mitigate electrical hazards to protect what you value most

## Using the Eaton Catalog Library

As we grow, it becomes increasingly difficult to include all products in one or two comprehensive catalogs. Knowing that each user has their specific needs, we have created a library of catalogs for our products that when complete, will contain 15 volumes. Since the volumes will continuously be a work in progress and updated, each volume will stand alone. Refer to our volume directory, MZ08100001E, for a quick glance of where to look for the products you need. The 15 volumes include:

- Volume 1—Residential and Light Commercial (CA08100002E)
- Volume 2—Commercial Distribution (CA08100003E)
- Volume 3—Power Distribution and Control Assemblies (CA08100004E)
- Volume 4—Circuit Protection (CA08100005E)
- Volume 5—Motor Control and Protection (CA08100006E)
- Volume 6—Solid-State Motor Control (CA08100007E)
- Volume 7—Logic Control, Operator Interface and Connectivity Solutions (CA08100008E)
- Volume 8—Sensing Solutions (CA08100010E)
- Volume 9—Original Equipment Manufacturer (CA08100011E)
- Volume 10—Enclosed Control (CA08100012E)
- Volume 11—Vehicle and Commercial Controls (CA08100013E)
- Volume 12—Aftermarket, Renewal Parts and Life Extension Solutions (CA08100014E)
- Volume 13—Counters, Timers and Tachometers (CA08100015E)—Available in electronic format only
- Volume 14—Fuses (CA08100016E)—Available in electronic format only
- Volume 15—Solar Inverters and Electrical Balance of System (CA08100018E)

These volumes are not all-inclusive of every product, but they are meant to be an overview of our product lines. For our full range of product solutions and additional product information, consult [Eaton.com/electrical](http://Eaton.com/electrical) and other catalogs and product guides in our literature library. These references include:

- The Consulting Application Guide (CA08104001E)
- The Eaton Power Quality Product Guide (COR01FYA)

If you don't have the volume that contains the product or information that you are looking for, not to worry. You can access every volume of the catalog library at [Eaton.com/electrical](http://Eaton.com/electrical) in the Literature Library.

By installing our Automatic Tab Updater (ATU), you can be sure you always have the most recent version of each volume and tab.



## Icons



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When you see the Drawings Online icon, go to [Eaton.com/electrical](http://Eaton.com/electrical) and find the products page. There you will find a tab that includes helpful product drawings and illustrations.

## Contact Us

If you need additional help, you can find contact information under the Customer Care heading of [Eaton.com/electrical](http://Eaton.com/electrical).

# Miniature Circuit Breakers and Supplementary Protectors

**Miniature Circuit Breakers and Supplementary Protectors**



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# 1.1

## Miniature Circuit Breakers and Supplementary Protectors

### Industrial Circuit Breakers

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#### Miniature Circuit Breakers and Supplementary Protectors



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##### Description

Quick Reference

## QUICKLAG

### Quick Reference

#### Eaton's QUICKLAG Industrial Circuit Breakers ① Plug-In, Bolt-On, Cable-In/Cable-Out

Circuit Breaker Type	Circuit Breaker Type Code	Continuous Ampere Rating at 40°C	Number of Poles	Vac		Federal Spec. W-C-375b	Interrupting Ratings rms Symmetrical Amperes						Page Number
				Vac	Vdc		Vac Ratings			Vdc Ratings ②③			
							120	120/240	240	24-48	62.5	80	
HQP	P	10-70	1	120/240	24, 48, 62.5	10a, 11a, 12a	—	10,000	—	5000	④	—	V4-T1-6
HQP	P	10-125	2	120/240	24, 48, 80	10a, 12a	—	10,000	—	5000	5000	5000	V4-T1-6
HQP	P	10-100	2, 3	240	—	10b, 11b, 12b	—	—	10,000	—	—	—	V4-T1-6
QPHW	P	15-70	1	120/240	24, 48, 62.5	14a	—	22,000	—	5000	④	—	V4-T1-6
QPHW	P	15-125	2	120/240	24, 48, 80	14a	—	22,000	—	5000	5000	5000	V4-T1-6
QPHW	P	15-100	2, 3	240	—	14b	—	—	22,000	—	—	—	V4-T1-6
QHPX	P	15-70	1	120/240	24, 48, 62.5	—	—	42,000	—	5000	④	—	V4-T1-7
QHPX	P	15-100	2	120/240	24, 48, 80	—	—	42,000	—	5000	5000	5000	V4-T1-7
QHPX	P	15-100	3	240	—	—	—	—	42,000	—	—	—	V4-T1-7
QHPW	P	15-30	1	120/240	24, 48, 62.5	15a	—	65,000	—	5000	④	—	V4-T1-7
QHPW	P	15-30	2	120/240	24, 48, 80	15a	—	65,000	—	5000	5000	5000	V4-T1-7
QHPW	P	15-20	3	240	—	15b	—	—	65,000	—	—	—	V4-T1-7
QPGFT	P, GF	15-40	1	120	—	10a, 11a, 12a	10,000	—	—	—	—	—	V4-T1-9
QPGFT	P, GF	15-50	2	120/240	—	10a, 11a, 12a	—	10,000	—	—	—	—	V4-T1-9

#### Notes

① QUICKLAG circuit breakers are suitable for application in relative humidity 0-95% noncondensing.

② Two-pole DC interrupting ratings based on two poles connected in series. Not UL® listed.

③ Breakers at DC ratings are not UL listed.

④ 62.5 Vac interrupting rating is 3800 AIC 10-50A and 2500 AIC 55-100A continuous.

Circuit Breaker Type Codes: **P** Plug-In; **B** Bolt-On; **C** Cable-In/Cable-Out; **GF** Ground Fault, 5 mA; **GFEP** Ground Fault, 30 mA.

For Types GHBS, GBHS and BABRP solenoid-operated, remote-controlled circuit breakers, see **Pages V4-T1-30 to V4-T1-35**.



### Eaton's QUICKLAG Industrial Circuit Breakers ① Plug-In, Bolt-On, Cable-In/Cable-Out, continued

Circuit Breaker Type	Circuit Breaker Type Code	Continuous Ampere Rating at 40°C	Number of Poles	Vac		Federal Spec. W-C-375b	Interrupting Ratings rms Symmetrical Amperes						Page Number
				Vac	Vdc		Vac Ratings			Vdc Ratings ②③			
							120	120/240	240	24-48	62.5	80	
QPHGFT	P, GF	15-30	1	120	—	10a, 11a, 12a	22,000	—	—	—	—	—	V4-T1-9
QPHGFT	P, GF	15-50	2	120/240	—	10a, 11a, 12a	—	22,000	—	—	—	—	V4-T1-9
QPGFEP	P, GFEP	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-9
QPGFEP	P, GFEP	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-9
QPHGFEP	P, GFEP	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-9
BABRSP	B	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-12
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BRRP	P	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-31
BRRP	P	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-31
CLRP	P	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-31
CLRP	P	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-31
BAB	B	10-70	1	120/240	24, 48, 62.5	10a, 11a, 12a	—	10,000	—	5000	④	—	V4-T1-12
BAB	B	10-125	2	120/240	24, 48, 80	10a, 12a	—	10,000	—	5000	5000	5000	V4-T1-12
BAB	B	10-100	2, 3	240	—	10b, 11b, 12b	—	—	10,000	—	—	—	V4-T1-12
BABRP	B	15-30	1	120	—	—	10,000	—	—	—	—	—	V4-T1-31
BABRP	B	15-30	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-31
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QBCAF	B, AF, GF	15-20	1, 2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-15
QBHW	B	15-70	1	120/240	24, 48, 62.5	14a	—	22,000	—	5000	④	—	V4-T1-12
QBHW	B	15-125	2	120/240	24, 48, 80	14a	—	22,000	—	5000	5000	5000	V4-T1-12
QBHW	B	15-100	2, 3	240	—	14b	—	—	22,000	—	—	—	V4-T1-12
HBAX	B	15-70	1	120/240	24, 48, 62.5	—	—	42,000	—	5000	④	—	V4-T1-13
HBAX	B	15-100	2	120/240	24, 48, 80	—	—	42,000	—	5000	5000	5000	V4-T1-13
HBAX	B	15-100	3	240	—	—	—	—	42,000	—	—	—	V4-T1-13
HBAW	B	15-30	1	120/240	24, 48, 62.5	15a	—	65,000	—	5000	④	—	V4-T1-13
HBAW	B	15-30	2	120/240	24, 48, 80	15a	—	65,000	—	5000	5000	5000	V4-T1-13
HBAW	B	15-20	3	240	—	15b	—	—	65,000	—	—	—	V4-T1-13
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QBGFT	B, GF	15-50	2	120/240	—	10a, 11a, 12a	—	10,000	—	—	—	—	V4-T1-17
QBHGFT	B, GF	15-30	1	120	—	10a, 11a, 12a	22,000	—	—	—	—	—	V4-T1-17
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QBHGFEP	B, GFEP	15-30	2	120/240	—	—	22,000	22,000	—	—	—	—	V4-T1-17
QC	C	10-70	1	120/240	24, 48, 62.5	10a, 11a, 12a	—	10,000	—	5000	④	—	V4-T1-40
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QCD	C	10-100	2, 3	240	24, 48, 62.5	—	—	10,000	—	3000	3000	—	V4-T1-22
QCF	C	10-60	1, 2	120/240	24, 48, 62.5	—	10,000	10,000	—	3000	3000	—	V4-T1-41

#### Notes

① QUICKLAG circuit breakers are suitable for application in relative humidity 0-95% noncondensing.

② Two-pole DC interrupting ratings based on two poles connected in series. Not UL listed.

③ Breakers at DC ratings are not UL listed.

④ 62.5 Vac interrupting rating is 3800 AIC 10-50A and 2500 AIC 55-100A continuous.

Circuit Breaker Type Codes: **P** Plug-In; **B** Bolt-On; **C** Cable-In/Cable-Out; **GF** Ground Fault, 5 mA; **GFEP** Ground Fault, 30 mA.

For Types GHBS, GBHS and BABRP solenoid-operated, remote-controlled circuit breakers, see **Pages V4-T1-30 to V4-T1-35**.

## Eaton's QUICKLAG Industrial Circuit Breakers ① Plug-In, Bolt-On, Cable-In/Cable-Out, continued

Circuit Breaker Type	Circuit Breaker Type Code	Continuous Ampere Rating at 40°C	Number of Poles	Vac			Federal Spec. W-C-375b	Interrupting Ratings rms Symmetrical Amperes						Page Number
				Vac	Vdc	Vdc		Vac Ratings			Vdc Ratings ②			
							120	120/240	240	24-48	62.5	80		
QCF	C	15-20	1, 2	120/240	24, 48, 62.5	—	22,000	—	—	3000	3000	—	V4-T1-26	
QCF	C	15-30	2, 3	240	24, 48, 62.5	—	—	10,000	—	3000	3000	—	V4-T1-26	
QCR	C	10-60	1, 2	120/240	24, 48, 62.5	—	10,000	10,000	—	3000	3000	—	V4-T1-26	
QCR	C	15-20	1, 2	120/240	24, 48, 62.5	—	22,000	—	—	3000	3000	—	V4-T1-26	
QCR	C	15-30	2, 3	240	24, 48, 62.5	—	—	10,000	—	3000	3000	—	V4-T1-26	
QCHW	C	15-70	1	120/240	24, 48, 62.5	14a	—	22,000	—	5000	③	—	V4-T1-21	
QCHW	C	15-100	2	120/240	24, 48, 80	14a	—	22,000	—	5000	5000	5000	V4-T1-21	
QCHW	C	15-100	2, 3	240	—	14b	—	—	22,000	—	—	—	V4-T1-21	
QHCX	C	15-70	1	120/240	24, 48, 62.5	—	—	42,000	—	5000	③	—	V4-T1-21	
QHCX	C	15-100	2	120/240	24, 48, 80	—	—	42,000	—	5000	5000	5000	V4-T1-21	
QHCX	C	15-100	3	240	—	—	—	—	42,000	—	—	—	V4-T1-21	
QHCW	C	15-30	1	120/240	24, 48, 62.5	15a	—	65,000	—	5000	③	—	V4-T1-21	
QHCW	C	15-30	2	120/240	24, 48, 80	15a	—	65,000	—	5000	5000	5000	V4-T1-21	
QHCW	C	15-20	3	240	—	15b	—	—	65,000	—	—	—	V4-T1-21	
QCGFT	C, GF	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-28	
QCGFT	C, GF	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-28	
QCHGFT	C, GF	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-28	
QCHGFT	C, GF	15-30	2	120/240	—	—	—	22,000	—	—	—	—	V4-T1-28	
QCGFEP	C, GFEP	15-40	1	120	—	—	10,000	—	—	—	—	—	V4-T1-28	
QCGFEP	C, GFEP	15-50	2	120/240	—	—	—	10,000	—	—	—	—	V4-T1-28	
QCHGFEP	C, GFEP	15-30	1	120	—	—	22,000	—	—	—	—	—	V4-T1-28	
QCHGFEP	C, GFEP	15-30	2	120/240	—	—	—	22,000	—	—	—	—	V4-T1-28	

**Notes**

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**QUICKLAG Type HQP Single-Pole**



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### QUICKLAG Plug-On Types HQP, QPHW, QHPX, QHPW

#### Product Description

- All products 15–100A are HACR rated
- Switching duty rated for 120 Vac fluorescent light applications

#### Standards and Certifications

- Built and listed to UL 489
- All products UL and CSA® listed





#### Product Selection

**QUICKLAG Type HQP Single-Pole**



#### QUICKLAG Type: HQP 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac Catalog Number	240 Vac Catalog Number
10	HQP1010	HQP2010	—	HQP3010H ③
15	HQP1015 ①②	HQP2015	HQP2015H	HQP3015H
20	HQP1020 ①②	HQP2020	HQP2020H	HQP3020H
25	HQP1025	HQP2025	HQP2025H	HQP3025H
30	HQP1030	HQP2030	HQP2030H	HQP3030H
35	HQP1035	HQP2035	HQP2035H	HQP3035H
40	HQP1040	HQP2040	HQP2040H	HQP3040H
45	HQP1045	HQP2045	HQP2045H	HQP3045H
50	HQP1050	HQP2050	HQP2050H	HQP3050H
55	HQP1055	HQP2055	HQP2055H	HQP3055H
60	HQP1060	HQP2060	HQP2060H	HQP3060H
70	HQP1070	HQP2070	HQP2070H	HQP3070H
80	—	HQP2080	HQP2080H	HQP3080H
90	—	HQP2090	HQP2090H	HQP3090H
100	HQP1100	HQP2100	HQP2100H	HQP3100H
110	—	HQP2110	—	—
125	—	HQP2125	—	—
150	—	HQP2150	—	—

#### QUICKLAG Type: HQP Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac Catalog Number	240 Vac Catalog Number
50	HQP1050N	—	HQP2050N	HQP3050N
60	HQP1060N	—	HQP2060N	HQP3060N
100	HQP1100N	—	HQP2100N	HQP3100N

#### QUICKLAG Type: QPHW 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole	Two-Pole	Three-Pole
	120/240 Vac Catalog Number	120/240 Vac Catalog Number	240 Vac Catalog Number	240 Vac Catalog Number
15	QPHW1015 ①	QPHW2015	QPHW2015H	QPHW3015H
20	QPHW1020 ①	QPHW2020	QPHW2020H	QPHW3020H
25	QPHW1025	QPHW2025	QPHW2025H	QPHW3025H
30	QPHW1030	QPHW2030	QPHW2030H	QPHW3030H
35	QPHW1035	QPHW2035	QPHW2035H	QPHW3035H
40	QPHW1040	QPHW2040	QPHW2040H	QPHW3040H
45	QPHW1045	QPHW2045	QPHW2045H	QPHW3045H
50	QPHW1050	QPHW2050	QPHW2050H	QPHW3050H
55	QPHW1055	QPHW2055	QPHW2055H	QPHW3055H
60	QPHW1060	QPHW2060	QPHW2060H	QPHW3060H
70	QPHW1070	QPHW2070	QPHW2070H	QPHW3070H
80	—	QPHW2080	QPHW2080H	QPHW3080H
90	—	QPHW2090	QPHW2090H	QPHW3090H
100	—	QPHW2100	QPHW2100H	QPHW3100H
110	—	QPHW2110	—	—
125	—	QPHW2125	—	—

**Notes**

- ① Switching duty rated for 120 Vac fluorescent light applications.
- ② For special low-magnetic breaker, order **HQP1015L1** or **HQP1020L1**.
- ③ Not UL listed.

### QUICKLAG Type: QHPX 42,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QHPX1015 ①	QHPX2015	—	QHPX3015H
20	QHPX1020 ①	QHPX2020	—	QHPX3020H
25	QHPX1025	QHPX2025	—	QHPX3025H
30	QHPX1030	QHPX2030	—	QHPX3030H
35	QHPX1035	QHPX2035	—	QHPX3035H
40	QHPX1040	QHPX2040	—	QHPX3040H
45	QHPX1045	QHPX2045	—	QHPX3045H
50	QHPX1050	QHPX2050	—	QHPX3050H
55	QHPX1055	QHPX2055	—	QHPX3055H
60	QHPX1060	QHPX2060	—	QHPX3060H
70	QHPX1070	QHPX2070	—	QHPX3070H
80	—	QHPX2080	—	QHPX3080H
90	—	QHPX2090	—	QHPX3090H
100	—	QHPX2100	—	QHPX3100H

### QUICKLAG Type: QHPW 65,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QHPW1015 ①	QHPW2015	—	QHPW3015H
20	QHPW1020 ①	QHPW2020	—	QHPW3020H
25	QHPW1025	QHPW2025	—	—
30	QHPW1030	QHPW2030	—	—

### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)

### Note

① Switching duty rated for 120 Vac fluorescent light applications.

**QUICKLAG Type QPGFT Single-Pole Ground Fault Circuit Breaker**



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**QUICKLAG Plug-On Ground Fault and Equipment Protectors, Types QPGFT, QPHGFT, QPGFEP, QPHGFEP**

**Product Description**

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- 5 mA trip sensitivity

**QUICKLAG Ground Fault Equipment Protectors**

- 30 mA trip sensitivity

**Standards and Certifications**

- Built and listed to UL 489

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- Built and tested to UL 943

**QUICKLAG Ground Fault Equipment Protectors**

- Built and listed to UL 1053





### Product Selection

**QUICKLAG Type QPGFT Single-Pole**



#### Ground Fault Circuit Breakers—5 mA Sensitivity QUICKLAG Type: QPGFT 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QPGFT1015	QPGFT2015
20	QPGFT1020	QPGFT2020
25	QPGFT1025	QPGFT2025
30	QPGFT1030	QPGFT2030
40	QPGFT1040	QPGFT2040
50	—	QPGFT2050

#### Ground Fault Circuit Breakers—5 mA Sensitivity QUICKLAG Type: QPHGF 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QPHGF1015	QPHGF2015
20	QPHGF1020	QPHGF2020
25	QPHGF1025	QPHGF2025
30	QPHGF1030	QPHGF2030

#### Ground Fault Equipment Breakers—30 mA Sensitivity QUICKLAG Type: QPGFEP 10,000 Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QPGFEP1015	QPGFEP2015
20	QPGFEP1020	QPGFEP2020
25	QPGFEP1025	QPGFEP2025
30	QPGFEP1030	QPGFEP2030
40	QPGFEP1040	QPGFEP2040
50	—	QPGFEP2050

#### Ground Fault Equipment Breakers—30 mA Sensitivity QUICKLAG Type: QPHGFEP 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QPHGFEP1015	QPHGFEP2015
20	QPHGFEP1020	QPHGFEP2020
25	QPHGFEP1025	QPHGFEP2025
30	QPHGFEP1030	QPHGFEP2030

### Special Application Ground Fault Circuit Protectors—5 mA Sensitivity QUICKLAG Type: QPGFT 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPGFT1015W1	QPGFT2015W1
20	QPGFT1020W1	QPGFT2020W1
25	QPGFT1025W1	QPGFT2025W1
30	QPGFT1030W1	QPGFT2030W1
40	—	QPGFT2040W1
50	—	QPGFT2050W1
15	QPGFT1015W2	—
20	QPGFT1020W2	—
25	QPGFT1025W2	—
30	QPGFT1030W2	—

### Special Application Ground Fault Circuit Protectors—30 mA Sensitivity QUICKLAG Type: QPGFEP 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole	Two-Pole
	120 Vac Catalog Number	120/240 Vac Catalog Number
15	QPGFEP1015W1	QPGFEP2015W1
20	QPGFEP1020W1	QPGFEP2020W1
25	QPGFEP1025W1	QPGFEP2025W1
30	QPGFEP1030W1	QPGFEP2030W1
40	—	QPGFEP2040W1
50	—	QPGFEP2050W1
15	QPGFEP1015W2	—
20	QPGFEP1020W2	—
25	QPGFEP1025W2	—
30	QPGFEP1030W2	—

## Wiring Diagram

### Bell Alarm and Auxiliary Contact Schematic



Single-throw double-pole contacts are UL and CSA listed for 5A at 250 Vac.  
 Bell Alarm (W1)—contacts change state when breaker trips.  
 Auxiliary Switch (W2)—contacts change state when breaker is opened (or tripped) or closed.  
 14-inch (355.6 mm) long 18 AWG pigtail wire leads provided.

## Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
2	5	5.00 (2.3)	15.50 x 6.00 x 4.50 (393.7 x 152.4 x 114.3)

#### Note

Shipped individually or in carton quantities.

**QUICKLAG Type BAB Single-Pole**



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### Bolt-On Types BAB, QBHW, HBAX, HBAW

#### Product Description

- All products 15–100A are HACR rated
- Switching duty rated for 120 Vac fluorescent light applications

#### Standards and Certifications

- Built and listed to UL 489
- All products UL and CSA listed



## Product Selection

**QUICKLAG Type BAB**  
Single-Pole



### QUICKLAG Type: BA 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
10	BAB1010	BAB2010	BAB2010H <sup>③</sup>	BAB3010H <sup>③</sup>
15	BAB1015 <sup>①②</sup>	BAB2015	BAB2015H	BAB3015H
20	BAB1020 <sup>①②</sup>	BAB2020	BAB2020H	BAB3020H
25	BAB1025	BAB2025	BAB2025H	BAB3025H
30	BAB1030	BAB2030	BAB2030H	BAB3030H
35	BAB1035	BAB2035	BAB2035H	BAB3035H
40	BAB1040	BAB2040	BAB2040H	BAB3040H
45	BAB1045	BAB2045	BAB2045H	BAB3045H
50	BAB1050	BAB2050	BAB2050H	BAB3050H
55	BAB1055	BAB2055	BAB2055H	BAB3055H
60	BAB1060	BAB2060	BAB2060H	BAB3060H
70	BAB1070	BAB2070	BAB2070H	BAB3070H
80	—	BAB2080	BAB2080H	BAB3080H
90	—	BAB2090	BAB2090H	BAB3090H
100	BAB1100	BAB2100	BAB2100H	BAB3100H
110	—	BAB2110	—	—
125	—	BAB2125	—	—

### QUICKLAG Type: BA Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
50	BAB1050N	—	BAB2050N	BAB3050N
60	BAB1060N	—	BAB2060N	BAB3060N
100	BAB1100N	—	BAB2100N	BAB3100N

### QUICKLAG Type: QBHW 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	QBHW1015 <sup>①</sup>	QBHW2015	QBHW2015H	QBHW3015H
20	QBHW1020 <sup>①</sup>	QBHW2020	QBHW2020H	QBHW3020H
25	QBHW1025	QBHW2025	QBHW2025H	QBHW3025H
30	QBHW1030	QBHW2030	QBHW2030H	QBHW3030H
35	QBHW1035	QBHW2035	QBHW2035H	QBHW3035H
40	QBHW1040	QBHW2040	QBHW2040H	QBHW3040H
45	QBHW1045	QBHW2045	QBHW2045H	QBHW3045H
50	QBHW1050	QBHW2050	QBHW2050H	QBHW3050H
55	QBHW1055	QBHW2055	QBHW2055H	QBHW3055H
60	QBHW1060	QBHW2060	QBHW2060H	QBHW3060H
70	QBHW1070	QBHW2070	QBHW2070H	QBHW3070H
80	—	QBHW2080	QBHW2080H	QBHW3080H
90	—	QBHW2090	QBHW2090H	QBHW3090H
100	—	QBHW2100	QBHW2100H	QBHW3100H
110	—	QBHW2110	—	—
125	—	QBHW2125	—	—

#### Notes

- ① Switching duty rated for 120 Vac fluorescent light applications.
- ② For special low-magnetic breaker, order **BAB1015L1** or **BAB1020L1**.
- ③ Not UL listed.

### QUICKLAG Type: HBAX 42,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	HBAX1015 ①	HBAX2015	—	HBAX3015H
20	HBAX1020 ①	HBAX2020	—	HBAX3020H
25	HBAX1025	HBAX2025	—	HBAX3025H
30	HBAX1030	HBAX2030	—	HBAX3030H
35	HBAX1035	HBAX2035	—	HBAX3035H
40	HBAX1040	HBAX2040	—	HBAX3040H
45	HBAX1045	HBAX2045	—	HBAX3045H
50	HBAX1050	HBAX2050	—	HBAX3050H
55	HBAX1055	HBAX2055	—	HBAX3055H
60	HBAX1060	HBAX2060	—	HBAX3060H
70	HBAX1070	HBAX2070	—	HBAX3070H
80	—	HBAX2080	—	HBAX3080H
80	—	HBAX2080	—	HBAX3080H
90	—	HBAX2090	—	HBAX3090H
100	—	HBAX2100	—	HBAX3100H

### QUICKLAG Type: HBAW 65,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
15	HBAW1015 ①	HBAW2015	—	HBAW3015H
20	HBAW1020 ①	HBAW2020	—	HBAW3020H
25	HBAW1025	HBAW2025	—	—
30	HBAW1030	HBAW2030	—	—

### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)

### Note

① Switching duty rated for 120 Vac fluorescent light applications.

**Bolt-On Arc Fault Circuit Interrupter QUICKLAG Types QBAF, QBCAF**



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### Bolt-On Arc Fault Circuit Interrupter Types QBAF, QBCAF

#### Product Description

- All products HACR rated

#### Features, Benefits and Functions

- 10 and 22 kAIC rating at 120V and 120/240V
- Single-pole AFCI
- HID ratings for HID (High Intensity Discharge) lighting
- All models are HACR rated

#### Standards and Certifications

- Built and listed to UL 489
- UL File E7819 for QBAF



### Product Selection

#### QBACAF and QBAF Type AFCIs

Effective immediately, Eaton AFCIs are available for use in Sumter panels with a 22 kAIC rating. This higher rated breaker will allow us to win jobs where AFCIs are specified at higher than 10 kAIC. This breaker provides standard thermal-

magnetic protection of branch circuits. This product will have the same form, fit and function of the current bolt-on AFCI (QBACAF and QBAF Type). Product scope is below. These breakers are in Bid Manager™ for Pow-R-Line 1a, Pow-R-Line 1a-LX,

Pow-R-Line 3a and Pow-R-Line 4a panelboards. For series rated combinations, continue to use the less expensive 10 kAIC QBACAF and QBAF offerings.

Breakers can also be ordered from Vista.

#### QBHCAF

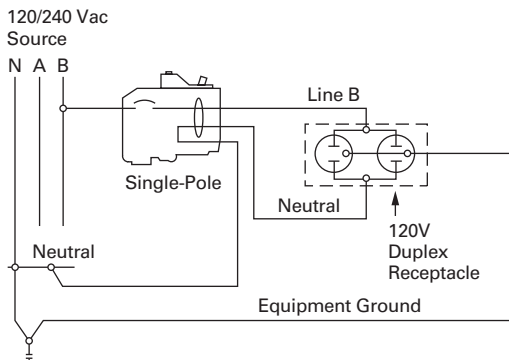


#### 1-Inch (25.4 mm) Wide Bolt-On Arc Fault Circuit Interrupter

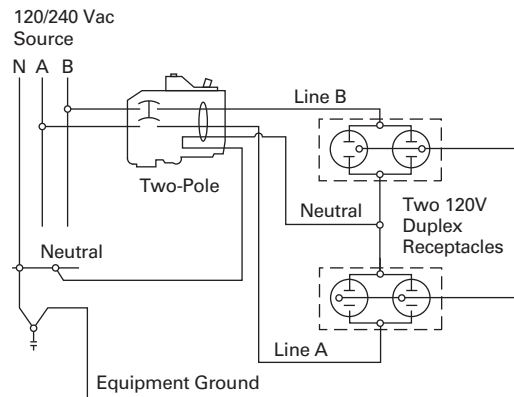
Poles	kAIC Rating	Ampere Rating	Configuration	Catalog Number
<b>Type QBACAF Combination AFCI</b>				
Single-pole	10 kAIC	15	Combination AFCI	<b>QB1015CAF</b>
		20	Combination AFCI	<b>QB1020CAF</b>
	22 kAIC	15	Combination AFCI	<b>QBH1015CAF</b>
		20	Combination AFCI	<b>QBH1020CAF</b>

### Wiring Diagrams

#### Single-Pole 120V Load Application Sourced by 120/240 Vac



#### Single-Pole Shared Neutral with Multi-Duplex Receptacle Application





**QUICKLAG Type QBGFT Single-Pole Ground Fault Circuit Breaker**



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### Bolt-On Ground Fault and Equipment Protectors, Types QBGFT, QBHGFT, QBGFEP, QBHGFEP

**Product Description**

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- 5 mA trip sensitivity

**QUICKLAG Ground Fault Equipment Protectors**

- 30 mA trip sensitivity

**Standards and Certifications**

- Built and tested to UL 489

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- Built and tested to UL 943

**QUICKLAG Ground Fault Equipment Protectors**

- Built and tested to UL 1053



## Product Selection

**QUICKLAG Type QBGFT Single-Pole**



### Ground Fault Circuit Breakers—5 mA Sensitivity QUICKLAG Type: QBGFT 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QB1015GF	QBGFT2015
20	QB1020GF	QBGFT2020
25	QB1025GF	QBGFT2025
30	QB1030GF	QBGFT2030
40	QB1040GF	QBGFT2040
50	—	QBGFT2050

### Ground Fault Circuit Breakers—5 mA Sensitivity QUICKLAG Type: QBHGF 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QBH1015GF	QBHGF2015
20	QBH1020GF	QBHGF2020
25	QBH1025GF	QBHGF2025
30	QBH1030GF	QBHGF2030

### Ground Fault Equipment Breakers—30 mA Sensitivity QUICKLAG Type: QBGFEP 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QB1015EP	QBGFEP2015
20	QB1020EP	QBGFEP2020
25	QB1025EP	QBGFEP2025
30	QB1030EP	QBGFEP2030
40	QB1040EP	QBGFEP2040
50	—	QBGFEP2050

### Ground Fault Equipment Breakers—30 mA Sensitivity QUICKLAG Type: QBHGFEP 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
15	QBH1015EP	QBHGFEP2015
20	QBH1020EP	QBHGFEP2020
25	QBH1025EP	QBHGFEP2025
30	QBH1030EP	QBHGFEP2030

### Special Application Ground Fault Circuit Protectors—5 mA Sensitivity QUICKLAG Type: QBGFT 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac	Two-Pole 120/240 Vac
	Catalog Number	Catalog Number
15	QBGFT1015W1	QBGFT2015W1
20	QBGFT1020W1	QBGFT2020W1
25	QBGFT1025W1	QBGFT2025W1
30	QBGFT1030W1	QBGFT2030W1
40	—	QBGFT2040W1
50	—	QBGFT2050W1
15	QBGFT1015W2	—
20	QBGFT1020W2	—
25	QBGFT1025W2	—
30	QBGFT1030W2	—

### Special Application Ground Fault Circuit Protectors—30 mA Sensitivity QUICKLAG Type: QBGFEP 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac	Two-Pole 120/240 Vac
	Catalog Number	Catalog Number
15	QBGFEP1015W1	QBGFEP2015W1
20	QBGFEP1020W1	QBGFEP2020W1
25	QBGFEP1025W1	QBGFEP2025W1
30	QBGFEP1030W1	QBGFEP2030W1
40	—	QBGFEP2040W1
50	—	QBGFEP2050W1
15	QBGFEP1015W2	—
20	QBGFEP1020W2	—
25	QBGFEP1025W2	—
30	QBGFEP1030W2	—

## Wiring Diagram

### Bell Alarm and Auxiliary Contact Schematic



Single-throw double-pole contacts are UL and CSA listed for 5A at 250 Vac.  
 Bell Alarm (W1)—contacts change state when breaker trips.  
 Auxiliary Switch (W2)—contacts change state when breaker is opened (or tripped) or closed.  
 14-inch (355.6 mm) long 18 AWG pigtail wire leads provided.

## Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Number of Poles	Approximate Weight Lbs (kg)	Dimensions
1	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
2	5.00 (2.3)	15.50 x 6.00 x 4.50 (393.7 x 152.4 x 114.3)

#### Note

Shipped individually or in carton quantities.

**QUICKLAG Type QC Single-Pole**



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### Cable-In/Cable-Out Types QC, QCD, QCHW, QHCX, QHCW

#### Product Description

- All products 10–100A are HACR rated
- Switching duty rated for 120 Vac fluorescent light applications only

#### Standards and Certifications

- Built and listed to UL 489
- All products UL and CSA listed



## Product Selection

QUICKLAG  
Type QC Single-Pole

## QUICKLAG Type: QC 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
5	QC1005 <sup>①</sup>	QC2005 <sup>①</sup>	—	—	—
10	QC1010	QC2010	QC2010H <sup>①</sup>	QC3010H <sup>①</sup>	—
15	QC1015 <sup>②</sup>	QC2015	QC2015H	QC3015H	QC4015H
20	QC1020 <sup>②</sup>	QC2020	QC2020H	QC3020H	QC4020H
25	QC1025	QC2025	QC2025H	QC3025H	QC4025H
30	QC1030	QC2030	QC2030H	QC3030H	QC4030H
35	QC1035	QC2035	QC2035H	QC3035H	QC4035H
40	QC1040	QC2040	QC2040H	QC3040H	QC4040H
45	QC1045	QC2045	QC2045H	QC3045H	QC4045H
50	QC1050	QC2050	QC2050H	QC3050H	QC4050H
55	QC1055	QC2055	QC2055H	QC3055H	QC4055H
60	QC1060	QC2060	QC2060H	QC3060H	QC4060H
70	QC1070	QC2070	QC2070H	QC3070H	QC4070H
70	—	QC2080	QC2080H	QC3080H	QC4080H
90	—	QC2090	QC2090H	QC3090H	QC4090H
100	QC1100	QC2100	QC2100H	QC3100H	QC4100H

## QUICKLAG Type: QC Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
50	QC1050N	—	QC2050N	QC3050N	—
60	QC1060N	—	QC2060N	QC3060N	—
100	QC1100N	—	QC2100N	QC3100N	—

**Notes**

① Not UL listed.

② Switching duty rated for 120 Vac fluorescent light applications only.

For special low-magnetic breaker, order **QC1015L1** or **QC1020L1**. Non-automatic switches, see **Page V4-T1-41**.

### QUICKLAG Type: QCHW 22,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
15	QCHW1015 ①	QCHW2015	QCHW2015H	QCHW3015H	QCHW4015H
20	QCHW1020 ①	QCHW2020	QCHW2020H	QCHW3020H	QCHW4020H
25	QCHW1025	QCHW2025	QCHW2025H	QCHW3025H	QCHW4025H
30	QCHW1030	QCHW2030	QCHW2030H	QCHW3030H	QCHW4030H
35	QCHW1035	QCHW2035	QCHW2035H	QCHW3035H	QCHW4035H
40	QCHW1040	QCHW2040	QCHW2040H	QCHW3040H	QCHW4040H
45	QCHW1045	QCHW2045	QCHW2045H	QCHW3045H	QCHW4045H
50	QCHW1050	QCHW2050	QCHW2050H	QCHW3050H	QCHW4050H
55	QCHW1055	QCHW2055	QCHW2055H	QCHW3055H	QCHW4055H
60	QCHW1060	QCHW2060	QCHW2060H	QCHW3060H	QCHW4060H
70	QCHW1070	QCHW2070	QCHW2070H	QCHW3070H	QCHW4070H
70	—	QCHW2080	QCHW2080H	QCHW3080H	QCHW4080H
90	—	QCHW2090	QCHW2090H	QCHW3090H	QCHW4090H
100	—	QCHW2100	QCHW2100H	QCHW3100H	QCHW4100H

### QUICKLAG Type: QHCX 42,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
15	QHCX1015 ①	QHCX2015	—	QHCX3015H	—
20	QHCX1020 ①	QHCX2020	—	QHCX3020H	—
25	QHCX1025	QHCX2025	—	QHCX3025H	—
30	QHCX1030	QHCX2030	—	QHCX3030H	—
35	QHCX1035	QHCX2035	—	QHCX3035H	—
40	QHCX1040	QHCX2040	—	QHCX3040H	—
45	QHCX1045	QHCX2045	—	QHCX3045H	—
50	QHCX1050	QHCX2050	—	QHCX3050H	—
55	QHCX1055	QHCX2055	—	QHCX3055H	—
60	QHCX1060	QHCX2060	—	QHCX3060H	—
70	QHCX1070	QHCX2070	—	QHCX3070H	—
70	—	QHCX2080	—	QHCX3080H	—
90	—	QHCX2090	—	QHCX3090H	—
100	—	QHCX2100	—	QHCX3100H	—

### QUICKLAG Type: QHCW 65,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number	Four-Pole 240 Vac Catalog Number
15	QHCW1015 ①	QHCW2015	—	QHCW3015H	—
20	QHCW1020 ①	QHCW2020	—	QHCW3020H	—
25	QHCW1025	QHCW2025	—	—	—
30	QHCW1030	QHCW2030	—	—	—

**Notes**

① Switching duty rated for 120 Vac fluorescent light applications only.

Non-automatic switches, see **Page V4-T1-41**.

# 1.1

## Miniature Circuit Breakers and Supplementary Protectors

### Industrial Circuit Breakers

1

#### QUICKLAG Type QCD Miniature Circuit Breakers

QCD breakers are used primarily in HVAC and industrial applications.

- Single-, two- and three-pole options
- Modular construction
- DIN mounted (symmetrical rail 35 x 7.5 DIN/EN 50 022)
- QCD same profile as Type QCR
- Flexible power feed connection: wire size, position
- Same breaker size for entire rating range
- Field mountable accessories: finger shroud proof, quick connect terminals
- Other accessories: jumper unit

#### QUICKLAG Type QCD Miniature Circuit Breaker



#### QUICKLAG Type QCD 10,000A Interrupting Capacity Thermal-Magnetic Breakers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
10	QCD1010	QCD2010	—	—
15	QCD1015	QCD2015	QCD2015H	QCD3015H
20	QCD1020	QCD2020	QCD2020H	QCD3020H
25	QCD1025	QCD2025	QCD2025H	QCD3025H
30	QCD1030	QCD2030	QCD2030H	QCD3030H
35	QCD1035	QCD2035	QCD2035H	QCD3035H
40	QCD1040	QCD2040	QCD2040H	QCD3040H
45	QCD1045	QCD2045	QCD2045H	QCD3045H
50	QCD1050	QCD2050	QCD2050H	QCD3050H
55	QCD1055	QCD2055	QCD2055H	QCD3055H
60	QCD1060	QCD2060	QCD2060H	QCD3060H
70	—	QCD2070	QCD2070H	QCD3070H
80	—	QCD2080	QCD2080H	QCD3080H
90	—	QCD2090	QCD2090H	QCD3090H
100	—	QCD2090	QCD2090H	QCD3100H
	—	QCD2100	QCD2100H	—

#### QUICKLAG Type QCD Non-Automatic Switches

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
60	—	—	QCD2060NA	—
100	—	—	—	—

#### Dimensions

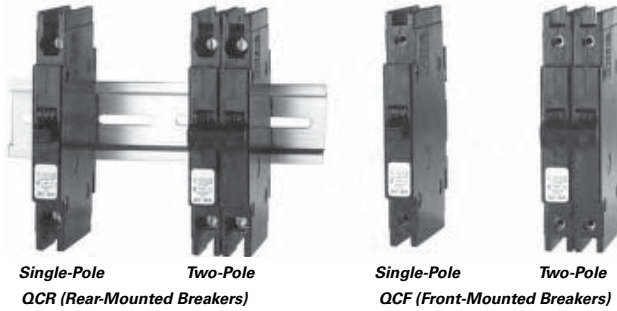
Approximate Dimensions in Inches (mm)

#### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)



### Cable-In/Cable-Out, 1/2-Inch Wide, Types QCR, QCF, QCRH, QCFH



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Solenoid-Operated, Remote-Controlled Latching Types BABRP, BABRSP, BRRP and CLRP . . . . .	<b>V4-T1-33</b>
Solenoid Operator—Remote Controlled Latching for Type GHBS, GBHS and GHQRSP Breakers . . . . .	<b>V4-T1-36</b>
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### Cable-In/Cable-Out, 1/2-Inch Wide, Types QCR, QCF, QCRH, QCFH

#### Product Description

Eaton Type QCR circuit breakers have as a standard feature provisions for 35 mm DIN rail rear mounting with a spring-loaded release. Optional clips for individual mounting are available as a separate accessory.

Type QCF have two threaded steel inserts to facilitate front mounting with #6–32 steel screws. The clamp type terminals are accessible from the rear of the breaker so that cables can be accessed without removal of the breaker from the front cover.

#### Application Description

QCR and QCF circuit breakers are only 1/2-inch (12.7 mm) wide per pole and are excellent for general purpose industrial applications where space savings is required.

#### Features, Benefits and Functions

- 1/2-inch (12.7 mm) wide per pole
- Cable-in/cable-out
- Black cases with black handles
- Three position handle: ON, Tripped (center), OFF
- Thermal-magnetic protection

#### Standards and Certifications

- Built and listed to UL 489
- UL File No. E7819
- CSA File No. LR48907
- Type QCR and QCF circuit breakers are UL listed circuit breakers that are suitable for use as branch circuit protectors
- All ratings 15–60A are HACR rated



## Product Selection

Cable-In/Cable-Out,  
1/2-Inch Wide



### QCR Breaker Catalog Numbers <sup>①②③④</sup>

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac <sup>⑤</sup> Catalog Number	Three-Pole Catalog Number
<b>QCR Breaker 10 kAIC Interrupting Ratings</b>				
10	QCR1010	QCR2010	—	—
	QCR1010T	QCR2010T	—	—
	—	QCR2010P	—	—
15	QCR1015 <sup>⑥</sup>	QCR2015	QCR2015H	QCR3015H
	QCR1015T <sup>⑥</sup>	QCR2015T	QCR2015HT	QCR3015HT
	—	QCR2015P	—	—
20	QCR1020 <sup>⑥</sup>	QCR2020	QCR2020H	QCR3020H
	QCR1020T <sup>⑥</sup>	QCR2020T	QCR2020HT	QCR3020HT
	—	QCR2020P	—	—
25	QCR1025	QCR2025	QCR2025H	QCR3025H
	QCR1025T	QCR2025T	QCR2025HT	QCR3025HT
	—	QCR2025P	—	—
30	QCR1030	QCR2030	QCR2030H	QCR3030H
	QCR1030T	QCR2030T	QCR2030HT	QCR3030HT
	—	QCR2030P	—	—
35	QCR1035	QCR2035	—	—
	—	QCR2035P	—	—
40	QCR1040	QCR2040	—	—
	—	QCR2040P	—	—
45	QCR1045	QCR2045	—	—
	—	QCR2045P	—	—
50	QCR1050	QCR2050	—	—
	—	QCR2050P	—	—
55	QCR1055	QCR2055	—	—
	—	QCR2055P	—	—
60 <sup>⑦</sup>	QCR1060	QCR2060	—	—
	—	QCR2060P	—	—
<b>QCR Breaker 22 kAIC Interrupting Ratings</b>				
15	QCRH1015 <sup>⑥</sup>	QCRH2015	—	—
	QCRH1015T <sup>⑥</sup>	QCRH2015T	—	—
20	QCRH1020 <sup>⑥</sup>	QCRH2020	—	—
	QCRH1020T <sup>⑥</sup>	QCRH2020T	—	—

#### Notes

- ① Standard breaker terminals are box type lugs.
- ② Breakers with **T** Catalog Number Suffix are suitable for line and load side ring terminal connection (#10–32 plus/minus terminal screw provided).
- ③ Breakers with **P** Catalog Number Suffix are suitable for terminating two 10 AWG Quick-Connect Type Terminals per phase on breaker load side.
- ④ Breakers with Shunt Trip (extra pole required on breaker right-hand side) are available on single-, two- and three-pole. Contact the Customer Support Center at 1-800-356-1243.
- ⑤ Breakers with **H** Catalog Suffix have 240 Vac construction.
- ⑥ All 15 and 20A single-pole breakers are SWD (Switching Duty) rated for fluorescent lighting applications.
- ⑦ 60/75°C Cu/Al wire on all ratings except 60A, which requires Cu only conductor.

Cable-In/Cable-Out,  
1/2-Inch Wide



### QCF Breaker Catalog Numbers <sup>①②③</sup>

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac <sup>④</sup> Catalog Number	Three-Pole Catalog Number
<b>QCF Breaker 10 kAIC Interrupting Ratings</b>				
10	QCF1010	QCF2010	—	—
	QCF1010T	QCF2010T	—	—
15	QCF1015 <sup>⑤</sup>	QCF2015	QCF2015H	QCF3015H
	QCF1015T <sup>⑤</sup>	QCF2015T	QCF2015HT	QCF3015HT
20	QCF1020 <sup>⑤</sup>	QCF2020	QCF2020H	QCF3020H
	QCF1020T <sup>⑤</sup>	QCF2020T	QCF2020HT	QCF3020HT
25	QCF1025	QCF2025	QCF2025H	QCF3025H
	QCF1025T	QCF2025T	QCF2025HT	QCF3025HT
30	QCF1030	QCF2030	QCF2030H	QCF3030H
	QCF1030T	QCF2030T	QCF2030HT	QCF3030HT
35	QCF1035	QCF2035	—	—
40	QCF1040	QCF2040	—	—
45	QCF1045	QCF2045	—	—
50	QCF1050	QCF2050	—	—
55	QCF1055	QCF2055	—	—
60 <sup>⑥</sup>	QCF1060	QCF2060	—	—
<b>QCF Breaker 22 kAIC Interrupting Ratings</b>				
15	QCFH1015 <sup>⑤</sup>	QCFH2015	—	—
	QCFH1015T <sup>⑤</sup>	QCFH2015T	—	—
20	QCFH1020 <sup>⑤</sup>	QCFH2020	—	—
	QCFH1020T <sup>⑤</sup>	QCFH2020T	—	—

#### Notes

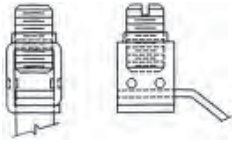
- ① Standard breaker terminals are box type lugs.
- ② Breakers with **T** Catalog Number Suffix are suitable for line and load side ring terminal connection (#10–32 plus/minus terminal screw provided).
- ③ Breakers with Shunt Trip Attachment (extra pole required on breaker right-hand side) are available. Contact the Customer Support Center.
- ④ Breakers with **H** Catalog Suffix have 240 Vac construction.
- ⑤ All 15 and 20A single-pole breakers are SWD (Switching Duty) rated for fluorescent lighting applications.
- ⑥ 60/75°C Cu/Al wire on all ratings except 60A, which requires Cu only conductor.

#### QCR and QCF Options and Accessories

##### QCR and QCF Standard Box Terminals

Factory-installed line and load side breaker terminal to accommodate 14 AWG to 4 AWG wire.

##### Standard Box Terminals



##### QCR Quick-Connect Terminals

Factory-installed two-prong quick-connect terminal on breaker load side suitable for terminating two 10 AWG wire with insulated slip-on terminals as shown. Line side terminal is the standard type.

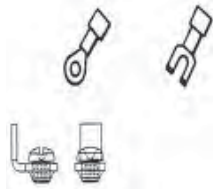
##### Catalog Suffix "P"



##### QCR and QCF Ring or Spade Lug Terminals (10 to 30A Ratings Only)

Factory-installed line and load side terminals each equipped with a #10–32 screw suitable for terminating one 10 AWG wire with insulated ring or spade type terminal as shown.

##### Catalog Suffix "T"



##### Available QCR and QCF Breaker Accessories

Description	Catalog Number
Steel mounting clip mounts QCR breaker if individual mounting is required. Quantity two required for single- and two-pole and four required for three-pole breakers.	<b>QCRMTGFT</b>
Removable padlock device for single-pole QCR or QCF breaker.	<b>QCRFPL1P</b>
Removable padlock device for multi-pole QCR or QCF breaker.	<b>QCRFPLMP</b>
Padlock bracket assembly for QCR or QCF single- or multi-pole breakers (OFF only).	<b>QCRFLOFF</b>
Padlock bracket for QCR, lock-off only.	<b>QCRPLOFF</b>

#### Technical Data and Specifications

- Single-, two- and three-pole
- 10 kAIC at 120/240 Vac, 10–60A
- 22 kAIC at 120/240 Vac, 15–20A
- 10 kAIC at 240 Vac, 10–30A
- 3 kAIC at 62.5 Vdc (single-pole)
- 3 kAIC at 130 Vdc (two poles in series)
- Normal operating environment:
  - 0–40°C
  - 5–95% humidity (noncondensing)

**QUICKLAG Type QCGFT Single-Pole Ground Fault Circuit Breaker**



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### Cable-In/Cable-Out Ground Fault and Equipment Protectors, Types QCGFT, QCHGFT, QCGFEP, QCHGFEP

#### Product Description

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- 5 mA trip sensitivity

**QUICKLAG Ground Fault Equipment Protectors**

- 30 mA trip sensitivity

#### Standards and Certifications

**QUICKLAG Ground Fault Circuit Breakers, Class A GFCI**

- Built and tested to UL 943

**QUICKLAG Ground Fault Equipment Protectors**

- Built and tested to UL 1053



## Product Selection

**QUICKLAG Type QCGFT Single-Pole Ground Fault Circuit Breaker**



### Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Single-Pole 120 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number
<b>Ground Fault Circuit Breakers—5 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGFT 10,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCGFT1015	QCGFT2015
20	QCGFT1020	QCGFT2020
25	QCGFT1025	QCGFT2025
30	QCGFT1030	QCGFT2030
40	QCGFT1040	QCGFT2040
50	—	QCGFT2050
<b>QUICKLAG Type: QCHGFT 22,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCHGFT1015	QCHGFT2015
20	QCHGFT1020	QCHGFT2020
25	QCHGFT1025	QCHGFT2025
30	QCHGFT1030	QCHGFT2030
<b>Ground Fault Equipment Protectors—30 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGFEP 10,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCGFEP1015	QCGFEP2015
20	QCGFEP1020	QCGFEP2020
25	QCGFEP1025	QCGFEP2025
30	QCGFEP1030	QCGFEP2030
40	QCGFEP1040	QCGFEP2040
50	—	QCGFEP2050
<b>QUICKLAG Type: QCHGFEP 22,000A Interrupting Capacity Thermal-Magnetic Breakers</b>		
15	QCHGFEP1015	QCHGFEP2015
20	QCHGFEP1020	QCHGFEP2020
25	QCHGFEP1025	QCHGFEP2025
30	QCHGFEP1030	QCHGFEP2030
<b>Special Application Ground Fault Circuit Protector—5 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGFT 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)</b>		
15	QCGFT1015W1	QCGFT2015W1
20	QCGFT1020W1	QCGFT2020W1
25	QCGFT1025W1	QCGFT2025W1
30	QCGFT1030W1	QCGFT2030W1
40	—	QCGFT2040W1
50	—	QCGFT2050W1
15	QCGFT1015W2	—
20	QCGFT1020W2	—
25	QCGFT1025W2	—
30	QCGFT1030W2	—
<b>Special Application Ground Fault Equipment Protectors—30 mA Sensitivity</b>		
<b>QUICKLAG Type: QCGFEP 10,000A Interrupting Capacity with Bell Alarm (W1) or Auxiliary Switch (W2)</b>		
15	QCGFEP1015W1	QCGFEP2015W1
20	QCGFEP1020W1	QCGFEP2020W1
25	QCGFEP1025W1	QCGFEP2025W1
30	QCGFEP1030W1	QCGFEP2030W1
40	—	QCGFEP2040W1
50	—	QCGFEP2050W1
15	QCGFEP1015W2	—
20	QCGFEP1020W2	—
25	QCGFEP1025W2	—
30	QCGFEP1030W2	—

### Wiring Diagram

#### Bell Alarm and Auxiliary Contact Schematic



Single-throw double-pole contacts are UL and CSA listed for 5A at 250 Vac.  
 Bell Alarm (W1)—contacts change state when breaker trips.  
 Auxiliary Switch (W2)—contacts change state when breaker is opened (or tripped) or closed.  
 14-inch (355.6 mm) long 18 AWG pigtail wire leads provided.

### Dimensions

Approximate Dimensions in Inches (mm)

#### Shipping Data

Number of Poles	Carton Quantity	Approximate Weight Lbs (kg)	Dimensions
1	20	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
2	5	5.00 (2.3)	15.50 x 6.00 x 4.50 (393.7 x 152.4 x 114.3)



**BABRP and BABRSP Breakers—  
Single- and Two-Pole**



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**Solenoid-Operated, Remote-Controlled Latching  
Types BABRP, BABRSP, BRRP and CLRP**

**Product Description**

The BABRP and BABRSP are bolt-on branch circuit breakers designed for use in panelboards. The BRRP is a plug-on branch circuit breaker designed for use in load-centers not manufactured with breakers with a 1-inch wide format and are listed on the “Compatibility list for Classified Applications”—Pub. 26271. In addition to providing conventional branch circuit protection, they include a unique solenoid-operated mechanism that provides for efficient breaker pulse-on and pulse-off operation when used with a suitable controller like Eaton’s Pow-R-Command™ lighting control system. These breakers can also be controlled by pushbutton or a PLC unit.

**Application Description**

Eaton’s BABRP, BABRSP, BRRP and CLRP breakers are remotely operated molded case circuit breakers ideally suited for lighting control applications or energy management applications.

**Features, Benefits and Functions**

- Bolt-on line-side terminal (BABRP, BABRSP—Type BA)
- Plug-on line-side terminal (BRRP—Type BR, CLRP—Type CL)
- Cable connected load-side terminal
- Four-position control terminal
- Bi-metal assembly for thermal overload protection
- Fast-acting short-circuit protection
- Arc-chute assembly for fast-acting arc extinction
- Three-position handle: OFF, TRIP (Center), ON
- Handle permits manual switching when control power is lost
- Mechanical trip indicator
- 15 and 20A breakers SWD (switching duty) rated
- HID ratings for HID (high intensity discharge) lighting
- All models HACR rated
- Status feedback of control circuit (BABRSP)
- Series rated (BABRP, BABRSP only)
  - BRRP series rated same as BR breakers
  - BABRP, BABRSP same as BA breakers

### Product Selection

#### QUICKLAG Type QCGFT Single-Pole Ground Fault Circuit Breaker



#### BABRP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)			Catalog Number
		Vac (50/60 Hz) 120	120/240	277/480	
1	15	10,000	—	—	<b>BABRP1015</b>
	20	10,000	—	—	<b>BABRP1020</b>
	25	10,000	—	—	<b>BABRP1025</b>
	30	10,000	—	—	<b>BABRP1030</b>
2	15	—	10,000	—	<b>BABRP2015</b>
	20	—	10,000	—	<b>BABRP2020</b>
	25	—	10,000	—	<b>BABRP2025</b>
	30	—	10,000	—	<b>BABRP2030</b>

#### BABRP and BABRSP Wire Harness

Description	Catalog Number
This 60-inch (1524.0 mm) wire pigtail provides a connection from a single BABRP's control plug to a customer's pushbutton, relay or PLC. Each box contains 12 pigtails. Wires are 22 AWG, 600V. Order in multiples of 12.	<b>SLBKRPTL1</b>

#### BABRSP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)			Catalog Number
		Vac (50/60 Hz) 120	120/240	277/480	
1	15	10,000	—	—	<b>BABRSP1015</b>
	20	10,000	—	—	<b>BABRSP1020</b>
	25	10,000	—	—	<b>BABRSP1025</b>
	30	10,000	—	—	<b>BABRSP1030</b>
2	15	—	10,000	—	<b>BABRSP2015</b>
	20	—	10,000	—	<b>BABRSP2020</b>
	25	—	10,000	—	<b>BABRSP2025</b>
	30	—	10,000	—	<b>BABRSP2030</b>

#### BRRP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating	Interrupting Capacity (Symmetrical Amperes)		Catalog Number
		Vac (50/60 Hz) 120	120/240	
1	15	10,000	—	<b>BRRP115</b>
	20	10,000	—	<b>BRRP120</b>
	25	10,000	—	<b>BRRP125</b>
	30	10,000	—	<b>BRRP130</b>
2	15	—	10,000	<b>BRRP215</b>
	20	—	10,000	<b>BRRP220</b>
	25	—	10,000	<b>BRRP225</b>
	30	—	10,000	<b>BRRP230</b>

#### CLRP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating	Interrupting Capacity (Symmetrical Amperes)		Catalog Number
		Vac (50/60 Hz) 120	120/240	
1	15	10,000	—	<b>CLRP115</b>
	20	10,000	—	<b>CLRP120</b>
	25	10,000	—	<b>CLRP125</b>
	30	10,000	—	<b>CLRP130</b>
2	15	—	10,000	<b>CLRP215</b>
	20	—	10,000	<b>CLRP220</b>
	25	—	10,000	<b>CLRP225</b>
	30	—	10,000	<b>CLRP230</b>

**Note**

<sup>①</sup> Continuous current rating at 40°C.

## Technical Data and Specifications

### Solenoid Operating Data

- Power requirements: 24 Vac/dc (20.4V minimum–30V maximum)
- Controlled signal: +AC/DC 8 ms minimum with zero cross, 300 ms maximum
- AC: 1.3 cycles minimum, 18 cycles or 300 ms maximum
- DC: 8 ms minimum, 300 ms maximum
- Maximum duty cycle of 6 OPEN/CLOSE cycles per minute
- Current draw: open 1A, close 3/4A
- Blue wire: power input (see power requirements)
- Black wire: remote opening
- Red wire: remote closing
- Yellow wire: feedback status from power input, maximum 0.50A draw (BABRSP only)

### Operation

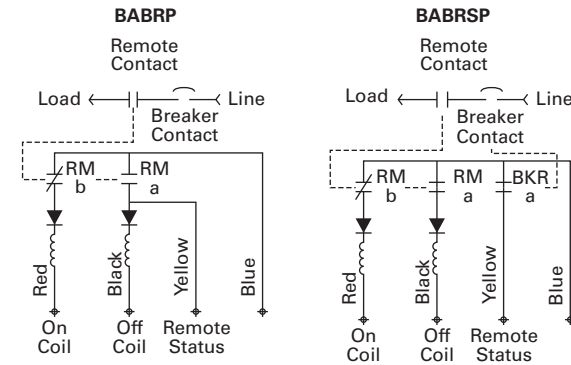
- Tripping system—the BABRP, BABRSP, BRRP and CLRP circuit breakers have a permanent trip unit that contains a factory preset thermal (overload) trip element in each pole
- Operating mechanism—the BABRP, BABRSP, BRRP and CLRP circuit breakers have an over-center toggle mechanism that provides quick-make, quick-break operation. The operating mechanism is trip free. An internal cross-bar provides a common tripping of all multi-pole circuit breakers

### Operating/Application Data

- Ambient temperature: 0 to 40°C
- Nominal pulse magnitude: 24 Vac/dc
- Frequency: 50/60 Hz
- Maximum breaker cycling: 6 operations per minute
- Tolerance: +10% to –15% of nominal voltage
- Humidity: 0 to 95% noncondensing

## Wiring Diagrams

### Control Circuit for the BABRP and BABRSP



GHBS and GHQRSP



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### Solenoid Operator—Remote-Controlled Latching for Type GHBS, GBHS and GHQRSP Breakers

#### Product Description

Eaton's GHBS, GBHS and GHQRSP circuit breakers are bolt-on branch circuit breakers designed for use in 277/480 Vac panelboards. In addition to providing conventional branch circuit protection, they include a unique solenoid-operated mechanism that provides for efficient breaker pulse-on and pulse-off operation when used with a suitable controller like Eaton's Pow-R-Command lighting control system.

#### Features, Benefits and Functions

- Bolt-on line-side terminal
- Cable-connected load-side terminal
- Status switch—remote status and breaker status available from internal auxiliary switches
- Bi-metal assembly for thermal overload protection
- Fast-acting short-circuit protection
- Arc-runner and arc-chute assembly for fast-acting arc extinction
- Three-position breaker handle: OFF, TRIP (Center), ON
- Visual indication of the remotely operated contact's position (open, closed or trip)
- Remote override handle permits manual switching when control power is lost
- 15 and 20A breakers SWD (switching duty) rated.
- 15 and 20A breakers HID rated for HID (High intensity discharge) lighting
- All models HACR rated
- Series rated with various Eaton main circuit breakers

## Product Selection

## GHQ UL 489 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)				Catalog Number
		Vac (50/60 Hz)				
		120	120/240	277	480Y/277	
1	15	65,000	65,000	14,000	14,000	
1	20	65,000	65,000	14,000	14,000	
1	30	65,000	65,000	14,000	14,000	
2	15	65,000	65,000	14,000	14,000	
2	20	65,000	65,000	14,000	14,000	
2	30	65,000	65,000	14,000	14,000	

## GHBS—Single-Pole



## GHBS UL 489 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)			Catalog Number
		Vac (50/60 Hz)			
		120	240	277/480	
1	15	65,000	—	14,000	GHBS1015D
	20	65,000	—	14,000	GHBS1020D
	30	65,000	—	14,000	GHBS1030D
2	15	—	65,000	14,000	GHBS2015D
	20	—	65,000	14,000	GHBS2020D
	30	—	65,000	14,000	GHBS2030D

## GBHS CSA 22.2 Interrupting Ratings (Not UL Listed)

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)		Catalog Number
		Vac (50/60 Hz)		
		347/600		
1	15	10,000		GBHS1015D
	20	10,000		GBHS1020D
2	15	10,000		GBHS2015D
	20	10,000		GBHS2020D

## GHQRSP UL 489 and CSA 22.2 Interrupting Ratings

Number of Poles	Ampere Rating <sup>①</sup>	Interrupting Capacity (Symmetrical Amperes)				Catalog Number <sup>②</sup>
		Vac (50/60 Hz)				
		120	120/240	277	480Y/277	
1	15	65,000	65,000	14,000	14,000	GHQRSP1015
	20	65,000	65,000	14,000	14,000	GHQRSP1020
	30	65,000	65,000	14,000	14,000	GHQRSP1030
2	15	65,000	65,000	14,000	14,000	GHQRSP2015
	20	65,000	65,000	14,000	14,000	GHQRSP2020
	30	65,000	65,000	14,000	14,000	GHQRSP2030

**Notes**

① Continuous current rating at 40°C.

② All UL listed circuit breakers are HID (high intensity discharge) rated.

### Technical Data and Specifications

#### Solenoid Operating Data

- Power requirements: 24 Vac/dc (20.4V minimum–30V maximum)
- Controlled signal: +AC/DC 8 ms minimum with zero cross, 300 ms maximum
- AC: 1.3 cycles minimum, 18 cycles or 300 ms maximum
- DC: 8 ms minimum, 300 ms maximum
- Maximum duty cycle of 6 OPEN/CLOSE cycles per minute
- Current draw: open 1A, close 3/4A
- Blue wire: power input (see power requirements)
- Black wire: remote opening

- Red wire: remote closing
- Yellow wire: feedback status from power input, maximum 0.50A draw

#### Operation

Mechanism manually operated by external handle allowing ON, OFF and RESET operation. Handle assumes a center TRIP position after performing protective response.

#### Operating/Application Data

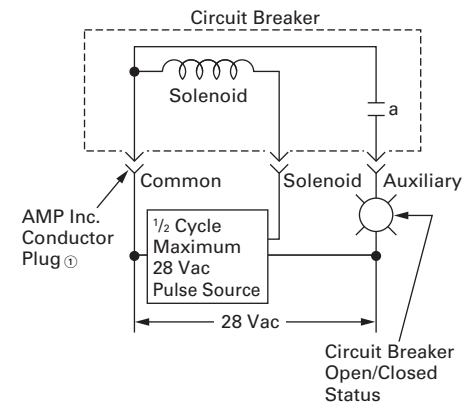
- Ambient temperature: 0–40°C
- Frequency: 48–62 Hz
- Humidity: 0–95% noncondensing

#### Terminal Type

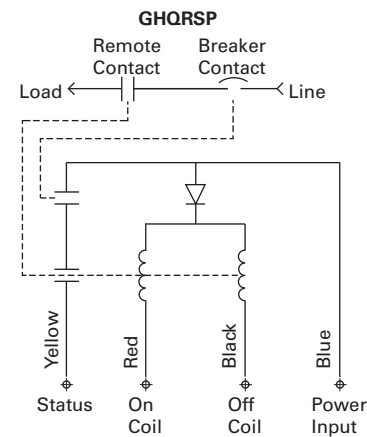
Circuit Breaker Type	Circuit Breaker Amperes	Screw Head Type	Terminal Type	Range
GHQRSP	15–20	Slotted	Clamp	#14–#4 AWG

### Wiring Diagrams

#### Typical Single-Pole Circuit Breaker Schematic Diagram for GBHS and GBHS Breakers



#### Typical Single-Pole Circuit Breaker Schematic Diagram for GHQRSP Breakers



### Dimensions

Approximate Dimensions in Inches (mm)

#### Dimensions per Pole

Circuit Breaker Type	Width	Height <sup>②</sup>	Length <sup>③</sup>
GHQRSP	1.00 (25.4)	4.63 (117.6)	2.81 (71.4)

#### Notes

- ① Purchase separate AMP Inc. conductor plug #640426-3.
- ② Excluding line terminal.
- ③ Excluding handle.

**International Rated**



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**International Rated Types HQP, BA, QC, GFMB, GFXBC**

**Product Description**

**QUICKLAG International Circuit Breakers**

- Bolt-on Type BA

**QUICKLAG International Ground Fault Circuit Breakers**

- Plug-on Type GFMB
- Cable-in/cable-out Type GFXBC

**Standards and Certifications**

**QUICKLAG International Circuit Breakers**

- Built and test certified to BS3871, Pt. 1
- 50/60 Hz, 40°C

**QUICKLAG International Ground Fault Circuit Breakers**

- Built and test certified to BS3871, Pt. 1; BS3871, Section 31-C; BS4293
- 50/60 Hz, 40°C; 30 mA sensitivity



### Product Selection

BAB



#### Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Single-Pole 240/415 Vac Catalog Number	Two-Pole 240/415 Vac Catalog Number	Three-Pole 240/415 Vac Catalog Number
<b>3000A Interrupting Capacity (M3) Bolt-On Thermal-Magnetic Circuit Breakers</b>			
10	BAB1010E	BAB2010E	BAB3010E
15	BAB1015E	BAB2015E	BAB3015E
16	—	—	—
20	BAB1020E	BAB2020E	BAB3020E
25	BAB1025E	BAB2025E	BAB3025E
30	BAB1030E	BAB2030E	BAB3030E
32	—	—	—
40	BAB1040E	BAB2040E	BAB3040E
50	BAB1050E	BAB2050E	BAB3050E
60	BAB1060E	BAB2060E	BAB3060E
70	BAB1070E	BAB2070E	BAB3070E
90	—	BAB2090E	BAB3090E
100	—	BAB2100E	BAB3100E
<b>6000A Interrupting Capacity (M6) Bolt-On Thermal-Magnetic Circuit Breakers</b>			
15	BAB1015HE	BAB2015HE	BAB3015HE
20	BAB1020HE	BAB2020HE	BAB3020HE
25	BAB1025HE	BAB2025HE	BAB3025HE
30	BAB1030HE	BAB2030HE	BAB3030HE
40	BAB1040HE	BAB2040HE	BAB3040HE
50	BAB1050HE	BAB2050HE	BAB3050HE
60	BAB1060HE	BAB2060HE	BAB3060HE
70	BAB1070HE	BAB2070HE	BAB3070HE
90	—	BAB2090HE	BAB3090HE
100	—	BAB2100HE	BAB3100HE

#### Breaker Catalog Numbers—Ground Fault Single-Pole 30 mA Sensitivity

Continuous Ampere Rating at 40°C	240/415 Vac Catalog Number
<b>3000A Interrupting Capacity (M3) Plug-On Thermal-Magnetic Circuit Breakers</b>	
10	GFMB110B2
15	GFMB115B2
16	GFMB116B2
20	GFMB120B2
25	GFMB125B2
30	GFMB130B2
32	GFMB132B2
40	GFMB140B2

**Note**

For other 240/415V applications, please contact the Customer Support Center at 1-800-356-1243.

## Technical Data and Specifications

### Interrupting Ratings

Ratings	Suffix E	Suffix HE
<b>International Circuit Breakers</b>		
NEMA® 120/240 Vac	10,000 AIC	10,000 AIC
BS3871 220/380, 240/415 Vac	3000 AIC	6000 AIC
<b>International Ground Fault Circuit Breakers</b>		
BS3871 220/380, 240/415 Vac	3000 AIC	

### Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Miniature Circuit Breaker	Number of Poles	Standard Carton Quantity	Approximate Carton Weight Lbs (kg)	Approximate Standard Carton
QUICKLAG Type B	1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
	2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
	3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
<b>QUICKLAG Ground Fault</b>				
Type P—All	1	20	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
Types B and C—All	1	20	11.00 (5.0)	12.50 x 7.00 x 5.50 (317.5 x 177.8 x 139.7)
Types P and B—All	2	5	5.00 (2.3)	12.50 x 6.00 x 4.50 (317.5 x 152.4 x 114.3)

**QUICKLAG Type P Switching Neutral**



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## Special Application Breakers, Types HQP, BA, QC

### Product Description

#### Breakers

- Plug-on Type HQP: 10–30A, single- and two-pole, 10 kAIC
- Bolt-on Type BA: 10–30A, single- and two-pole, 10 kAIC
- Cable-in Type QC: 10–30A, single- and two-pole, 10 kAIC

Switching neutral QUICKLAG breakers available in single- and two-pole configurations, plus neutral pole for applications in accordance with NEC® 514.5, 240.22 and 380.2. A single-pole device takes two pole spaces, and a two-pole device takes three pole spaces.

#### QUICKLAG HID (High Intensity Discharge) Breakers

- Plug-on Type HQP: 15–60A, single- and two-pole, 10 kAIC
- Bolt-on Type BA: 15–60A, single- and two-pole, 10 kAIC
- Cable-in Type QC: 15–60A, single- and two-pole, 10 kAIC

Breakers designed specifically for use with high intensity discharge (HID) lighting applications. (UL listed as standard lighting breakers.)

#### Molded Case Switches—Non-automatic QUICKLAG Molded Case Switch

- Plug-on Type HQP: 50, 60, 100A, single-, two- and three-pole
- Bolt-on Type BA: 50, 60, 100A, single-, two- and three-pole
- Cable-in Type QC: 50, 60, 100A, single-, two- and three-pole

### Standards and Certifications

- All products UL and CSA listed



## Product Selection

QUICKLAG Type P  
Switching Neutral

## Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
<b>QUICKLAG Type: HQP Switching Neutral Thermal-Magnetic Breakers</b>				
10	HQP2010B	HQP3010B	—	—
15	HQP2015B	HQP3015B	—	—
20	HQP2020B	HQP3020B	—	—
25	HQP2025B	HQP3025B	—	—
30	HQP2030B	HQP3030B	—	—
<b>QUICKLAG Type: BA Switching Neutral Thermal-Magnetic Breakers</b>				
10	BAB2010C	BAB3010C	—	—
15	BAB2015C	BAB3015C	—	—
20	BAB2020C	BAB3020C	—	—
25	BAB2025C	BAB3025C	—	—
30	BAB2030C	BAB3030C	—	—
<b>QUICKLAG Type: QC Switching Neutral Thermal-Magnetic Breakers</b>				
10	QC2010B	QC3010B	—	—
15	QC2015B	QC3015B	—	—
20	QC2020B	QC3020B	—	—
25	QC2025B	QC3025B	—	—
30	QC2030B	QC3030B	—	—
<b>QUICKLAG Type: HQP HID (High Intensity Discharge) Thermal-Magnetic Breakers</b>				
15	HQP1015D	HQP2015D	—	—
20	HQP1020D	HQP2020D	—	—
25	HQP1025D	HQP2025D	—	—
30	HQP1030D	HQP2030D	—	—
35	HQP1035D	HQP2035D	—	—
40	HQP1040D	HQP2040D	—	—
50	HQP1050D	HQP2050D	—	—
60	HQP1060D	HQP2060D	—	—
<b>QUICKLAG Type: BA HID (High Intensity Discharge) Thermal-Magnetic Breakers</b>				
15	BAB1015D	BAB2015D	—	—
20	BAB1020D	BAB2020D	—	—
25	BAB1025D	BAB2025D	—	—
30	BAB1030D	BAB2030D	—	—
35	BAB1035D	BAB2035D	—	—
40	BAB1040D	BAB2040D	—	—
50	BAB1050D	BAB2050D	—	—
60	BAB1060D	BAB2060D	—	—
<b>QUICKLAG Type: QC HID (High Intensity Discharge) Thermal-Magnetic Breakers</b>				
15	QC1015D	QC2015D	—	—
20	QC1020D	QC2020D	—	—
25	QC1025D	QC2025D	—	—
30	QC1030D	QC2030D	—	—
35	QC1035D	QC2035D	—	—
40	QC1040D	QC2040D	—	—
50	QC1050D	QC2050D	—	—
60	QC1060D	QC2060D	—	—

### Breaker Catalog Numbers, continued

Continuous Ampere Rating at 40°C	Single-Pole 120/240 Vac Catalog Number	Two-Pole 120/240 Vac Catalog Number	Two-Pole 240 Vac Catalog Number	Three-Pole 240 Vac Catalog Number
<b>QUICKLAG Type: HQP Non-Automatic Switches</b>				
50	HQP1050N	—	HQP2050N	HQP3050N
60	HQP1060N	—	HQP2060N	HQP3060N
100	HQP1100N	—	HQP2100N	HQP3100N
<b>QUICKLAG Type: BA Non-Automatic Switches</b>				
50	BAB1050N	—	BAB2050N	BAB3050N
60	BAB1060N	—	BAB2060N	BAB3060N
100	BAB1100N	—	BAB2100N	BAB3100N
<b>QUICKLAG Type: QC Non-Automatic Switches</b>				
50	QC1050N	—	QC2050N	QC3050N
60	QC1060N	—	QC2060N	QC3060N
100	QC1100N	—	QC2100N	QC3100N
<b>QUICKLAG Type: QCD Non-Automatic Switches</b>				
60	—	—	QCD2060NA	—
100	—	—	—	—




#### 1

#### Accessories ①

##### Handle Locks: Non-Padlockable ②

	Description	Order in Multiples of	Catalog Number
<b>QL1NPL</b>	QUICKLAG Type P, B, C—single-pole	10	<b>QL1NPL</b>
			
<b>QL23NPL</b>	QUICKLAG Type P, B, C—two- and three-pole	10	<b>QL23NPL</b>
			







##### Handle Locks: Padlockable ②

	Description	Order in Multiples of	Catalog Number
<b>QL1PL</b>	QUICKLAG Type P, B, C—single-pole	10	<b>QL1PL</b>
			
<b>QL123PL</b>	QUICKLAG Type P, B and ground fault—single-, two- and three-pole	10	<b>QL123PL</b>
			
<b>QC123PL</b>	QUICKLAG Type C—single-, two- and three-pole	10	<b>QC123PL</b>
			
	QUICKLAG Type P, B—single-, two- and three-pole (off only)	10	<b>QL123PLOFF</b>
	QUICKLAG Type C—single-, two- and three-pole (off only)	10	<b>QC123PLOFF</b>

##### Notes

- ① See **Page V4-T1-26** for QCR and QCF accessories.
- ② Can lock in ON or OFF position.

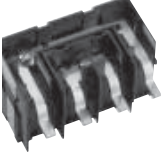


### Mounting Hardware

	Description	Order in Multiples of	Catalog Number
<b>QCFCLIP</b>	QUICKLAG Type C face mounting clip	24	<b>QCFCLIP</b>
			
<b>QC1FP</b>	QUICKLAG Type C face mounting plate—single-pole	10	<b>QC1FP</b>
			
<b>QC2FP</b>	QUICKLAG Type C face mounting plate—two-pole	10	<b>QC2FP</b>
			
<b>QC3FP</b>	QUICKLAG Type C face mounting plate—three-pole	10	<b>QC3FP</b>
			
	QUICKLAG Type C face mounting plate and lock-off (off only)—two-pole ①	10	<b>QC2FPLOFF</b>
	QUICKLAG Type C face mounting plate and lock-off (off only)—three-pole	10	<b>QC3FPLOFF</b>
<b>QCBCLIP</b>	QUICKLAG Type C base mounting clamp	10	<b>QCBCLIP</b>
			
<b>QC6BP</b>	QUICKLAG Type mounting plate—six poles total	10	<b>QC6BP</b>
			

**Note**

① Suitable for ground fault breakers.

#### Mounting Hardware, continued

	Description	Order in Multiples of	Catalog Number
	QUICKLAG Type C base mounting plate—six poles total—heavy-duty screw-secured	10	QC6BPS
	QUICKLAG Type C (QCD) 2-way jumper unit with cover	10	QCDJ2
<b>QCDJ4</b>	QUICKLAG Type C (QCD) 4-way jumper unit with cover	10	QCDJ4
			
	QUICKLAG Type C (QCD) 6-way jumper unit with cover	10	QCDJ6
	QUICKLAG Type C (QCD) 2-way jumper unit, no cover	10	QCDJ2T
	QUICKLAG Type C (QCD) 4-way jumper unit, no cover	10	QCDJ4T
	QUICKLAG Type C (QCD) 6-way jumper unit, no cover	10	QCDJ6T
	QUICKLAG Type QCD Finger protection attachment	10	QCDFP
	QUICKLAG Type QCD 4-prong Quick Connect	10	QCQUICK
<b>QCDINADAPT</b>	QUICKLAG Type C DIN rail adapter	6	QCDINADAPT
			
<b>QCDRING</b>	QUICKLAG Type QCD ring lug attachment	10	QCDRING
			

#### Dummy Breakers

Description	Order in Multiples of	Catalog Number
QUICKLAG Type P	1	HQP1000
QUICKLAG Type B	1	BAB1000
QUICKLAG Type C	1	QC1000
QUICKLAG Type C clear choice breaker	4	QC30SAMPLE

#### QCRSPACER



#### Miscellaneous

Description	Order in Multiples of	Catalog Number
QUICKLAG Type C Spacer	1	QCRSPACER

#### QL1HT



#### Handle Tie

Description	Order in Multiples of	Catalog Number
QUICKLAG handle tie—single-pole	100	QL1HT



### Factory Modifications and Installed Terminals

#### Factory Modifications <sup>①</sup>

Type of Modification	Breaker Type	Catalog Suffix
Shunt trip (requires one extra pole space on right side) 120, 208, 240 Vac Draws 2.6A at 120V, draws 11A at 24 Vdc	QUICKLAG Types P, B and C	<b>S</b>
Shunt trip (requires one extra pole space on right side) 24, 48 Vac/dc Draws 2.6A at 120V, draws 11A at 24 Vdc	QUICKLAG Types P, B and C	<b>S1</b>
Special calibration (50°C) (no UL)	QUICKLAG Types P, B and C	<b>V</b>
Shock testing	QUICKLAG Types P, B and C	<b>L</b>
Freeze testing	QUICKLAG Types P, B and C	<b>Y</b>
Moisture-fungus treatment	QUICKLAG Types P, B, C and ground fault	<b>F</b>
Marine duty	QUICKLAG Types P, B, C	<b>H08</b>
Naval duty	QUICKLAG Types P, B, C	<b>H09</b>
400 Hz calibration	QUICKLAG Types P, B, C	<b>G</b>
Specific DC ratings (breaker marked with a max. Vdc rating)	QUICKLAG Types P, B, C	<b>Q thru Q9</b> <sup>②</sup>

#### Spare Terminal Hardware Screws (Lugs not Included)

Terminal Type	Description	Order in Multiples of	Catalog Number
1	QUICKLAG terminal screw	10	<b>QLD TSA</b>
2	QUICKLAG terminal screw	10	<b>QLD TSB</b>
3	QUICKLAG terminal screw	10	<b>QLD TSC</b>
5	QUICKLAG binding head terminal screw and clamp	10	<b>QLB HTSE</b>
6 and 7	QUICKLAG terminal screw	10	<b>QLLNTSFG</b>

#### Notes

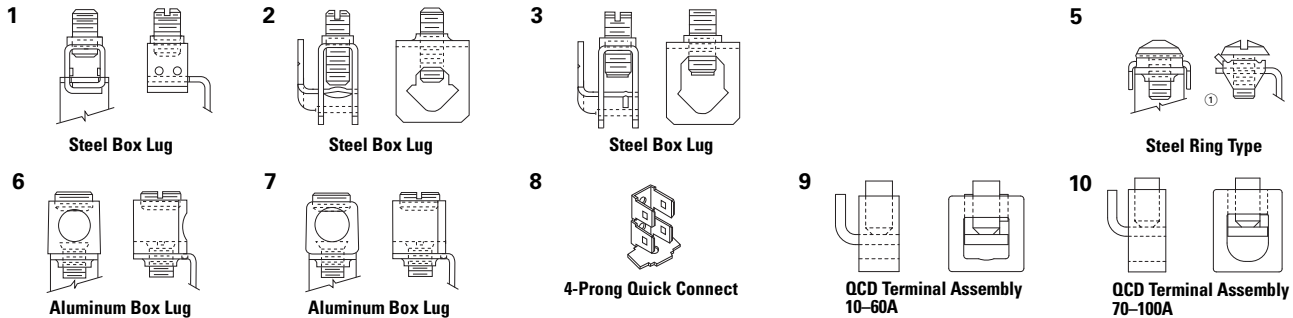
<sup>①</sup> Contact Eaton for factory modifications available for QCR and QCF breakers.

<sup>②</sup> Q = 32 Vdc; Q1 = 32–40 Vdc; Q2 = 37.5 Vdc; Q3 = 45 Vdc; Q4 = 48 Vdc; Q5 = 50 Vdc; Q6 = 62.5 Vdc; Q7 = 75 Vdc (2P); Q8 = 80 Vdc (2P); Q9 = 125 Vdc (QCR 2P); Q10 = 62.5 Vdc (QCR 1P).

## Technical Data and Specifications

### Factory-Installed Breaker Terminals

Breaker Type	Continuous Ampere Rating	Standard Line Terminal			Standard Load Terminal			Optional Terminals	
		Terminal Type	Wire Type	Wire Range (AWG)	Terminal Type	Wire Type	Wire Range (AWG)	Line	Load
QUICKLAG Type P HQP, QPHW, QHPX, QHPW	10–30	Plug-on female clips that mate with the bus stabs			1	Cu/Al	14–4	N/A	3
	35–50				2	Cu/Al	14–4	N/A	3
	55–125				3	Cu/Al	8–1/0	N/A	—
QUICKLAG ground fault QPGFT, QPGFEP, QPHGFT, QPHGFEP	10–40	Plug-on female clips that mate with the bus stabs			1 (single-pole)	Cu/Al	14–4	N/A	3
	10–40				1	Cu/Al	—	N/A	3
	10–30				1	Cu	14–8	N/A	—
QUICKLAG Type B BAB, QBHW, HBAX, HBAW	10–40	Extended tangs that bolt directly to the bus			1 (single- and two-pole)	Cu/Al	14–4	N/A	3
	35–50				2 (three-pole)	Cu/Al	14–4	N/A	3
	55–125				3	Cu/Al	8–1/0	N/A	—
QUICKLAG ground fault QBGFT, QBGFEP, QBHGFT, QBHGFEP	10–40	Extended tangs that bolt directly to the bus			1 (single-pole)	Cu/Al	14–4	N/A	N/A
	10–40				1	Cu/Al	14–8	N/A	N/A
	10–30				1	Cu	14–8	N/A	N/A
QUICKLAG Type C QC, QCHW, QHCX, QHCW	10–20	5	Cu/Al	TBD	5	Cu/Al	14–10	6, 7	6, 7, 8
	25–60	6	Cu/Al	TBD	2	Cu/Al	14–4	5, 7	5, 6, 7, 8
	70–100	7	Cu/Al	TBD	3	Cu/Al	8–1/0	5	5, 7, 8
QUICKLAG QCR, QCF	10–55	1	Cu/Al	TBD	1	Cu/Al	14–4	N/A	N/A
	60	1	Cu	TBD	1	Cu	14–4	N/A	N/A
QUICKLAG ground fault QCGFT, QCGFEP, QCHGFT, QCHGFEP	10–20	6	Cu/Al	TBD	14–8	Cu/Al	14–4	6, 7	5
	25–50	6	Cu/Al	TBD	1	Cu/Al	14–4	5, 7	5
	10–30	6	—	—	—	—	—	—	—
QUICKLAG QCD	10–60	9	Cu/Al	14–4	9	Cu/Al	14–4	See Accessories	
	70–100	10	Cu	4–1/0	10	Cu	4–1/0	See Accessories	



## Dimensions

Approximate Dimensions in Inches (mm)

### Shipping Data

Miniature Circuit Breaker	Number of Poles	Standard Carton Quantity	Approximate Carton Weight Lbs (kg)	Approximate Standard Carton
QUICKLAG Types B, P, C—all	1	24	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
QUICKLAG Types B, P, C—all	2	12	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
QUICKLAG Types B, P, C—all	3	8	9.00 (4.1)	12.50 x 7.50 x 5.00 (317.5 x 190.5 x 127.0)
QUICKLAG ground fault Type P—all	1	20	11.00 (5.0)	12.50 x 6.50 x 5.00 (317.5 x 165.1 x 127.0)
Types B and C—all	1	20	11.00 (5.0)	12.50 x 7.00 x 5.50 (317.5 x 177.8 x 139.7)
Types P and B—all	2	5	5.00 (2.3)	12.50 x 6.00 x 4.50 (317.5 x 152.4 x 114.3)

#### Note

① Clamp on line side only.

### FAZ-NA and FAZ-NA-L Circuit Breakers



*Optimum and Efficient Protection for Every Application*

### Contents

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## FAZ-NA and FAZ-NA-L Circuit Breakers

### Product Overview

Optimum product quality, tested reliability and safety stand for best protection of personnel, installations and plant. Eaton's FAZ-NA and FAZ-NA-L DIN rail mountable circuit breakers are designed for use in branch service applications.

### Powerful Offering for Machine and System Builders

FAZ-NA and FAZ-NA-L are available with B, C and D characteristics in accordance with UL® 489, CSA® C22.2 No.5; UL 1077, CSA C22.2 No.235 and IEC 60947-2. These devices are CE marked.

### Application Description

Feeder and branch circuit protection for:

- Convenience receptacle circuits (internal/external)
- Motor control circuits
- Load circuits leaving the equipment (external)
- HACR internal/external equipment (heating, air conditioning, refrigeration)
- PLC I/O points
- Computers
- Power supplies
- Control instrumentation
- Relays
- UPS
- Power conditioners

### Features

- Complete range of UL 489 listed DIN rail mounted miniature circuit breakers up to 63A current rating
- Two distinct UL 489 FAZ-NA offerings available to provide the best solution for the application—FAZ-NA at 277/480 Vac and FAZ-NA-L at 240 Vac
- Standard ratings of 10 kAIC available at both 240 Vac and 277/480 Vac
- Select amperages available at 14 kAIC for both the 240 Vac and 277/480 Vac offerings and 10 kAIC up to 125 Vdc per pole
- Current limiting design provides fast short-circuit interruption that reduces the let-through energy, which can damage the circuit
- Suitable for branch circuit device protection
- Thermal-magnetic overcurrent protection
  - Three levels of short-circuit protection, categorized by B, C and D curves
- Trip-free design—breaker can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost
- SWD (switching duty)—suitable for switching fluorescent lighting loads ( $I_n \leq 20A$ )
- Fulfill UL 489, CSA C22.2 No.5 and also IEC 60947-2 Standard
- For use in applications for which UL 1077 or CSA C22.2 No.235 are also allowed
- Field-installable shunt trip and auxiliary switch subsequent mounting
- Separate version for ring-tongue connection (Type FAZ-RT), terminal screws can be removed (on both sides)
- Module width of only 17.7 mm (per pole)
- Contact Position Indicator (red/green)
- Easy installation on DIN rail
- Possibility for sealing the toggle in ON or OFF position
- Single-, two-, three- and four-pole configurations

### Device Printing on Front and Side Installation options

These branch circuit breakers are available in two terminal configurations: standard box terminals that accept multiple conductors and ring-tongue terminals, ideally suited to demanding requirements of the semi-conductor industry. All breakers mount on standard 35 mm DIN rail. Bus connectors and feeder terminal facilitate mounting and wiring of multiple miniature circuit breaker arrays in control panel assemblies. These circuit breakers can also be reverse feed.

# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### Standards and Certifications

##### FAZ-NA

FAZ-NA complies with the latest national and international standards.

- UL 489
  - Standard for molded case circuit breakers (MCCB) for feeder and branch circuit protection
  - Products meet the requirements of the National Electrical Code® (NEC®)

- CSA C22.2 No.5
  - Standard for molded case circuit breakers (MCCB) for feeder and branch circuit protection (corresponds closely to UL 489 Standard)
  - Products meet the requirements of the Canadian Electrical Code (CEC)

- RoHS compliant
- VDE compliant
- ABS compliant



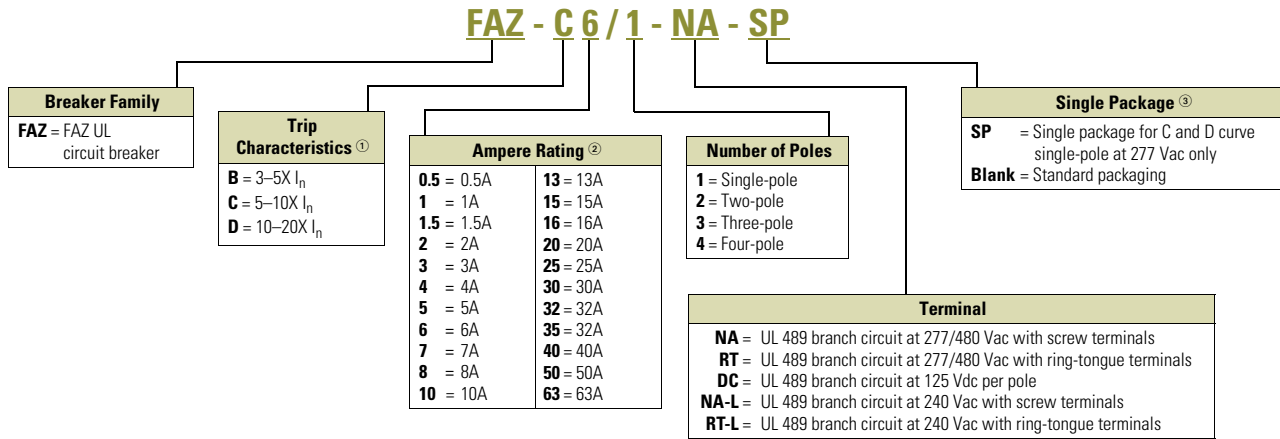
##### FAZ-NA-L

FAZ-NA-L 0.5–63A at 240 Vac comply with the following standards.

- UL 489 listed
- CSA C22.2 No. 5-02
- IEC rated
- RoHS compliant
- CCC compliant
- OVE compliant
- EAC compliant
- ABS compliant
- VDE compliant



#### Catalog Number Selection



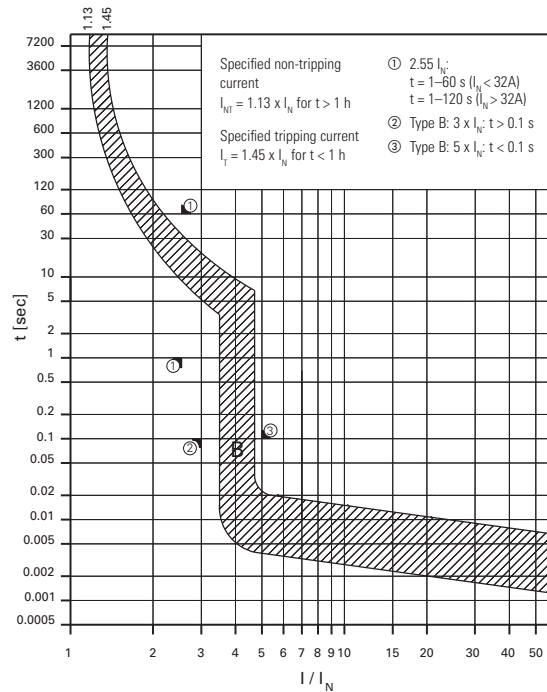
#### Notes

- ① I<sub>n</sub> = Rated current for instantaneous trip characteristics.
- ② B curve starts at 1 ampere.
- ③ Single package only available for 277 Vac offering—not an option for 240 Vac line.

### Product Selection

#### FAZ-NA B Curve 277/480 Vac Rated Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



### FAZ-NA UL 489 Circuit Breakers at 277/480 Vac— 10 kAIC, 14 kAIC B Curve (15–25A)

Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>B Curve (3–5X <math>I_N</math> Current Rating)</b>				
1	FAZ-B1/1-NA	FAZ-B1/2-NA	FAZ-B1/3-NA	FAZ-B1/4-NA
1.5	FAZ-B1.5/1-NA	FAZ-B1.5/2-NA	FAZ-B1.5/3-NA	FAZ-B1.5/4-NA
2	FAZ-B2/1-NA	FAZ-B2/2-NA	FAZ-B2/3-NA	FAZ-B2/4-NA
3	FAZ-B3/1-NA	FAZ-B3/2-NA	FAZ-B3/3-NA	FAZ-B3/4-NA
4	FAZ-B4/1-NA	FAZ-B4/2-NA	FAZ-B4/3-NA	FAZ-B4/4-NA
5	FAZ-B5/1-NA	FAZ-B5/2-NA	FAZ-B5/3-NA	FAZ-B5/4-NA
6	FAZ-B6/1-NA	FAZ-B6/2-NA	FAZ-B6/3-NA	FAZ-B6/4-NA
7	FAZ-B7/1-NA	FAZ-B7/2-NA	FAZ-B7/3-NA	FAZ-B7/4-NA
8	FAZ-B8/1-NA	FAZ-B8/2-NA	FAZ-B8/3-NA	FAZ-B8/4-NA
10	FAZ-B10/1-NA	FAZ-B10/2-NA	FAZ-B10/3-NA	FAZ-B10/4-NA
13	FAZ-B13/1-NA	FAZ-B13/2-NA	FAZ-B13/3-NA	FAZ-B13/4-NA
15	FAZ-B15/1-NA	FAZ-B15/2-NA	FAZ-B15/3-NA	FAZ-B15/4-NA
16	FAZ-B16/1-NA	FAZ-B16/2-NA	FAZ-B16/3-NA	FAZ-B16/4-NA
20	FAZ-B20/1-NA	FAZ-B20/2-NA	FAZ-B20/3-NA	FAZ-B20/4-NA
25	FAZ-B25/1-NA	FAZ-B25/2-NA	FAZ-B25/3-NA	FAZ-B25/4-NA
30	FAZ-B30/1-NA	FAZ-B30/2-NA	FAZ-B30/3-NA	FAZ-B30/4-NA
32	FAZ-B32/1-NA	FAZ-B32/2-NA	FAZ-B32/3-NA	FAZ-B32/4-NA

#### Note

① Two-piece order. Quantities of two per box.

# 1.2

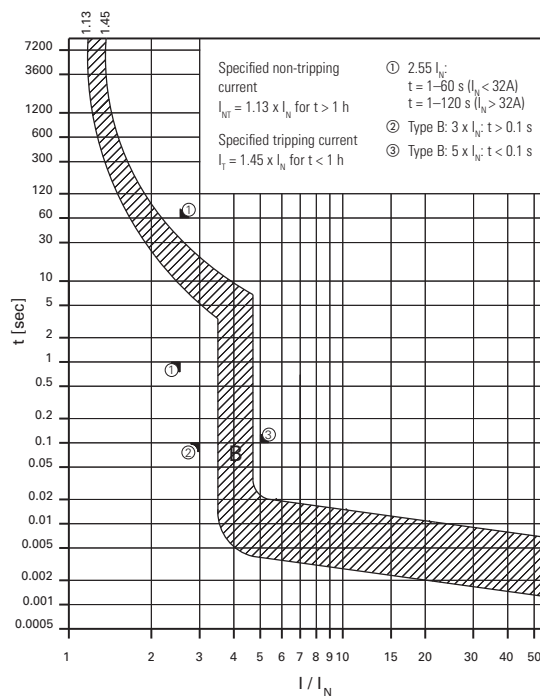
## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### FAZ-NA B Curve 277/480 Vac Rated Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



#### FAZ-RT UL 489 Circuit Breakers with Ring-Tongue Terminals at 277/480 Vac— 10 kAIC, 14 kAIC B Curve (15–25A)

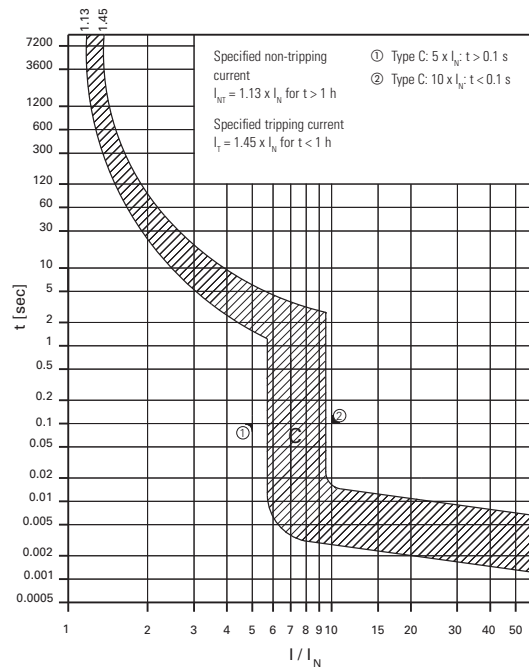
Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>B Curve with Ring-Tongue Terminals (3–5X I<sub>N</sub> Current Rating)</b>				
1	FAZ-B1/1-RT	FAZ-B1/2-RT	FAZ-B1/3-RT	FAZ-B1/4-RT
1.5	FAZ-B1.5/1-RT	FAZ-B1.5/2-RT	FAZ-B1.5/3-RT	FAZ-B1.5/4-RT
2	FAZ-B2/1-RT	FAZ-B2/2-RT	FAZ-B2/3-RT	FAZ-B2/4-RT
3	FAZ-B3/1-RT	FAZ-B3/2-RT	FAZ-B3/3-RT	FAZ-B3/4-RT
4	FAZ-B4/1-RT	FAZ-B4/2-RT	FAZ-B4/3-RT	FAZ-B4/4-RT
5	FAZ-B5/1-RT	FAZ-B5/2-RT	FAZ-B5/3-RT	FAZ-B5/4-RT
6	FAZ-B6/1-RT	FAZ-B6/2-RT	FAZ-B6/3-RT	FAZ-B6/4-RT
7	FAZ-B7/1-RT	FAZ-B7/2-RT	FAZ-B7/3-RT	FAZ-B7/4-RT
8	FAZ-B8/1-RT	FAZ-B8/2-RT	FAZ-B8/3-RT	FAZ-B8/4-RT
10	FAZ-B10/1-RT	FAZ-B10/2-RT	FAZ-B10/3-RT	FAZ-B10/4-RT
13	FAZ-B13/1-RT	FAZ-B13/2-RT	FAZ-B13/3-RT	FAZ-B13/4-RT
15	FAZ-B15/1-RT	FAZ-B15/2-RT	FAZ-B15/3-RT	FAZ-B15/4-RT
16	FAZ-B16/1-RT	FAZ-B16/2-RT	FAZ-B16/3-RT	FAZ-B16/4-RT
20	FAZ-B20/1-RT	FAZ-B20/2-RT	FAZ-B20/3-RT	FAZ-B20/4-RT
25	FAZ-B25/1-RT	FAZ-B25/2-RT	FAZ-B25/3-RT	FAZ-B25/4-RT
30	FAZ-B30/1-RT	FAZ-B30/2-RT	FAZ-B30/3-RT	FAZ-B30/4-RT
32	FAZ-B32/1-RT	FAZ-B32/2-RT	FAZ-B32/3-RT	FAZ-B32/4-RT

#### Note

① Two-piece order. Quantities of two per box.

### FAZ-NA C Curve 277/480 Vac Rated Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



### FAZ-NA UL 489 Circuit Breakers at 277/480 Vac— 10 kAIC, 14 kAIC C Curve (15–25A)

Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>C Curve (5–10X I<sub>n</sub> Current Rating)</b>				
0.5	FAZ-C0.5/1-NA-SP	FAZ-C0.5/2-NA	FAZ-C0.5/3-NA	FAZ-C0.5/4-NA
1	FAZ-C1/1-NA-SP	FAZ-C1/2-NA	FAZ-C1/3-NA	FAZ-C1/4-NA
1.5	FAZ-C1.5/1-NA-SP	FAZ-C1.5/2-NA	FAZ-C1.5/3-NA	FAZ-C1.5/4-NA
2	FAZ-C2/1-NA-SP	FAZ-C2/2-NA	FAZ-C2/3-NA	FAZ-C2/4-NA
3	FAZ-C3/1-NA-SP	FAZ-C3/2-NA	FAZ-C3/3-NA	FAZ-C3/4-NA
4	FAZ-C4/1-NA-SP	FAZ-C4/2-NA	FAZ-C4/3-NA	FAZ-C4/4-NA
5	FAZ-C5/1-NA-SP	FAZ-C5/2-NA	FAZ-C5/3-NA	FAZ-C5/4-NA
6	FAZ-C6/1-NA-SP	FAZ-C6/2-NA	FAZ-C6/3-NA	FAZ-C6/4-NA
7	FAZ-C7/1-NA-SP	FAZ-C7/2-NA	FAZ-C7/3-NA	FAZ-C7/4-NA
8	FAZ-C8/1-NA-SP	FAZ-C8/2-NA	FAZ-C8/3-NA	FAZ-C8/4-NA
10	FAZ-C10/1-NA-SP	FAZ-C10/2-NA	FAZ-C10/3-NA	FAZ-C10/4-NA
13	FAZ-C13/1-NA-SP	FAZ-C13/2-NA	FAZ-C13/3-NA	FAZ-C13/4-NA
15	FAZ-C15/1-NA-SP	FAZ-C15/2-NA	FAZ-C15/3-NA	FAZ-C15/4-NA
16	FAZ-C16/1-NA-SP	FAZ-C16/2-NA	FAZ-C16/3-NA	FAZ-C16/4-NA
20	FAZ-C20/1-NA-SP	FAZ-C20/2-NA	FAZ-C20/3-NA	FAZ-C20/4-NA
25	FAZ-C25/1-NA-SP	FAZ-C25/2-NA	FAZ-C25/3-NA	FAZ-C25/4-NA
30	FAZ-C30/1-NA-SP	FAZ-C30/2-NA	FAZ-C30/3-NA	FAZ-C30/4-NA
32	FAZ-C32/1-NA-SP	FAZ-C32/2-NA	FAZ-C32/3-NA	FAZ-C32/4-NA

**Note**

① Option for single packaging on single-pole C and D curves only; add suffix SP when ordering.

# 1.2

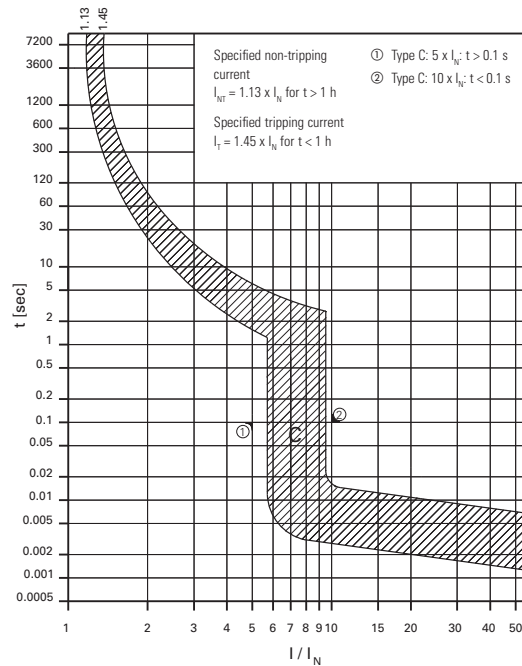
## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### FAZ-NA C Curve 277/480 Vac Rated Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



#### FAZ-RT UL 489 Circuit Breakers with Ring-Tongue Terminals at 277/480 Vac—10 kAIC, 14 kAIC C Curve (15–25A)

Amps	Single-Pole <sup>①</sup> Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>C Curve with Ring-Tongue Terminals (5–10X I<sub>N</sub> Current Rating)</b>				
0.5	FAZ-C0.5/1-RT-SP	FAZ-C0.5/2-RT	FAZ-C0.5/3-RT	FAZ-C0.5/4-RT
1	FAZ-C1/1-RT-SP	FAZ-C1/2-RT	FAZ-C1/3-RT	FAZ-C1/4-RT
1.5	FAZ-C1.5/1-RT-SP	FAZ-C1.5/2-RT	FAZ-C1.5/3-RT	FAZ-C1.5/4-RT
2	FAZ-C2/1-RT-SP	FAZ-C2/2-RT	FAZ-C2/3-RT	FAZ-C2/4-RT
3	FAZ-C3/1-RT-SP	FAZ-C3/2-RT	FAZ-C3/3-RT	FAZ-C3/4-RT
4	FAZ-C4/1-RT-SP	FAZ-C4/2-RT	FAZ-C4/3-RT	FAZ-C4/4-RT
5	FAZ-C5/1-RT-SP	FAZ-C5/2-RT	FAZ-C5/3-RT	FAZ-C5/4-RT
6	FAZ-C6/1-RT-SP	FAZ-C6/2-RT	FAZ-C6/3-RT	FAZ-C6/4-RT
7	FAZ-C7/1-RT-SP	FAZ-C7/2-RT	FAZ-C7/3-RT	FAZ-C7/4-RT
8	FAZ-C8/1-RT-SP	FAZ-C8/2-RT	FAZ-C8/3-RT	FAZ-C8/4-RT
10	FAZ-C10/1-RT-SP	FAZ-C10/2-RT	FAZ-C10/3-RT	FAZ-C10/4-RT
13	FAZ-C13/1-RT-SP	FAZ-C13/2-RT	FAZ-C13/3-RT	FAZ-C13/4-RT
15	FAZ-C15/1-RT-SP	FAZ-C15/2-RT	FAZ-C15/3-RT	FAZ-C15/4-RT
16	FAZ-C16/1-RT-SP	FAZ-C16/2-RT	FAZ-C16/3-RT	FAZ-C16/4-RT
20	FAZ-C20/1-RT-SP	FAZ-C20/2-RT	FAZ-C20/3-RT	FAZ-C20/4-RT
25	FAZ-C25/1-RT-SP	FAZ-C25/2-RT	FAZ-C25/3-RT	FAZ-C25/4-RT
30	FAZ-C30/1-RT-SP	FAZ-C30/2-RT	FAZ-C30/3-RT	FAZ-C30/4-RT
32	FAZ-C32/1-RT-SP	FAZ-C32/2-RT	FAZ-C32/3-RT	FAZ-C32/4-RT

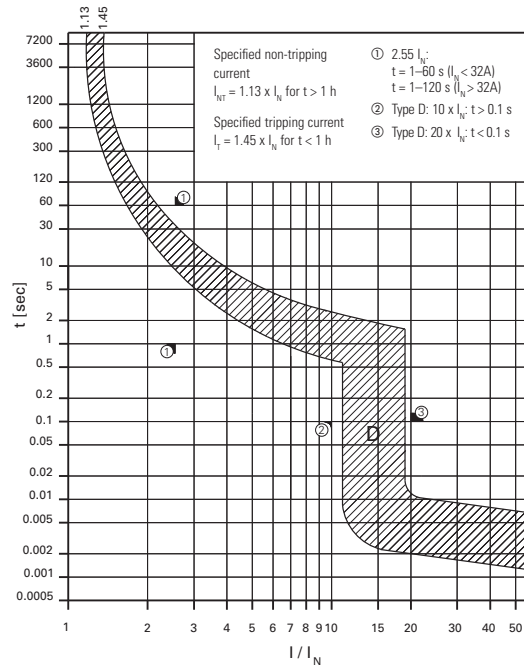
#### Note

<sup>①</sup> Option for single packaging on single-pole C and D curves only.



### FAZ-NA D Curve 277/480 Vac Rated Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



### Single-Pole



### Two-Pole



### Three-Pole



### Four-Pole



### FAZ-NA UL 489 Circuit Breakers at 277/480 Vac— 10 kAIC, 14 kAIC D Curve (13–20A)

Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>D Curve (10–20X I<sub>n</sub> Current Rating)</b>				
0.5	FAZ-D0.5/1-NA-SP	FAZ-D0.5/2-NA	FAZ-D0.5/3-NA	FAZ-D0.5/4-NA
1	FAZ-D1/1-NA-SP	FAZ-D1/2-NA	FAZ-D1/3-NA	FAZ-D1/4-NA
1.5	FAZ-D1.5/1-NA-SP	FAZ-D1.5/2-NA	FAZ-D1.5/3-NA	FAZ-D1.5/4-NA
2	FAZ-D2/1-NA-SP	FAZ-D2/2-NA	FAZ-D2/3-NA	FAZ-D2/4-NA
3	FAZ-D3/1-NA-SP	FAZ-D3/2-NA	FAZ-D3/3-NA	FAZ-D3/4-NA
4	FAZ-D4/1-NA-SP	FAZ-D4/2-NA	FAZ-D4/3-NA	FAZ-D4/4-NA
5	FAZ-D5/1-NA-SP	FAZ-D5/2-NA	FAZ-D5/3-NA	FAZ-D5/4-NA
6	FAZ-D6/1-NA-SP	FAZ-D6/2-NA	FAZ-D6/3-NA	FAZ-D6/4-NA
7	FAZ-D7/1-NA-SP	FAZ-D7/2-NA	FAZ-D7/3-NA	FAZ-D7/4-NA
8	FAZ-D8/1-NA-SP	FAZ-D8/2-NA	FAZ-D8/3-NA	FAZ-D8/4-NA
10	FAZ-D10/1-NA-SP	FAZ-D10/2-NA	FAZ-D10/3-NA	FAZ-D10/4-NA
13	FAZ-D13/1-NA-SP	FAZ-D13/2-NA	FAZ-D13/3-NA	FAZ-D13/4-NA
15	FAZ-D15/1-NA-SP	FAZ-D15/2-NA	FAZ-D15/3-NA	FAZ-D15/4-NA
16	FAZ-D16/1-NA-SP	FAZ-D16/2-NA	FAZ-D16/3-NA	FAZ-D16/4-NA
20	FAZ-D20/1-NA-SP	FAZ-D20/2-NA	FAZ-D20/3-NA	FAZ-D20/4-NA
25	FAZ-D25/1-NA-SP	FAZ-D25/2-NA	FAZ-D25/3-NA	FAZ-D25/4-NA
30	FAZ-D30/1-NA-SP	FAZ-D30/2-NA	FAZ-D30/3-NA	FAZ-D30/4-NA
32	FAZ-D32/1-NA-SP	FAZ-D32/2-NA	FAZ-D32/3-NA	FAZ-D32/4-NA

**Note**

① Option for single packaging on single-pole C and D curves only.

# 1.2

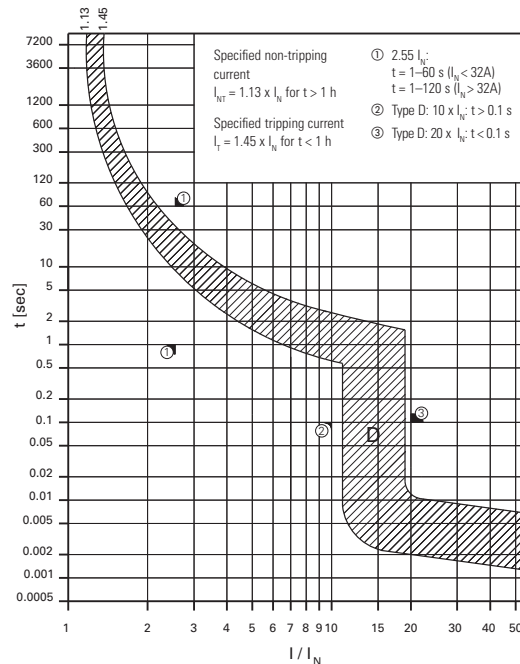
## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

#### FAZ-NA D Curve 277/480 Vac Rated Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



#### FAZ-RT UL 489 Circuit Breakers with Ring-Tongue Terminals at 277/480 Vac— 10 kAIC, 14 kAIC D Curve (13–20A)

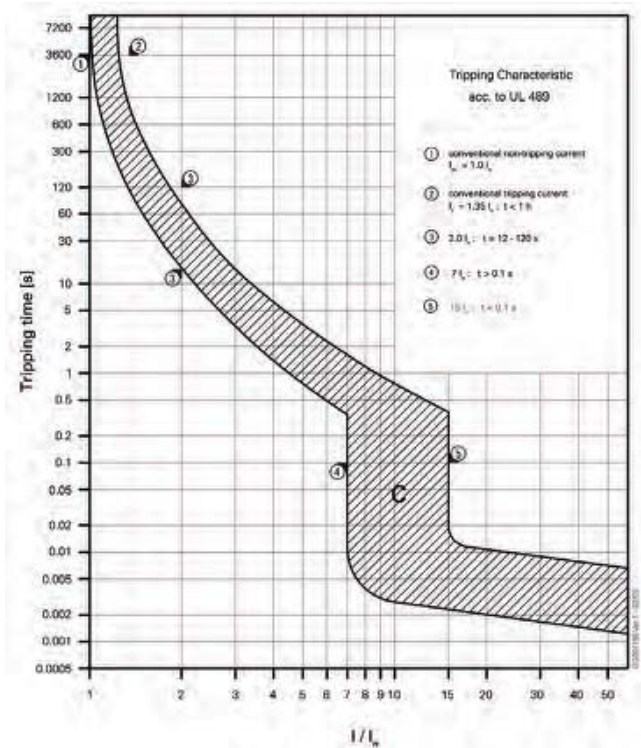
Amps	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>D Curve with Ring-Tongue Terminals (10–20X I<sub>N</sub> Current Rating)</b>				
0.5	FAZ-D0.5/1-RT-SP	FAZ-D0.5/2-RT	FAZ-D0.5/3-RT	FAZ-D0.5/4-RT
1	FAZ-D1/1-RT-SP	FAZ-D1/2-RT	FAZ-D1/3-RT	FAZ-D1/4-RT
1.5	FAZ-D1.5/1-RT-SP	FAZ-D1.5/2-RT	FAZ-D1.5/3-RT	FAZ-D1.5/4-RT
2	FAZ-D2/1-RT-SP	FAZ-D2/2-RT	FAZ-D2/3-RT	FAZ-D2/4-RT
3	FAZ-D3/1-RT-SP	FAZ-D3/2-RT	FAZ-D3/3-RT	FAZ-D3/4-RT
4	FAZ-D4/1-RT-SP	FAZ-D4/2-RT	FAZ-D4/3-RT	FAZ-D4/4-RT
5	FAZ-D5/1-RT-SP	FAZ-D5/2-RT	FAZ-D5/3-RT	FAZ-D5/4-RT
6	FAZ-D6/1-RT-SP	FAZ-D6/2-RT	FAZ-D6/3-RT	FAZ-D6/4-RT
7	FAZ-D7/1-RT-SP	FAZ-D7/2-RT	FAZ-D7/3-RT	FAZ-D7/4-RT
8	FAZ-D8/1-RT-SP	FAZ-D8/2-RT	FAZ-D8/3-RT	FAZ-D8/4-RT
10	FAZ-D10/1-RT-SP	FAZ-D10/2-RT	FAZ-D10/3-RT	FAZ-D10/4-RT
13	FAZ-D13/1-RT-SP	FAZ-D13/2-RT	FAZ-D13/3-RT	FAZ-D13/4-RT
15	FAZ-D15/1-RT-SP	FAZ-D15/2-RT	FAZ-D15/3-RT	FAZ-D15/4-RT
16	FAZ-D16/1-RT-SP	FAZ-D16/2-RT	FAZ-D16/3-RT	FAZ-D16/4-RT
20	FAZ-D20/1-RT-SP	FAZ-D20/2-RT	FAZ-D20/3-RT	FAZ-D20/4-RT
25	FAZ-D25/1-RT-SP	FAZ-D25/2-RT	FAZ-D25/3-RT	FAZ-D25/4-RT
30	FAZ-D30/1-RT-SP	FAZ-D30/2-RT	FAZ-D30/3-RT	FAZ-D30/4-RT
32	FAZ-D32/1-RT-SP	FAZ-D32/2-RT	FAZ-D32/3-RT	FAZ-D32/4-RT

#### Note

① Option for single packaging on single-pole C and D curves only.

### FAZ-NA-DC C Curve at 125 Vdc per Pole Offering

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as Branch Circuit Breakers
- Interrupting capacity: 10 kA at 125 Vdc UL/CSA, 10 kA at 250 Vdc
- 125 Vdc for one-pole, 250 Vdc for two-pole in series
- Current limiting device
- Polarity (+/-) sensitive and not for use on photovoltaic string application
- UL file number E235139



#### Single-Pole



#### Two-Pole



### FAZ-NA-DC UL 489 Circuit Breakers— 10 kAIC at 125 Vdc Per Pole

Amps	Single-Pole <sup>①</sup> Catalog Number	Two-Pole Catalog Number
<b>C Curve (5–10X I<sub>n</sub> Current Rating)</b>		
2	FAZ-C2/1-NA-DC-SP	FAZ-C2/2-NA-DC
3	FAZ-C3/1-NA-DC-SP	FAZ-C3/2-NA-DC
4	FAZ-C4/1-NA-DC-SP	FAZ-C4/2-NA-DC
5	FAZ-C5/1-NA-DC-SP	FAZ-C5/2-NA-DC
6	FAZ-C6/1-NA-DC-SP	FAZ-C6/2-NA-DC
7	FAZ-C7/1-NA-DC-SP	FAZ-C7/2-NA-DC
8	FAZ-C8/1-NA-DC-SP	FAZ-C8/2-NA-DC
10	FAZ-C10/1-NA-DC-SP	FAZ-C10/2-NA-DC
13	FAZ-C13/1-NA-DC-SP	FAZ-C13/2-NA-DC
15	FAZ-C15/1-NA-DC-SP	FAZ-C15/2-NA-DC
16	FAZ-C16/1-NA-DC-SP	FAZ-C16/2-NA-DC
20	FAZ-C20/1-NA-DC-SP	FAZ-C20/2-NA-DC
25	FAZ-C25/1-NA-DC-SP	FAZ-C25/2-NA-DC
30	FAZ-C30/1-NA-DC-SP	FAZ-C30/2-NA-DC
32	FAZ-C32/1-NA-DC-SP	FAZ-C32/2-NA-DC
35	FAZ-C35/1-NA-DC-SP	FAZ-C35/2-NA-DC
40	FAZ-C40/1-NA-DC-SP	FAZ-C40/2-NA-DC

#### Note

<sup>①</sup> Option for single packaging on single-pole C curves only; add suffix SP when ordering.

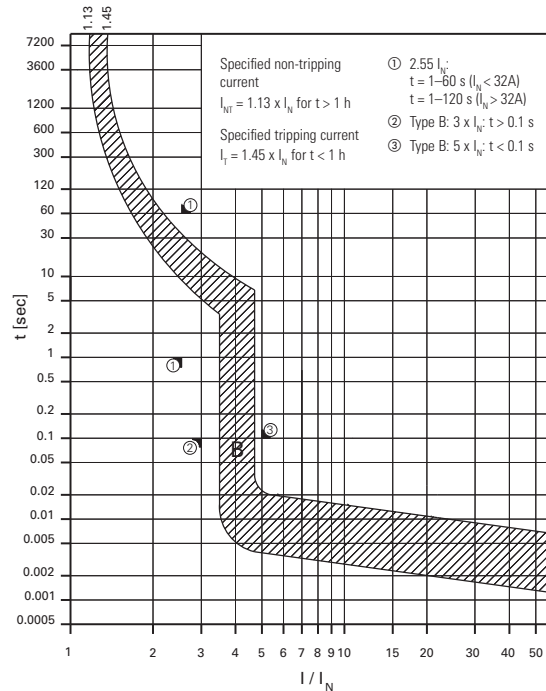
# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

#### 1 FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC B Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- 48 Vdc for single-pole
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



#### FAZ-NA-L UL 489 Circuit Breakers at 240 Vac— 10 kAIC, 14 kAIC B Curve (15–25A)

Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>B Curve (3–5X I<sub>N</sub> Current Rating)</b>				
1	FAZ-B1/1-NA-L	FAZ-B1/2-NA-L	FAZ-B1/3-NA-L	FAZ-B1/4-NA-L
1.5	FAZ-B1.5/1-NA-L	FAZ-B1.5/2-NA-L	FAZ-B1.5/3-NA-L	FAZ-B1.5/4-NA-L
2	FAZ-B2/1-NA-L	FAZ-B2/2-NA-L	FAZ-B2/3-NA-L	FAZ-B2/4-NA-L
3	FAZ-B3/1-NA-L	FAZ-B3/2-NA-L	FAZ-B3/3-NA-L	FAZ-B3/4-NA-L
4	FAZ-B4/1-NA-L	FAZ-B4/2-NA-L	FAZ-B4/3-NA-L	FAZ-B4/4-NA-L
5	FAZ-B5/1-NA-L	FAZ-B5/2-NA-L	FAZ-B5/3-NA-L	FAZ-B5/4-NA-L
6	FAZ-B6/1-NA-L	FAZ-B6/2-NA-L	FAZ-B6/3-NA-L	FAZ-B6/4-NA-L
7	FAZ-B7/1-NA-L	FAZ-B7/2-NA-L	FAZ-B7/3-NA-L	FAZ-B7/4-NA-L
8	FAZ-B8/1-NA-L	FAZ-B8/2-NA-L	FAZ-B8/3-NA-L	FAZ-B8/4-NA-L
10	FAZ-B10/1-NA-L	FAZ-B10/2-NA-L	FAZ-B10/3-NA-L	FAZ-B10/4-NA-L
13	FAZ-B13/1-NA-L	FAZ-B13/2-NA-L	FAZ-B13/3-NA-L	FAZ-B13/4-NA-L
15	FAZ-B15/1-NA-L	FAZ-B15/2-NA-L	FAZ-B15/3-NA-L	FAZ-B15/4-NA-L
16	FAZ-B16/1-NA-L	FAZ-B16/2-NA-L	FAZ-B16/3-NA-L	FAZ-B16/4-NA-L
20	FAZ-B20/1-NA-L	FAZ-B20/2-NA-L	FAZ-B20/3-NA-L	FAZ-B20/4-NA-L
25	FAZ-B25/1-NA-L	FAZ-B25/2-NA-L	FAZ-B25/3-NA-L	FAZ-B25/4-NA-L
30	FAZ-B30/1-NA-L	FAZ-B30/2-NA-L	FAZ-B30/3-NA-L	FAZ-B30/4-NA-L
32	FAZ-B32/1-NA-L	FAZ-B32/2-NA-L	FAZ-B32/3-NA-L	FAZ-B32/4-NA-L
35 ②	FAZ-B35/1-NA	FAZ-B35/2-NA	FAZ-B35/3-NA	FAZ-B35/4-NA
40 ②	FAZ-B40/1-NA	FAZ-B40/2-NA	FAZ-B40/3-NA	FAZ-B40/4-NA
50	FAZ-B50/1-NA	FAZ-B50/2-NA	FAZ-B50/3-NA	FAZ-B50/4-NA
63	FAZ-B63/1-NA	FAZ-B63/2-NA	FAZ-B63/3-NA	FAZ-B63/4-NA

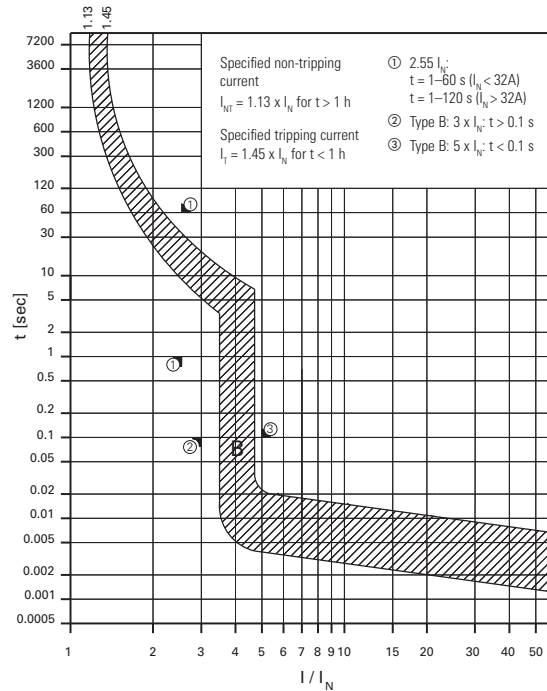
#### Notes

① Two-piece order. Quantities of two per box.

② 35A and 40A at 240 Vac were available prior to the creation of the FAZ-NA-L offering so the catalog numbers at these amperages exclude the “L” suffix.

### FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC B Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- 48 Vdc for single-pole
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



### FAZ-RT-L UL 489 Circuit Breakers with Ring-Tongue Terminals at 240 Vac— 10 kAIC, 14 kAIC B Curve (15–25A)

Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>B Curve with Ring-Tongue Terminals (3–5X I<sub>N</sub> Current Rating)</b>				
1	FAZ-B1/1-RT-L	FAZ-B1/2-RT-L	FAZ-B1/3-RT-L	FAZ-B1/4-RT-L
1.5	FAZ-B1.5/1-RT-L	FAZ-B1.5/2-RT-L	FAZ-B1.5/3-RT-L	FAZ-B1.5/4-RT-L
2	FAZ-B2/1-RT-L	FAZ-B2/2-RT-L	FAZ-B2/3-RT-L	FAZ-B2/4-RT-L
3	FAZ-B3/1-RT-L	FAZ-B3/2-RT-L	FAZ-B3/3-RT-L	FAZ-B3/4-RT-L
4	FAZ-B4/1-RT-L	FAZ-B4/2-RT-L	FAZ-B4/3-RT-L	FAZ-B4/4-RT-L
5	FAZ-B5/1-RT-L	FAZ-B5/2-RT-L	FAZ-B5/3-RT-L	FAZ-B5/4-RT-L
6	FAZ-B6/1-RT-L	FAZ-B6/2-RT-L	FAZ-B6/3-RT-L	FAZ-B6/4-RT-L
7	FAZ-B7/1-RT-L	FAZ-B7/2-RT-L	FAZ-B7/3-RT-L	FAZ-B7/4-RT-L
8	FAZ-B8/1-RT-L	FAZ-B8/2-RT-L	FAZ-B8/3-RT-L	FAZ-B8/4-RT-L
10	FAZ-B10/1-RT-L	FAZ-B10/2-RT-L	FAZ-B10/3-RT-L	FAZ-B10/4-RT-L
13	FAZ-B13/1-RT-L	FAZ-B13/2-RT-L	FAZ-B13/3-RT-L	FAZ-B13/4-RT-L
15	FAZ-B15/1-RT-L	FAZ-B15/2-RT-L	FAZ-B15/3-RT-L	FAZ-B15/4-RT-L
16	FAZ-B16/1-RT-L	FAZ-B16/2-RT-L	FAZ-B16/3-RT-L	FAZ-B16/4-RT-L
20	FAZ-B20/1-RT-L	FAZ-B20/2-RT-L	FAZ-B20/3-RT-L	FAZ-B20/4-RT-L
25	FAZ-B25/1-RT-L	FAZ-B25/2-RT-L	FAZ-B25/3-RT-L	FAZ-B25/4-RT-L
30	FAZ-B30/1-RT-L	FAZ-B30/2-RT-L	FAZ-B30/3-RT-L	FAZ-B30/4-RT-L
32	FAZ-B32/1-RT-L	FAZ-B32/2-RT-L	FAZ-B32/3-RT-L	FAZ-B32/4-RT-L
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40 ②	FAZ-B40/1-RT	FAZ-B40/2-RT	FAZ-B40/3-RT	FAZ-B40/4-RT
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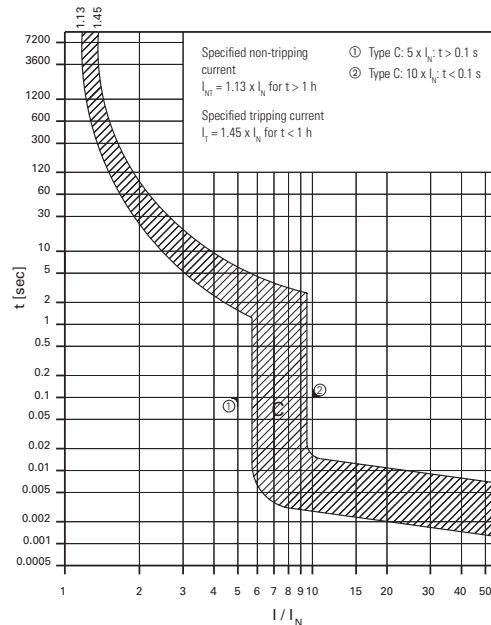
#### Notes

① Two-piece order. Quantities of two per box.

② 35A and 40A at 240 Vac were available prior to the creation of the FAZ-NA-L offering so the catalog numbers at these amperages exclude the “L” suffix.

#### 1 FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC C Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- 48 Vdc for single-pole
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



#### FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC, 14 kAIC C Curve (15–25A)

Amps	Single-Pole <sup>①</sup> Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>C Curve (5–10X I<sub>N</sub> Current Rating)</b>				
0.5	FAZ-C0.5/1-NA-L	FAZ-C0.5/2-NA-L	FAZ-C0.5/3-NA-L	FAZ-C0.5/4-NA-L
1	FAZ-C1/1-NA-L	FAZ-C1/2-NA-L	FAZ-C1/3-NA-L	FAZ-C1/4-NA-L
1.5	FAZ-C1.5/1-NA-L	FAZ-C1.5/2-NA-L	FAZ-C1.5/3-NA-L	FAZ-C1.5/4-NA-L
2	FAZ-C2/1-NA-L	FAZ-C2/2-NA-L	FAZ-C2/3-NA-L	FAZ-C2/4-NA-L
3	FAZ-C3/1-NA-L	FAZ-C3/2-NA-L	FAZ-C3/3-NA-L	FAZ-C3/4-NA-L
4	FAZ-C4/1-NA-L	FAZ-C4/2-NA-L	FAZ-C4/3-NA-L	FAZ-C4/4-NA-L
5	FAZ-C5/1-NA-L	FAZ-C5/2-NA-L	FAZ-C5/3-NA-L	FAZ-C5/4-NA-L
6	FAZ-C6/1-NA-L	FAZ-C6/2-NA-L	FAZ-C6/3-NA-L	FAZ-C6/4-NA-L
7	FAZ-C7/1-NA-L	FAZ-C7/2-NA-L	FAZ-C7/3-NA-L	FAZ-C7/4-NA-L
8	FAZ-C8/1-NA-L	FAZ-C8/2-NA-L	FAZ-C8/3-NA-L	FAZ-C8/4-NA-L
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16	FAZ-C16/1-NA-L	FAZ-C16/2-NA-L	FAZ-C16/3-NA-L	FAZ-C16/4-NA-L
20	FAZ-C20/1-NA-L	FAZ-C20/2-NA-L	FAZ-C20/3-NA-L	FAZ-C20/4-NA-L
25	FAZ-C25/1-NA-L	FAZ-C25/2-NA-L	FAZ-C25/3-NA-L	FAZ-C25/4-NA-L
30	FAZ-C30/1-NA-L	FAZ-C30/2-NA-L	FAZ-C30/3-NA-L	FAZ-C30/4-NA-L
32	FAZ-C32/1-NA-L	FAZ-C32/2-NA-L	FAZ-C32/3-NA-L	FAZ-C32/4-NA-L
35 <sup>②</sup>	FAZ-C35/1-NA-SP	FAZ-C35/2-NA	FAZ-C35/3-NA	FAZ-C35/4-NA
40 <sup>②</sup>	FAZ-C40/1-NA-SP	FAZ-C40/2-NA	FAZ-C40/3-NA	FAZ-C40/4-NA
50	FAZ-C50/1-NA	FAZ-C50/2-NA	FAZ-C50/3-NA	FAZ-C50/4-NA
63	FAZ-C63/1-NA	FAZ-C63/2-NA	FAZ-C63/3-NA	FAZ-C63/4-NA

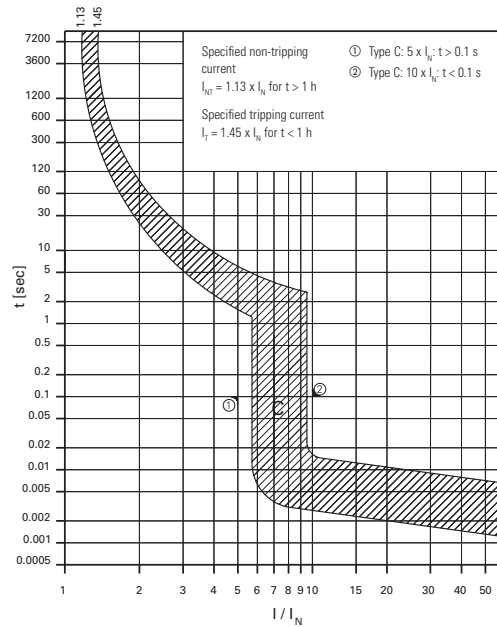
#### Notes

<sup>①</sup> Two-piece order. Quantities of two per box.

<sup>②</sup> 35A and 40A at 240 Vac were available prior to the creation of the FAZ-NA-L offering so the catalog numbers at these amperages exclude the “L” suffix.

### FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC C Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- 48 Vdc for single-pole
- Current limiting device
- UL file number E235139



### Single-Pole



### Two-Pole



### Three-Pole



### Four-Pole



### FAZ-RT-L UL 489 Circuit Breakers with Ring-Tongue Terminals at 240 Vac— 10 kAIC, 14 kAIC C Curve (15–25A)

Amps	Single-Pole Catalog Number ①	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>C Curve with Ring-Tongue Terminals (5–10X I<sub>n</sub> Current Rating)</b>				
0.5	FAZ-C0.5/1-RT-L	FAZ-C0.5/2-RT-L	FAZ-C0.5/3-RT-L	FAZ-C0.5/4-RT-L
1	FAZ-C1/1-RT-L	FAZ-C1/2-RT-L	FAZ-C1/3-RT-L	FAZ-C1/4-RT-L
1.5	FAZ-C1.5/1-RT-L	FAZ-C1.5/2-RT-L	FAZ-C1.5/3-RT-L	FAZ-C1.5/4-RT-L
2	FAZ-C2/1-RT-L	FAZ-C2/2-RT-L	FAZ-C2/3-RT-L	FAZ-C2/4-RT-L
3	FAZ-C3/1-RT-L	FAZ-C3/2-RT-L	FAZ-C3/3-RT-L	FAZ-C3/4-RT-L
4	FAZ-C4/1-RT-L	FAZ-C4/2-RT-L	FAZ-C4/3-RT-L	FAZ-C4/4-RT-L
5	FAZ-C5/1-RT-L	FAZ-C5/2-RT-L	FAZ-C5/3-RT-L	FAZ-C5/4-RT-L
6	FAZ-C6/1-RT-L	FAZ-C6/2-RT-L	FAZ-C6/3-RT-L	FAZ-C6/4-RT-L
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13	FAZ-C13/1-RT-L	FAZ-C13/2-RT-L	FAZ-C13/3-RT-L	FAZ-C13/4-RT-L
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25	FAZ-C25/1-RT-L	FAZ-C25/2-RT-L	FAZ-C25/3-RT-L	FAZ-C25/4-RT-L
30	FAZ-C30/1-RT-L	FAZ-C30/2-RT-L	FAZ-C30/3-RT-L	FAZ-C30/4-RT-L
32	FAZ-C32/1-RT-L	FAZ-C32/2-RT-L	FAZ-C32/3-RT-L	FAZ-C32/4-RT-L
35 ②	FAZ-C35/1-RT-SP	FAZ-C35/2-RT	FAZ-C35/3-RT	FAZ-C35/4-RT
40 ②	FAZ-C40/1-RT-SP	FAZ-C40/2-RT	FAZ-C40/3-RT	FAZ-C40/4-RT
50	FAZ-C50/1-RT	FAZ-C50/2-RT	FAZ-C50/3-RT	FAZ-C50/4-RT
63	FAZ-C63/1-RT	FAZ-C63/2-RT	FAZ-C63/3-RT	FAZ-C63/4-RT

#### Notes

- ① Two-piece order. Quantities of two per box.
- ② 35A and 40A at 240 Vac were available prior to the creation of the FAZ-NA-L offering so the catalog numbers at these amperages exclude the "L" suffix.

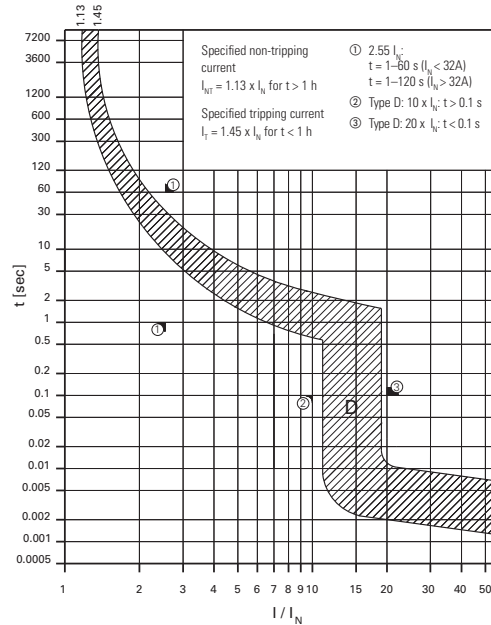
# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

#### 1 FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC D Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No.5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- 48 Vdc for single-pole
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



#### FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC, 14 kAIC D Curve (13–20A)

Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>D Curve (10–20X I<sub>N</sub> Current Rating)</b>				
0.5	FAZ-D0.5/1-NA-L	FAZ-D0.5/2-NA-L	FAZ-D0.5/3-NA-L	FAZ-D0.5/4-NA-L
1	FAZ-D1/1-NA-L	FAZ-D1/2-NA-L	FAZ-D1/3-NA-L	FAZ-D1/4-NA-L
1.5	FAZ-D1.5/1-NA-L	FAZ-D1.5/2-NA-L	FAZ-D1.5/3-NA-L	FAZ-D1.5/4-NA-L
2	FAZ-D2/1-NA-L	FAZ-D2/2-NA-L	FAZ-D2/3-NA-L	FAZ-D2/4-NA-L
3	FAZ-D3/1-NA-L	FAZ-D3/2-NA-L	FAZ-D3/3-NA-L	FAZ-D3/4-NA-L
4	FAZ-D4/1-NA-L	FAZ-D4/2-NA-L	FAZ-D4/3-NA-L	FAZ-D4/4-NA-L
5	FAZ-D5/1-NA-L	FAZ-D5/2-NA-L	FAZ-D5/3-NA-L	FAZ-D5/4-NA-L
6	FAZ-D6/1-NA-L	FAZ-D6/2-NA-L	FAZ-D6/3-NA-L	FAZ-D6/4-NA-L
7	FAZ-D7/1-NA-L	FAZ-D7/2-NA-L	FAZ-D7/3-NA-L	FAZ-D7/4-NA-L
8	FAZ-D8/1-NA-L	FAZ-D8/2-NA-L	FAZ-D8/3-NA-L	FAZ-D8/4-NA-L
10	FAZ-D10/1-NA-L	FAZ-D10/2-NA-L	FAZ-D10/3-NA-L	FAZ-D10/4-NA-L
13	FAZ-D13/1-NA-L	FAZ-D13/2-NA-L	FAZ-D13/3-NA-L	FAZ-D13/4-NA-L
15	FAZ-D15/1-NA-L	FAZ-D15/2-NA-L	FAZ-D15/3-NA-L	FAZ-D15/4-NA-L
16	FAZ-D16/1-NA-L	FAZ-D16/2-NA-L	FAZ-D16/3-NA-L	FAZ-D16/4-NA-L
20	FAZ-D20/1-NA-L	FAZ-D20/2-NA-L	FAZ-D20/3-NA-L	FAZ-D20/4-NA-L
25	FAZ-D25/1-NA-L	FAZ-D25/2-NA-L	FAZ-D25/3-NA-L	FAZ-D25/4-NA-L
30	FAZ-D30/1-NA-L	FAZ-D30/2-NA-L	FAZ-D30/3-NA-L	FAZ-D30/4-NA-L
32	FAZ-D32/1-NA-L	FAZ-D32/2-NA-L	FAZ-D32/3-NA-L	FAZ-D32/4-NA-L
35 ②	FAZ-D35/1-NA-SP	FAZ-D35/2-NA	FAZ-D35/3-NA	FAZ-D35/4-NA
40 ②	FAZ-D40/1-NA-SP	FAZ-D40/2-NA	FAZ-D40/3-NA	FAZ-D40/4-NA

#### Notes

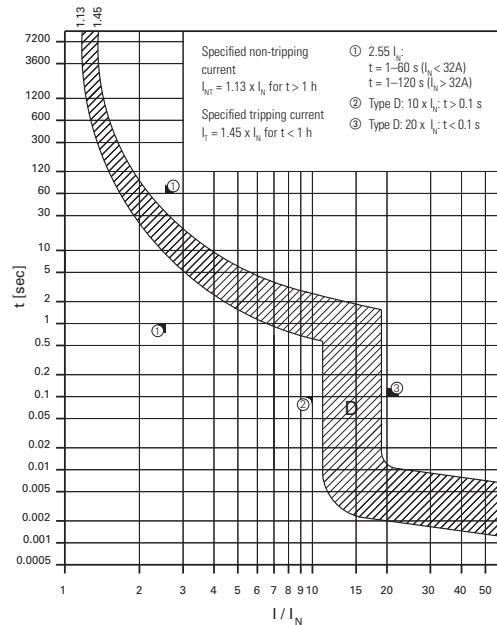
① Two-piece order. Quantities of two per box.

② 35A and 40A at 240 Vac were available prior to the creation of the FAZ-NA-L offering so the catalog numbers at these amperages exclude the "L" suffix.



### FAZ-NA-L UL 489 Circuit Breakers at 240 Vac—10 kAIC D Curve

- UL approved (UL 489) and CSA Certified (CSA C22.2 No. 5-02) as branch circuit breakers
- Interrupting capacity: 10 kA UL/CSA; 15 kA IEC 60947-2
- 48 Vdc for single-pole
- Current limiting device
- UL file number E235139



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### Four-Pole



### FAZ-RT-L UL 489 Circuit Breakers with Ring-Tongue Terminals at 240 Vac— 10 kAIC, 14 kAIC D Curve (13–20A)




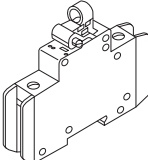
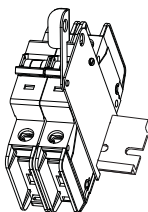
Amps	Single-Pole ① Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
<b>D Curve with Ring-Tongue Terminals (10–20X I<sub>N</sub> Current Rating)</b>				
0.5	FAZ-D0.5/1-RT-L	FAZ-D0.5/2-RT-L	FAZ-D0.5/3-RT-L	FAZ-D0.5/4-RT-L
1	FAZ-D1/1-RT-L	FAZ-D1/2-RT-L	FAZ-D1/3-RT-L	FAZ-D1/4-RT-L
1.5	FAZ-D1.5/1-RT-L	FAZ-D1.5/2-RT-L	FAZ-D1.5/3-RT-L	FAZ-D1.5/4-RT-L
2	FAZ-D2/1-RT-L	FAZ-D2/2-RT-L	FAZ-D2/3-RT-L	FAZ-D2/4-RT-L
3	FAZ-D3/1-RT-L	FAZ-D3/2-RT-L	FAZ-D3/3-RT-L	FAZ-D3/4-RT-L
4	FAZ-D4/1-RT-L	FAZ-D4/2-RT-L	FAZ-D4/3-RT-L	FAZ-D4/4-RT-L
5	FAZ-D5/1-RT-L	FAZ-D5/2-RT-L	FAZ-D5/3-RT-L	FAZ-D5/4-RT-L
6	FAZ-D6/1-RT-L	FAZ-D6/2-RT-L	FAZ-D6/3-RT-L	FAZ-D6/4-RT-L
7	FAZ-D7/1-RT-L	FAZ-D7/2-RT-L	FAZ-D7/3-RT-L	FAZ-D7/4-RT-L
8	FAZ-D8/1-RT-L	FAZ-D8/2-RT-L	FAZ-D8/3-RT-L	FAZ-D8/4-RT-L
10	FAZ-D10/1-RT-L	FAZ-D10/2-RT-L	FAZ-D10/3-RT-L	FAZ-D10/4-RT-L
13	FAZ-D13/1-RT-L	FAZ-D13/2-RT-L	FAZ-D13/3-RT-L	FAZ-D13/4-RT-L
15	FAZ-D15/1-RT-L	FAZ-D15/2-RT-L	FAZ-D15/3-RT-L	FAZ-D15/4-RT-L
16	FAZ-D16/1-RT-L	FAZ-D16/2-RT-L	FAZ-D16/3-RT-L	FAZ-D16/4-RT-L
20	FAZ-D20/1-RT-L	FAZ-D20/2-RT-L	FAZ-D20/3-RT-L	FAZ-D20/4-RT-L
25	FAZ-D25/1-RT-L	FAZ-D25/2-RT-L	FAZ-D25/3-RT-L	FAZ-D25/4-RT-L
30	FAZ-D30/1-RT-L	FAZ-D30/2-RT-L	FAZ-D30/3-RT-L	FAZ-D30/4-RT-L
32	FAZ-D32/1-RT-L	FAZ-D32/2-RT-L	FAZ-D32/3-RT-L	FAZ-D32/4-RT-L
35 ②	FAZ-D35/1-RT-SP	FAZ-D35/2-RT	FAZ-D35/3-RT	FAZ-D35/4-RT
40 ②	FAZ-D40/1-RT-SP	FAZ-D40/2-RT	FAZ-D40/3-RT	FAZ-D40/4-RT

#### Notes



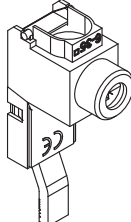
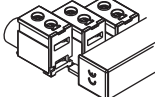
- ① Two-piece order. Quantities of two per box.
- ② 35A and 40A at 240 Vac were available prior to the creation of the FAZ-NA-L offering so the catalog numbers at these amperages exclude the "L" suffix.

#### Accessories

#### FAZ-NA and FAZ-NA-L UL 489 Breakers

	Description	Catalog Number
<b>Contact</b>	Two-pole contact or auxiliary contact/trip indicating contact	<b>Z-NHK</b> <sup>①</sup>
		
<b>Auxiliary Contact</b>	Auxiliary contact	<b>Z-IHK-NA</b>
		
<b>Shunt Trip</b>	Shunt trip 110–415 Vac Shunt trip 12–110 Vac	<b>FAZ-XAA-NA110-415VAC</b> <b>FAZ-XAA-NA12-110VAC</b>
		
<b>Padlock Hasp</b>	Padlock hasp	<b>Z-IS/SPE-1TE</b>
		
<b>Lockoff Device</b>	UL lockoff device	<b>FAZPLOFF</b>
		

#### FAZ-NA and FAZ-NA-L UL 489 Breakers, continued

	Description	Catalog Number
<b>Busbar</b>	Busbar—single-pole, 6 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/1P-1TE/6</b>
	Busbar—single-pole, 12 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/1P-1TE/12</b>
	Busbar—single-pole, 18 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/1P-1TE/18</b>
	Busbar—two-pole, 6 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/2P-2TE/6</b>
	Busbar—two-pole, 12 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/2P-2TE/12</b>
	Busbar—two-pole, 18 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/2P-2TE/18</b>
	Busbar—three-pole, 6 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/3P-3TE/6</b>
	Busbar—three-pole, 12 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/3P-3TE/12</b>
	Busbar—three-pole, 18 terminals <sup>②③④⑤</sup>	<b>Z-SV/UL-16/3P-3TE/18</b>
<b>Busbar Shroud</b>	Three-pole busbar shroud	<b>ZV-BS-UL</b>
		
<b>Extension Terminal</b>	Extension terminal—35 mm <sup>2</sup> (10–1/0 AWG)	<b>Z-EK/35/UL</b>
		
<b>Bus Connector</b>	Bus connector—conductors up to 50 mm <sup>2</sup> (–1/0 AWG)	<b>Z-EB/50/UL</b>
		

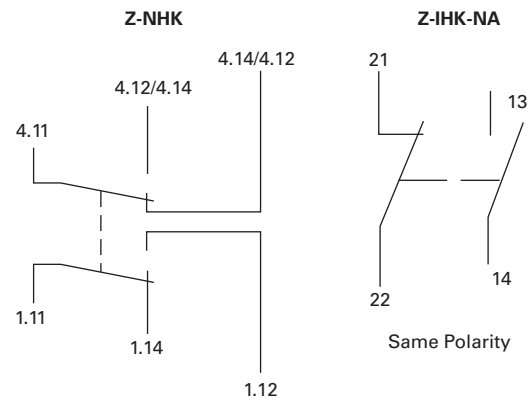
#### Notes

- ① Voltage of FAZ-NA circuit breaker is limited to 300V with this auxiliary contact installed.
- ② Do not cut commoning link.
- ③ A maximum of three commoning links may be used in conjunction. Each breaker connected to the commoning link must have the same number of poles for proper use.
- ④ Not for use with ring-tongue circuit breakers.
- ⑤ Bus may be center fed for high current capacity.

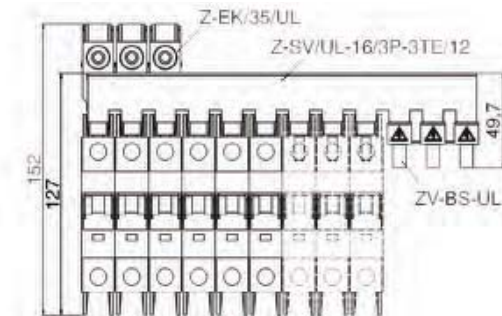
### Tripping Signal Switch Z-NHK, Z-IHK-NA

- Design according to IEC/EN 60947-5-1, IEC/EN 62019
- Field installable
- The specified minimum voltages are per contact—take into account particularly in case of series connection
- Self-cleaning contacts
- Contact material and design particularly suitable for extra low voltage
- Z-NHK: the function of one of the two change-over contacts can be switched from “auxiliary switch” to “tripping signal switch”
- Tripping signal contact transmits message of electric tripping, not mechanical switch-off
- Test key for contact function “electrical tripping”
- Z-IHK-NA: will allow for > 480Y/277 Vac rating

### Connection Diagram



### Busbar Connection Example



1

Z-NHK

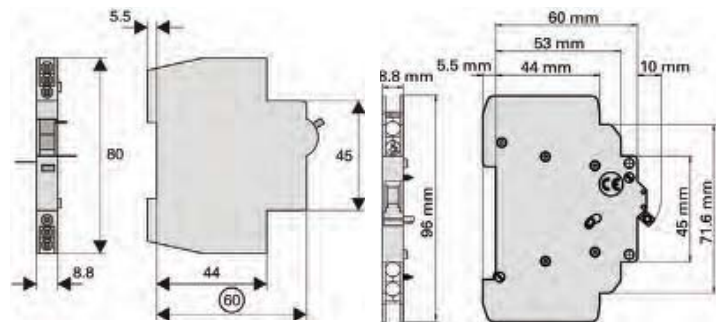


Z-IHK-NA



#### Contact and Auxiliary Contact

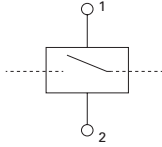
Description	Z-NHK	Z-IHK-NA
<b>Electrical</b>		
Contact function	2CO	1NO + 1NC
Rated voltage	230V	250V
Frequency	50/60 Hz	50/60 Hz
Rated current	2A	6A
Rated thermal current $I_{th}$	2A	6A
Utilization category AC13 Rated operational current $I_{\theta}$	3A/250 Vac	3A/250 Vac
Utilization category AC15 Rated operational current $I_{\theta}$	2A/250 Vac	2A/250 Vac
Utilization category DC12 Rated operational current $I_{\theta}$	0.5A/110 Vdc	0.5A/110 Vdc 0.25A/220 Vdc
Rated insulation voltage $U_i$	250 Vac	250 Vac
Minimum operational voltage per contact $U_{min}$	5 Vdc	5 Vdc
Minimum operational current $I_{min}$	10 mA DC	10 mA AC/DC
Rated peak withstand voltage $U_{imp}$ (1.2/50 $\mu$ )	2.5 kV	4 kV
Conditional short-circuit current $I_k$ with backup fuse 6A	1 kA	1 kA
Max. backup fuse, overload and short circuit	6A gL	—
<b>Mechanical</b>		
Tripping indicator "electrical tripping"	Blue/white	—
Frame size	45 mm	45 mm
Device height	80 mm	80 mm
Device width	8.8 mm (0.5MU)	8.8 mm (0.5MU)
Mounting	Onto switching device	—
Degree of protection, built-in	IP40	IP40
Terminal protection	Finger and hand touch safe According to BGV A3, ÖVE-EN 6	Finger and hand touch safe According to BGV A3, ÖVE-EN 6
Terminals	Lift terminals	Lift terminals
Terminal capacity	20–14 AWG	0.5–2.5 mm <sup>2</sup>
Terminal screws	M3 (Posidrive Z0)	M3 (Posidrive Z0)
Fastening torque of terminal screws	7 lb-in	Max. 1.2 Nm



### Shunt trip release FAZ-XAA-NA

- Remote release for subsequent mounting onto FAZ-NA/RT
- Additional installation of standard auxiliary switch is possible
- Position indicator red–green

#### Connection Diagram



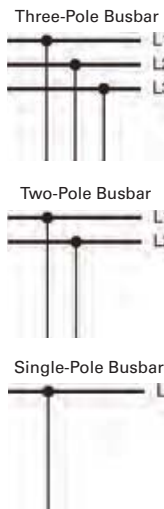
### Shunt Trip Release FAZ-XAA-NA

Description	FAZ-XAA-NA12-110VAC	FAZ-XAA-NA110-415VAC
<b>Electrical</b>		
Can be mounted onto	FAZ-NA / FAZ-NA-DC / FAZ-RT	FAZ-NA / FAZ-NA-DC / FAZ-RT
Operational voltage range	12–110 Vac 12–60 Vdc	110–415 Vac 110–230 Vdc
Frequency	50/60 Hz	50/60 Hz
<b>Mechanical</b>		
Frame size	45 mm	45 mm
Device height	105 mm	105 mm
Device width	17.5 mm	17.5 mm
Mounting	Quick fastening with two lock-in positions on EN 50022	
Degree of protection, built-in	IP40	IP40
Terminal protection	Finger and hand touch safe according to BGV A3, ÖVE-EN 6	
Terminals	Open mouthed/lift	Open mouthed/lift
Terminal capacity One and two wires	18–10 AWG	18–10 AWG

### Busbar block UL 489 (pin)

- Tested according to UL 489
- Do not cut
- Extension terminal 35 mm<sup>2</sup> Z-EK/35/UL for copper conductors
- Incoming terminal 50 mm<sup>2</sup> Z-EB/50/UL
- For covering of not used pins, use busbar tag shrouds ZV-BS-UL

#### Connection Diagrams



### Busbar Block UL 489 (Pin)

Description	UL 489	IEC/EN 60947-2
<b>Electrical</b>		
Rated operational voltage	480/277 Vac 96 Vdc	—
Rated frequency	50/60 Hz	—
Rated voltage	480 Vac	690 Vac
Overvoltage category	—	III
Rated impulse withstand voltage $U_{imp}$	—	9.5 kV
Rated current	80A at 40°C	80A at 30°C
Rated conditional short-circuit current AC with 350A gG	—	15 kA
Short-circuit current	10 kA	—
<b>Mechanical</b>		
Busbar cross section	—	16 mm <sup>2</sup> Cu
Flame class according to UL 94	V0	—
Pollution degree	—	2
Comparative tracking index	—	CTI 600
Minimum clearance (internal/external)	—	> 9.5/25.4 mm
Minimum creepage distance (internal/external)	—	> 12.7/50.8 mm
Resistance to climatic conditions	—	According to DIN/EN 60068

#### 1

### Technical Data and Specifications

#### Trip Curve Chart

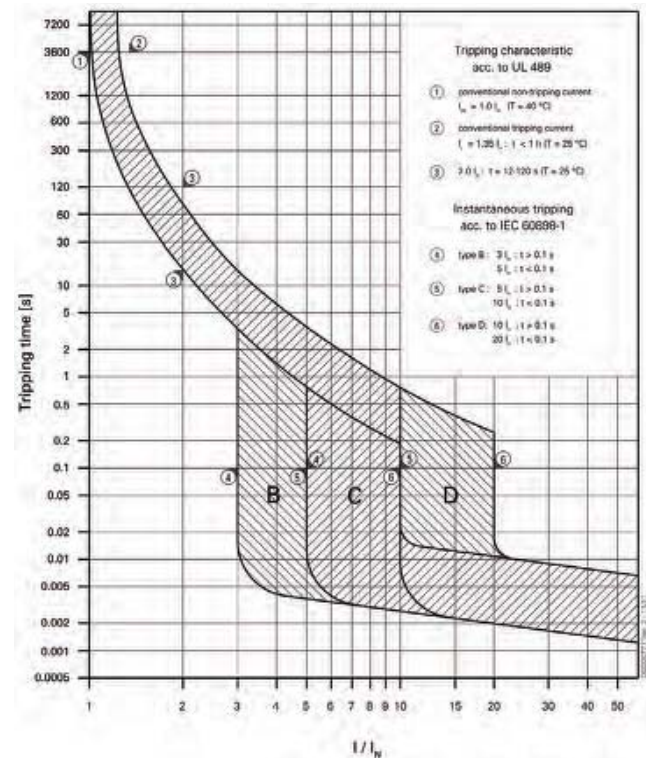
Eaton FAZ-NA and FAZ-NA-L branch circuit breakers are available with "B," "C" and "D" tripping characteristics. B-curve devices are suitable for applications where low levels of inrush current are expected.

C-curve devices are suitable for applications where medium levels of inrush current are expected. Applications include small transformers, lighting, pilot devices, control circuits and coils. C-curve devices provide a medium magnetic trip point.

D-curve devices are suitable for applications where high levels of inrush current are expected. The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.

Eaton FAZ-NA and FAZ-NA-L devices are current limiting, which means they interrupt fault currents within one half cycle of the fault. Current limiting devices offer superior protection by reducing peak let-through current and energy.

#### Tripping Characteristics

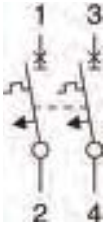


### Connection Diagrams

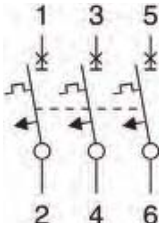
Single-Pole



Two-Pole



Three-Pole



### UL 489 Miniature Circuit Breakers Technical Data

Description	FAZ-NA	FAZ-NA-DC	FAZ-NA-L	
<b>Electrical</b>				
Design according to	UL 489, CSA C22.2 No.5, IEC 60947-2	UL 489, CSA C22.2 No.5, IEC 60947-2	UL 489, CSA C22.2 No.5, IEC 60947-2	
Rated voltage	Single-pole: 277 Vac 2-, 3- or 4-pole: 277/480 Vac	125 Vdc per pole 250 Vdc with 2-poles in connected series	Single-pole: 240 Vac 2-, 3- or 4-pole: 240 Vac	
	Single-pole: 48 Vdc per pole 2-pole in series: 96 Vdc	—	Single-pole: 48 Vdc per pole 2-pole in series: 96 Vdc	
Rated current	B: 1–32 A C & D: 0.5–32 A	C: 2–40 A	B: 1–63 A C: 0.5–63 A D: 0.5–40 A	
Characteristic	B, C, D	C	B, C, D	
Current interrupting rating	B curve—10 kA: 1–13 A, 30–32 A C curve—10 kA: 0.5–13 A, 30–32 A B & C curve—14 kA: 15–25 A D curve—10 kA: 0.5–10 A, 25–32 A D curve—14 kA: 13–20 A	10 kA	B curve—10 kA: 1–13 A, 30–32 A C curve—10 kA: 0.5–13 A, 30–32 A B & C curve—14 kA: 15–25 A D curve—10 kA: 0.5–10 A, 25–32 A D curve—14 kA: 13–20 A	
	Rated frequency	50/60 Hz	50/60 Hz	50/60 Hz
	Endurance	≥ 20,000 operations	≥ 20,000 operations	≥ 20,000 operations
	Line voltage connection	Suitable for reverse feed	Suitable for reverse feed	Suitable for reverse feed
	<b>Mechanical</b>			
Frame size	45 mm	45 mm	45 mm	
Device height	105 mm	105 mm	105 mm	
Device width	17.7 mm per pole	17.7 mm per pole	17.7 mm per pole	
Terminal protection	Finger and hand touch safe according to BGV A3, OVE-EN 6	Finger and hand touch safe according to BGV A3, OVE-EN 6	Finger and hand touch safe according to BGV A3, OVE-EN 6	
Mounting	Quick fastening with two lock-in positions on IEC/EN 60715	Quick fastening with two lock-in positions on IEC/EN 60715	Quick fastening with two lock-in positions on IEC/EN 60715	
Upper and lower terminals	Open mouth/lift terminals	Open mouth/lift terminals	Open mouth/lift terminals	
Terminal capacity	One wire: AWG 18–6 Two wires: AWG 18–10	One wire: AWG 18–6 Two wires: AWG 18–10	One wire: AWG 18–6 Two wires: AWG 18–10	
Terminal fastening torque	AWG 18–21: 21 lb-in AWG 10–8: 25 lb-in AWG 6: 36 lb-in	AWG 18–21: 21 lb-in AWG 10–8: 25 lb-in AWG 6: 36 lb-in	AWG 18–21: 21 lb-in AWG 10–8: 25 lb-in AWG 6: 36 lb-in	
Mounting	Independent of position	Independent of position	Independent of position	
Calibration temperature	UL 489, CSA C22.2 No.5	40°C	40°C	
	IEC 60947-2	30°C	30°C	

# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

### UL 489 DIN Rail Miniature Circuit Breakers

1

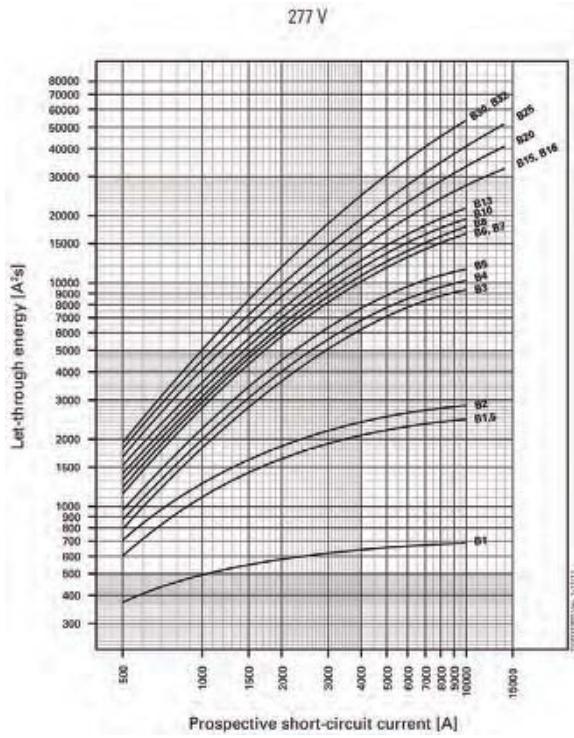
#### Power Loss at $I_n$

$I_n$ [A]	Characteristic B			Characteristic C			Characteristic D		
	Single-Pole P [W]	Two-Pole P [W]	Three-Pole P [W]	Single-Pole P [W]	Two-Pole P [W]	Three-Pole P [W]	Single-Pole P [W]	Two-Pole P [W]	Three-Pole P [W]
0.5	—	—	—	1.6	3.2	4.7	1.6	3.2	4.8
1.0	1.1	2.2	3.4	1.1	2.2	3.4	0.8	1.5	2.3
1.5	2.2	4.4	6.6	1.3	2.6	3.9	1.0	2.1	3.1
2.0	1.4	2.8	4.3	1.4	2.8	4.3	1.0	2.1	3.1
3.0	2.1	4.2	6.4	1.2	2.4	3.6	1.2	2.4	3.6
4.0	1.4	2.9	4.3	1.4	2.9	4.3	1.4	2.9	4.3
5.0	1.8	3.7	5.5	1.9	3.7	5.6	1.5	2.9	4.4
6.0	1.7	3.5	5.2	1.2	2.3	3.5	1.2	2.3	3.5
7.0	2.0	4.0	6.0	1.4	2.8	4.3	1.4	2.8	4.3
8.0	2.0	3.9	5.9	1.4	2.8	4.2	1.2	2.4	3.7
10.0	1.8	3.6	5.3	1.8	3.6	5.3	1.5	3.0	4.5
13.0	2.4	4.7	7.1	2.4	4.7	7.1	2.0	4.1	6.1
15.0	1.9	3.8	5.6	1.9	3.8	5.6	1.5	3.1	4.6
16.0	2.1	4.3	6.4	2.1	4.3	6.4	1.7	3.5	5.2
20.0	2.9	5.8	8.7	2.9	5.8	8.7	1.8	3.7	5.5
25.0	3.1	6.2	9.3	3.1	6.2	9.3	2.6	5.1	7.7
30.0	3.0	6.0	9.0	3.0	6.0	9.0	2.7	5.4	8.1
32.0	3.4	6.8	10.2	3.4	6.8	10.2	3.1	6.2	9.3
35.0	4.0	8.1	12.1	3.7	7.4	11.0	3.8	7.6	11.3
40.0	4.0	8.1	12.1	4.0	8.1	12.1	3.9	7.8	11.6

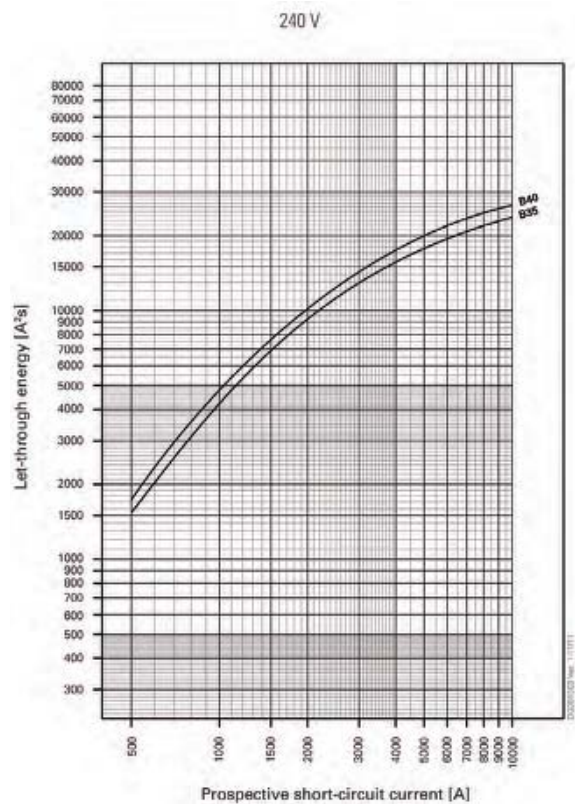


### Let-Through Energy

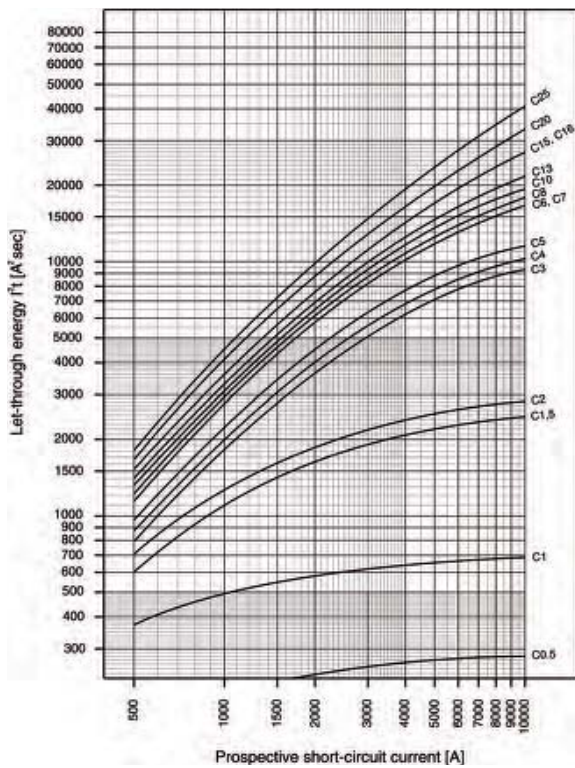
Characteristic B (1–32A), 277V



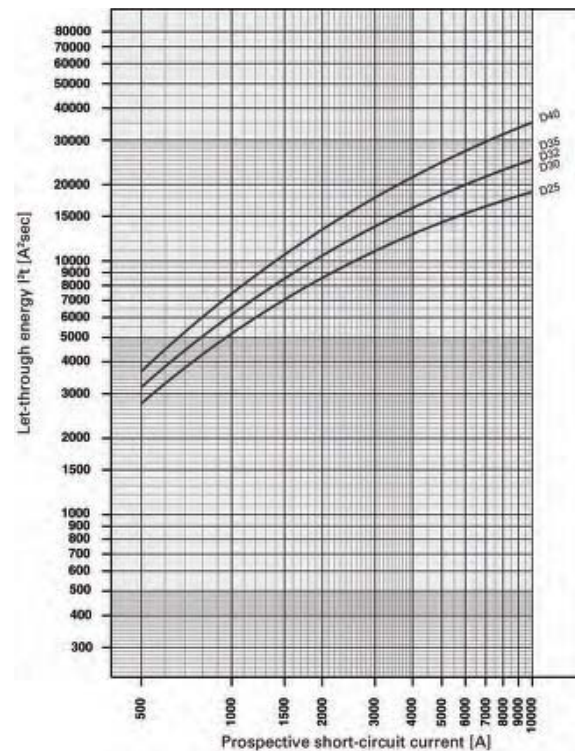
Characteristic B (35–63A), 240V



Characteristic C (0.5–32A), 277V



Characteristic C (35–63A), 240V



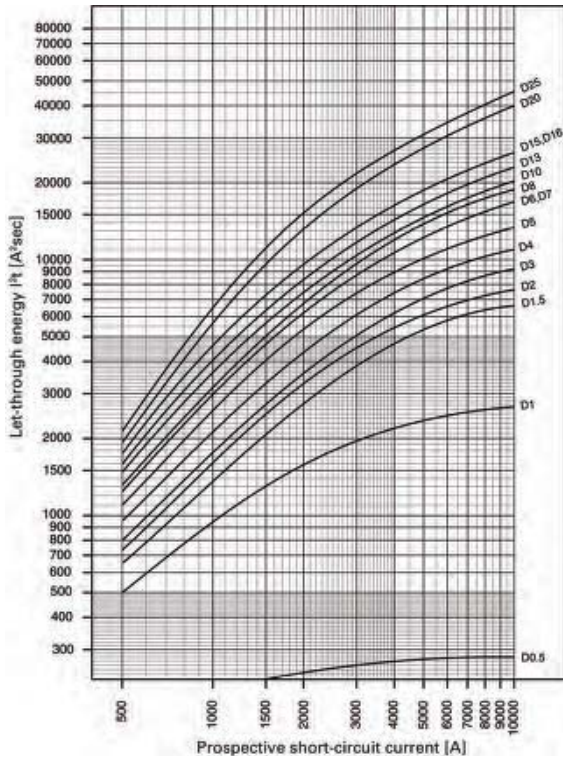
# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

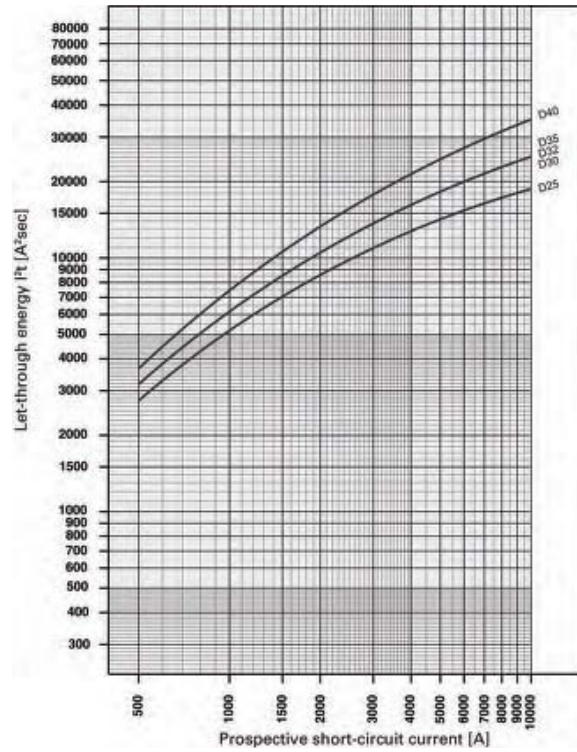
UL 489 DIN Rail Miniature Circuit Breakers

1

Characteristic D (0.5–32A), 277V

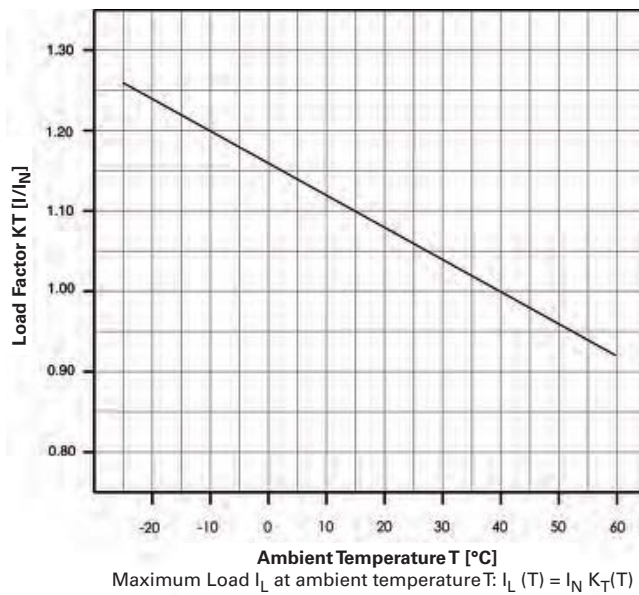


Characteristic D (35–63A), 240V

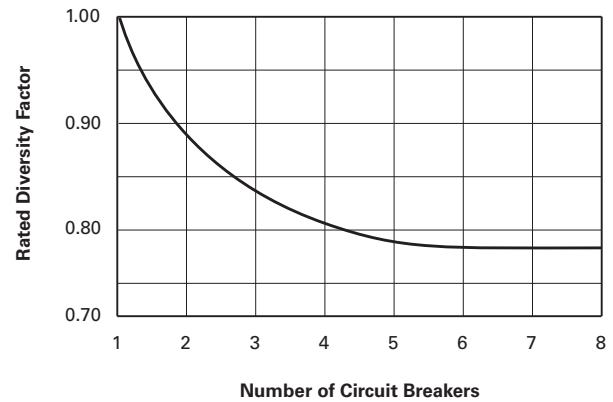


### Influence of Ambient Temperature T on Load Carrying Capacity

Device Market Current Rating $I_n$ (A) at 40°C	$I_n$ (A) at Higher Ambient Temperature							
	15°C	20°C	25°C	30°C	40°C	50°C	55°C	60°C
0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9
1.5	1.7	1.6	1.6	1.6	1.5	1.4	1.4	1.4
2.0	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8
3.0	3.3	3.2	3.2	3.1	3.0	2.9	2.9	2.8
4.0	4.4	4.3	4.2	4.2	4.0	3.8	3.8	3.7
5.0	5.5	5.4	5.3	5.2	5.0	4.8	4.7	4.6
6.0	6.6	6.5	6.4	6.2	6.0	5.8	5.6	5.5
7.0	7.7	7.6	7.4	7.3	7.0	6.7	6.6	6.4
8.0	8.8	8.6	8.5	8.3	8.0	7.7	7.5	7.4
10.0	11.0	10.8	10.6	10.4	10.0	9.6	9.4	9.2
13.0	14.3	14.0	13.8	13.5	13.0	12.5	12.5	12.0
15.0	16.5	16.2	15.9	15.6	15.0	14.4	14.1	13.8
16.0	17.6	17.3	17.0	16.6	16.0	15.4	15.0	14.7
20.0	22.0	21.6	21.2	20.8	20.0	19.2	18.8	18.4
25.0	27.5	27.0	26.5	26.0	25.0	24.0	23.3	23.0
30.0	33.0	32.4	31.8	31.2	30.0	28.8	28.2	27.6
32.0	35.2	34.6	33.9	33.3	32.0	30.7	30.1	29.4
40.0	44.0	43.2	42.4	41.6	40.0	38.4	37.6	36.8



### Load Carrying Capacity of Adjoining Miniature Circuit Breakers





# 1.2

## Miniature Circuit Breakers and Supplementary Protectors

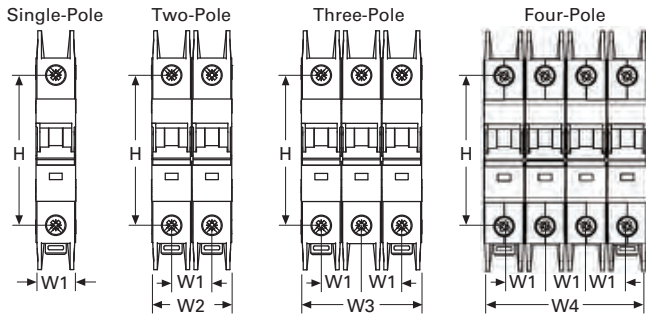
### UL 489 DIN Rail Miniature Circuit Breakers

1

#### Dimensions

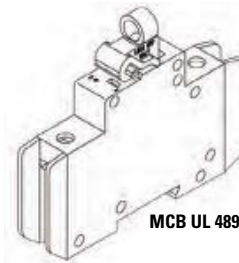
Approximate Dimensions in Inches (mm)

#### Miniature Circuit Breakers

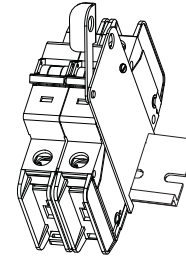


H	W1	W2	W3	W4
4.13 (105.0)	0.70 (17.7)	1.39 (35.3)	2.09 (53.1)	2.79 (70.8)

#### Lockout Attachment—Z-IS/SPE-1TE

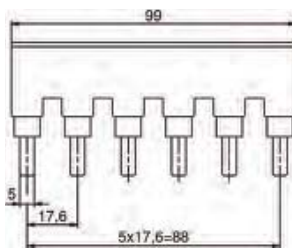


#### UL Lockoff Device—FAZPLOFF

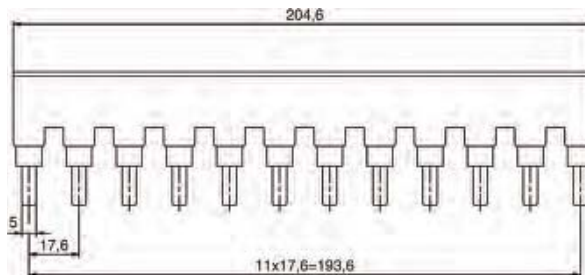


#### Accessories

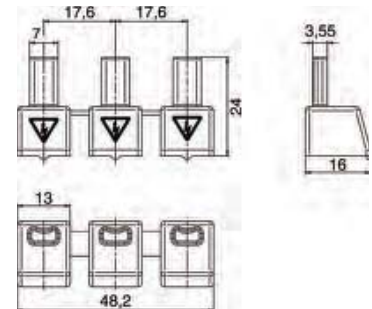
##### Z-SV/UL-16/6



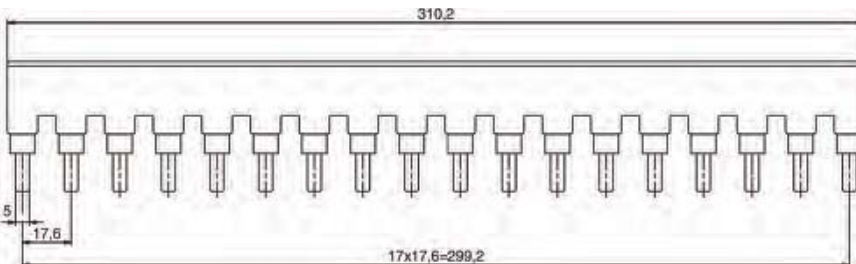
##### Z-SV/UL-18...12



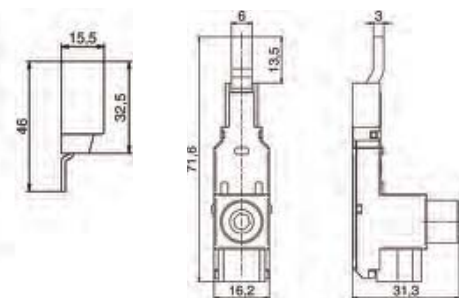
##### ZV-BS-UL



##### Z-SV/UL-16.../18



##### Z-EK/35/UL



#### Z-EK/35/UL

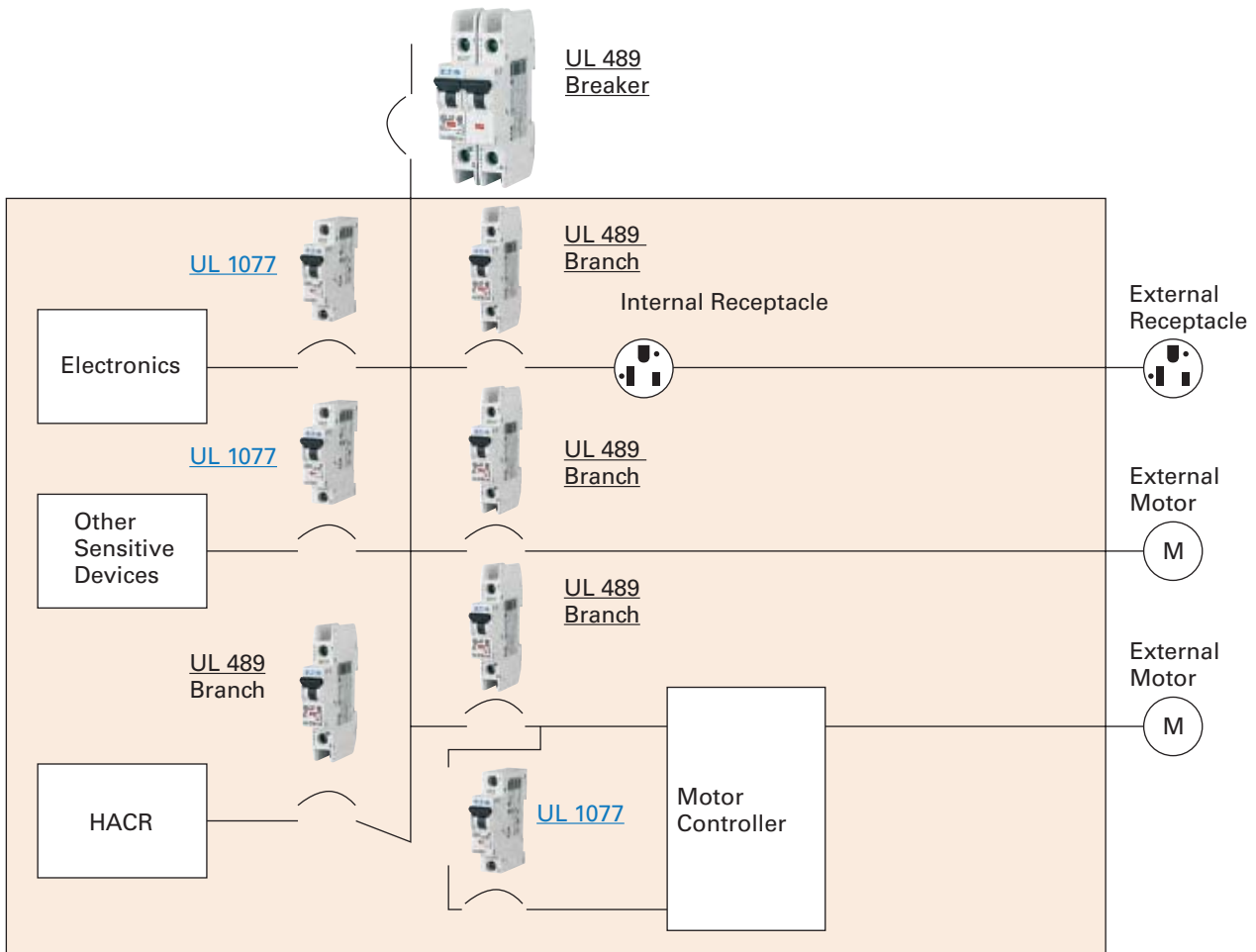
Description	UL 489	IEC/EN 60947-2
$U_e$	480 Vac/96 Vdc	240/415 Vac
f	50/60 Hz	50/60 Hz
$U_{imp}$	—	9.5 kV
$I_e$	80A at 40°C	80A at 30°C
	10–1/0 AWG 60/75°C Cu	2.5–35 mm <sup>2</sup> Cu
	0.56 in	14 mm

#### Z-EB/50/UL

Description	UL 489	IEC/EN 60947-2
$U_e$	480 Vac/96 Vdc	240/415 Vac
f	50/60 Hz	50/60 Hz
$U_{imp}$	—	9.5 kV
$I_e$	115A at 40°C	160A at 30°C
	#1–14 AWG 60/75°C Cu	1.5–50 mm <sup>2</sup> Cu
	0.56 in	14 mm

### Application Guidelines

#### Example of UL 489 and UL 1077 Application



Example of UL 489 and UL 1077 Application

#### UL 489 circuit breakers

Used for branch circuit protection, internal/external receptacles, external motors and HACR equipment (heating, air conditioning and refrigeration).

#### UL 1077 supplementary protectors

Used for overcurrent protection within appliances or electrical equipment, where branch circuit protection is already provided or not required.

**Note:** UL 489 devices can be used in place of UL 1077; UL 1077 devices cannot be used in place of UL 489.

**FAZ Circuit Breakers**



*Optimum and Efficient Protection for Every Application*

**Contents**

**Description**

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Catalog Number Selection . . . . .	<b>V4-T1-75</b>
Standards and Certifications . . . . .	<b>V4-T1-75</b>
Product Selection . . . . .	<b>V4-T1-76</b>
Accessories . . . . .	<b>V4-T1-82</b>
Technical Data and Specifications . . . . .	<b>V4-T1-85</b>
Dimensions . . . . .	<b>V4-T1-92</b>

**FAZ Circuit Breakers**

**Product Overview**

Optimum product quality, tested reliability and safety stand for best protection of personnel, installations and plant. Eaton’s FAZ DIN rail mountable circuit breaker is designed for use in control panel applications.

**Powerful offering for machine and system builders**

The FAZ is available with B, C, D, K, S, and Z characteristics in accordance with UL 1077, CSA C22.2 No.235 and IEC 60947-2. These devices are CE marked.

**Application Description**

- Supplementary protection
- Control circuits
- Lighting
- Business equipment
- Appliances

**Features**

- Complete range of UL 1077 recognized DIN rail mounted miniature circuit breakers up to 63A current rating
- Standard ratings of 10 kAIC up to 277/480 Vac
- Current limiting design provides fast short-circuit interruption that reduces the let-through energy, which can damage the circuit
- Suitable for supplementary protection
- Thermal-magnetic overcurrent protection
  - Six levels of short-circuit protection, categorized by B, C, D, K, S, and Z curves
- Trip-free design—breaker can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost
- Fulfill UL 1077, CSA C22.2 No.235 and also IEC 60947-2 Standard
- Field-installable shunt trip and auxiliary switch subsequent mounting
- Module width of only 17.7 mm (per pole)
- Contact position indicator (red/green)
- Easy installation on DIN rail
- Possibility for sealing the toggle in ON or OFF position

### Discover These Advanced Features

Breakers install on standard DIN rail

Available in one-, two-, three-, four-pole, 1+N and 3+N models

Color-coded indicator provides breaker status for easy troubleshooting



Captive Posidrive terminal screws with finger and back-of-hand protection (IP20)

Trip-free design; breaker cannot be defeated by holding the handle in the ON position

Breaker information printed on the front of the device for quick identification

### Standards and Certifications

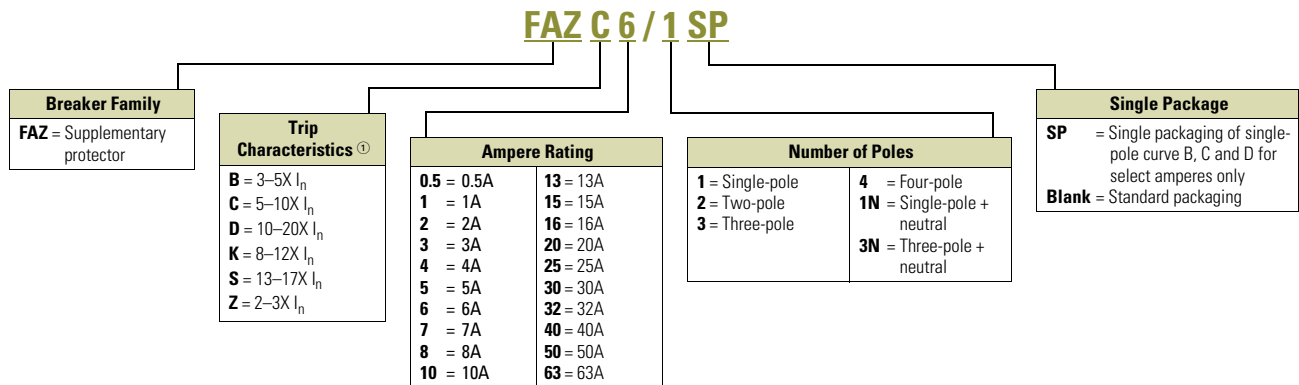
FAZ complies with the latest national and international standards.

- UL 1077, CSA C22.2 No. 235
- Apply to supplementary protectors intended for use as overcurrent, or overvoltage or undervoltage protection within an appliance or other electrical equipment where branch circuit protection is already provided, or is not required

- RoHS compliant
- VDE compliant
  - Devices with B, C, and D curves are VDE compliant
- CCC
- Devices with B, C, and D curves are CCC compliant
- ABS compliant



### Catalog Number Selection



**Note**

① I<sub>n</sub> = Rated current for instantaneous trip characteristics.

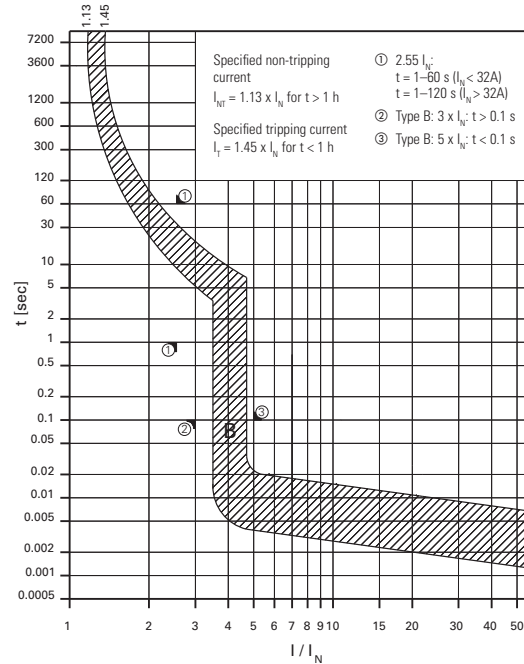
#### 1

### Product Selection

#### FAZ B curve (3–5X $I_n$ current rating)

- Designed for resistive or slightly inductive loads
- Response time of instantaneous trip: 3–5X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where protection against low-level short-circuit faults in control wiring is desired. Instantaneous trip is 3–5X continuous rating of device ( $I_n$ ). Applications include PLC wiring, business equipment, lighting, appliances and some motors. Low magnetic trip point.



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### B Curve (3–5X $I_n$ Current Rating)— Designed for Resistive or Slightly Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
1	FAZ-B1/1-SP	FAZ-B1/2	FAZ-B1/3
2	FAZ-B2/1-SP	FAZ-B2/2	FAZ-B2/3
3	FAZ-B3/1-SP	FAZ-B3/2	FAZ-B3/3
4	FAZ-B4/1-SP	FAZ-B4/2	FAZ-B4/3
5	FAZ-B5/1-SP	FAZ-B5/2	FAZ-B5/3
6	FAZ-B6/1-SP	FAZ-B6/2	FAZ-B6/3
7	FAZ-B7/1-SP	FAZ-B7/2	FAZ-B7/3
8	FAZ-B8/1-SP	FAZ-B8/2	FAZ-B8/3
10	FAZ-B10/1-SP	FAZ-B10/2	FAZ-B10/3
12	FAZ-B12/1-SP	FAZ-B12/2	FAZ-B12/3
13	FAZ-B13/1-SP	FAZ-B13/2	FAZ-B13/3
15	FAZ-B15/1-SP	FAZ-B15/2	FAZ-B15/3
16	FAZ-B16/1-SP	FAZ-B16/2	FAZ-B16/3
20	FAZ-B20/1-SP	FAZ-B20/2	FAZ-B20/3
25	FAZ-B25/1-SP	FAZ-B25/2	FAZ-B25/3
30	FAZ-B30/1-SP	FAZ-B30/2	FAZ-B30/3
32	FAZ-B32/1-SP	FAZ-B32/2	FAZ-B32/3
40	FAZ-B40/1-SP	FAZ-B40/2	FAZ-B40/3
50	FAZ-B50/1-SP	FAZ-B50/2	FAZ-B50/3
63	FAZ-B63/1-SP	FAZ-B63/2	FAZ-B63/3

#### Four-Pole



#### Single-Pole + Neutral



#### Three-Pole + Neutral



#### B Curve (3–5X $I_n$ Current Rating)— Designed for Resistive or Slightly Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
1	FAZ-B1/4	FAZ-B1/1N	FAZ-B1/3N
2	FAZ-B2/4	FAZ-B2/1N	FAZ-B2/3N
3	FAZ-B3/4	FAZ-B3/1N	FAZ-B3/3N
4	FAZ-B4/4	FAZ-B4/1N	FAZ-B4/3N
5	FAZ-B5/4	FAZ-B5/1N	FAZ-B5/3N
6	FAZ-B6/4	FAZ-B6/1N	FAZ-B6/3N
7	FAZ-B7/4	FAZ-B7/1N	FAZ-B7/3N
8	FAZ-B8/4	FAZ-B8/1N	FAZ-B8/3N
10	FAZ-B10/4	FAZ-B10/1N	FAZ-B10/3N
12	FAZ-B12/4	FAZ-B12/1N	FAZ-B12/3N
13	FAZ-B13/4	FAZ-B13/1N	FAZ-B13/3N
15	FAZ-B15/4	FAZ-B15/1N	FAZ-B15/3N
16	FAZ-B16/4	FAZ-B16/1N	FAZ-B16/3N
20	FAZ-B20/4	FAZ-B20/1N	FAZ-B20/3N
25	FAZ-B25/4	FAZ-B25/1N	FAZ-B25/3N
30	FAZ-B30/4	FAZ-B30/1N	FAZ-B30/3N
32	FAZ-B32/4	FAZ-B32/1N	FAZ-B32/3N
40	FAZ-B40/4	FAZ-B40/1N	FAZ-B40/3N
50	FAZ-B50/4	FAZ-B50/1N	FAZ-B50/3N
63	FAZ-B63/4	FAZ-B63/1N	FAZ-B63/3N

#### Notes

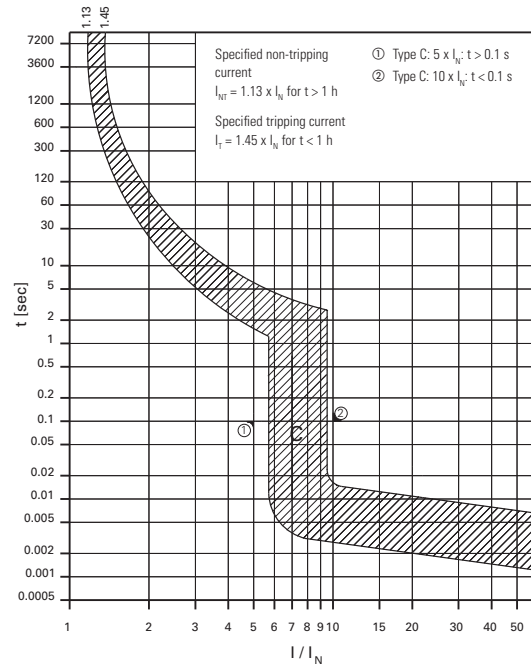
- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.



### FAZ C curve (5–10X $I_n$ current rating)

- Designed for inductive loads
- Response time of instantaneous trip: 5–10X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where medium levels of inrush current are expected. Instantaneous trip is 5–10X rating of device ( $I_n$ ). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



### Single-Pole



### Two-Pole



### Three-Pole



### C Curve (5–10X $I_n$ Current Rating) – Designed Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-C0.5/1-SP	FAZ-C0.5/2	FAZ-C0.5/3
1	FAZ-C1/1-SP	FAZ-C1/2	FAZ-C1/3
1.6	FAZ-C1.6/1-SP	FAZ-C1.6/2	FAZ-C1.6/3
2	FAZ-C2/1-SP	FAZ-C2/2	FAZ-C2/3
3	FAZ-C3/1-SP	FAZ-C3/2	FAZ-C3/3
4	FAZ-C4/1-SP	FAZ-C4/2	FAZ-C4/3
5	FAZ-C5/1-SP	FAZ-C5/2	FAZ-C5/3
6	FAZ-C6/1-SP	FAZ-C6/2	FAZ-C6/3
7	FAZ-C7/1-SP	FAZ-C7/2	FAZ-C7/3
8	FAZ-C8/1-SP	FAZ-C8/2	FAZ-C8/3
10	FAZ-C10/1-SP	FAZ-C10/2	FAZ-C10/3
13	FAZ-C13/1-SP	FAZ-C13/2	FAZ-C13/3
15	FAZ-C15/1-SP	FAZ-C15/2	FAZ-C15/3
16	FAZ-C16/1-SP	FAZ-C16/2	FAZ-C16/3
20	FAZ-C20/1-SP	FAZ-C20/2	FAZ-C20/3
25	FAZ-C25/1-SP	FAZ-C25/2	FAZ-C25/3
30	FAZ-C30/1-SP	FAZ-C30/2	FAZ-C30/3
32	FAZ-C32/1-SP	FAZ-C32/2	FAZ-C32/3
40	FAZ-C40/1-SP	FAZ-C40/2	FAZ-C40/3
50	FAZ-C50/1-SP	FAZ-C50/2	FAZ-C50/3
63	FAZ-C63/1-SP	FAZ-C63/2	FAZ-C63/3

### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.

### Four-Pole



### Single-Pole + Neutral



### Three-Pole + Neutral



### C Curve (5–10X $I_n$ Current Rating) – Designed Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-C0.5/4	FAZ-C0.5/1N	FAZ-C0.5/3N
1	FAZ-C1/4	FAZ-C1/1N	FAZ-C1/3N
1.6	FAZ-C1.6/4	FAZ-C1.6/1N	FAZ-C1.6/3N
2	FAZ-C2/4	FAZ-C2/1N	FAZ-C2/3N
3	FAZ-C3/4	FAZ-C3/1N	FAZ-C3/3N
4	FAZ-C4/4	FAZ-C4/1N	FAZ-C4/3N
5	FAZ-C5/4	FAZ-C5/1N	FAZ-C5/3N
6	FAZ-C6/4	FAZ-C6/1N	FAZ-C6/3N
7	FAZ-C7/4	FAZ-C7/1N	FAZ-C7/3N
8	FAZ-C8/4	FAZ-C8/1N	FAZ-C8/3N
10	FAZ-C10/4	FAZ-C10/1N	FAZ-C10/3N
13	FAZ-C13/4	FAZ-C13/1N	FAZ-C13/3N
15	FAZ-C15/4	FAZ-C15/1N	FAZ-C15/3N
16	FAZ-C16/4	FAZ-C16/1N	FAZ-C16/3N
20	FAZ-C20/4	FAZ-C20/1N	FAZ-C20/3N
25	FAZ-C25/4	FAZ-C25/1N	FAZ-C25/3N
32	FAZ-C32/4	FAZ-C32/1N	FAZ-C32/3N
40	FAZ-C40/4	FAZ-C40/1N	FAZ-C40/3N
50	FAZ-C50/4	FAZ-C50/1N	FAZ-C50/3N
63	FAZ-C63/4	FAZ-C63/1N	FAZ-C63/3N

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

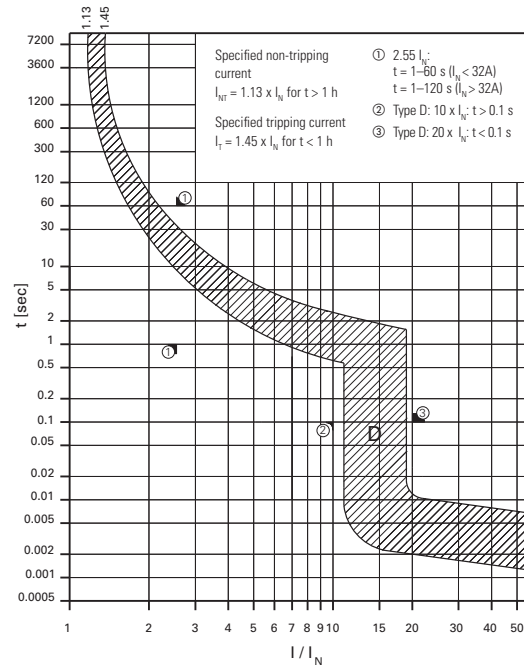
### UL 1077 DIN Rail Supplementary Protectors

1

#### FAZ D curve (10–20X $I_n$ current rating)

- Designed for highly inductive loads
- Response time of instantaneous trip: 10–20X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where high levels of inrush current are expected. Instantaneous trip is 10–20X rating of device ( $I_n$ ). The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.



#### Single-Pole



#### Two-Pole



#### Three-Pole



#### D Curve (10–20X $I_n$ Current Rating)— Designed for Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-D0.5/1-SP	FAZ-D0.5/2	FAZ-D0.5/3
1	FAZ-D1/1-SP	FAZ-D1/2	FAZ-D1/3
2	FAZ-D2/1-SP	FAZ-D2/2	FAZ-D2/3
3	FAZ-D3/1-SP	FAZ-D3/2	FAZ-D3/3
4	FAZ-D4/1-SP	FAZ-D4/2	FAZ-D4/3
5	FAZ-D5/1-SP	FAZ-D5/2	FAZ-D5/3
6	FAZ-D6/1-SP	FAZ-D6/2	FAZ-D6/3
7	FAZ-D7/1-SP	FAZ-D7/2	FAZ-D7/3
8	FAZ-D8/1-SP	FAZ-D8/2	FAZ-D8/3
10	FAZ-D10/1-SP	FAZ-D10/2	FAZ-D10/3
13	FAZ-D13/1-SP	FAZ-D13/2	FAZ-D13/3
15	FAZ-D15/1-SP	FAZ-D15/2	FAZ-D15/3
16	FAZ-D16/1-SP	FAZ-D16/2	FAZ-D16/3
20	FAZ-D20/1-SP	FAZ-D20/2	FAZ-D20/3
25	FAZ-D25/1-SP	FAZ-D25/2	FAZ-D25/3
30	FAZ-D30/1-SP	FAZ-D30/2	FAZ-D30/3
32	FAZ-D32/1-SP	FAZ-D32/2	FAZ-D32/3
40	FAZ-D40/1-SP	FAZ-D40/2	FAZ-D40/3
50 ③	FAZ-D50/1-SP	FAZ-D50/2	FAZ-D50/3
63 ③	FAZ-D63/1-SP	FAZ-D63/2	FAZ-D63/3

#### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.
- ③ IEC 60947-2 only.

#### Four-Pole



#### Single-Pole + Neutral



#### Three-Pole + Neutral



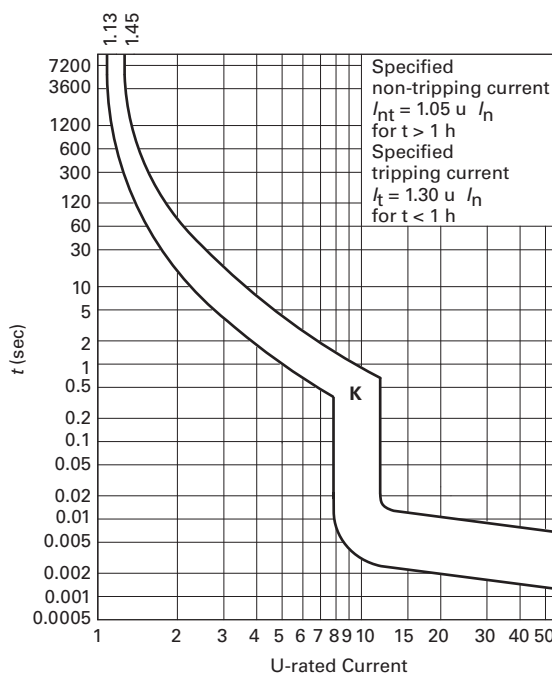
#### D Curve (10–20X $I_n$ Current Rating)— Designed for Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-D0.5/4	FAZ-D0.5/1N	FAZ-D0.5/3N
1	FAZ-D1/4	FAZ-D1/1N	FAZ-D1/3N
2	FAZ-D2/4	FAZ-D2/1N	FAZ-D2/3N
3	FAZ-D3/4	FAZ-D3/1N	FAZ-D3/3N
4	FAZ-D4/4	FAZ-D4/1N	FAZ-D4/3N
5	FAZ-D5/4	FAZ-D5/1N	FAZ-D5/3N
6	FAZ-D6/4	FAZ-D6/1N	FAZ-D6/3N
7	FAZ-D7/4	FAZ-D7/1N	FAZ-D7/3N
8	FAZ-D8/4	FAZ-D8/1N	FAZ-D8/3N
10	FAZ-D10/4	FAZ-D10/1N	FAZ-D10/3N
13	FAZ-D13/4	FAZ-D13/1N	FAZ-D13/3N
15	FAZ-D15/4	FAZ-D15/1N	FAZ-D15/3N
16	FAZ-D16/4	FAZ-D16/1N	FAZ-D16/3N
20	FAZ-D20/4	FAZ-D20/1N	FAZ-D20/3N
25	FAZ-D25/4	FAZ-D25/1N	FAZ-D25/3N
30	FAZ-D30/4	FAZ-D30/1N	FAZ-D30/3N
32	FAZ-D32/4	FAZ-D32/1N	FAZ-D32/3N
40	FAZ-D40/4	FAZ-D40/1N	FAZ-D40/3N
50 ③	FAZ-D50/4	FAZ-D50/1N	FAZ-D50/3N
63 ③	FAZ-D63/4	FAZ-D63/1N	FAZ-D63/3N

### FAZ K curve (8–12X $I_n$ current rating)

- Designed for motors, transformers and upstream electronics
- Response time of instantaneous trip: 8–12X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where medium levels of inrush current are expected. Instantaneous trip is 8–12X rating of device ( $I_n$ ). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



### Single-Pole



### Two-Pole



### Three-Pole



### K Curve (8–12X $I_n$ Current Rating) – Designed for Inductive Loads <sup>①②</sup>

Amperes	Single-Pole <sup>③</sup> Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-K0.5/1	FAZ-K0.5/2	FAZ-K0.5/3
1	FAZ-K1/1	FAZ-K1/2	FAZ-K1/3
1.6	FAZ-K1.6/1	FAZ-K1.6/2	FAZ-K1.6/3
2	FAZ-K2/1	FAZ-K2/2	FAZ-K2/3
3	FAZ-K3/1	FAZ-K3/2	FAZ-K3/3
4	FAZ-K4/1	FAZ-K4/2	FAZ-K4/3
6	FAZ-K6/1	FAZ-K6/2	FAZ-K6/3
8	FAZ-K8/1	FAZ-K8/2	FAZ-K8/3
10	FAZ-K10/1	FAZ-K10/2	FAZ-K10/3
13	FAZ-K13/1	FAZ-K13/2	FAZ-K13/3
16	FAZ-K16/1	FAZ-K16/2	FAZ-K16/3
20	FAZ-K20/1	FAZ-K20/2	FAZ-K20/3
25	FAZ-K25/1	FAZ-K25/2	FAZ-K25/3
32	FAZ-K32/1	FAZ-K32/2	FAZ-K32/3
40	FAZ-K40/1	FAZ-K40/2	FAZ-K40/3
50	FAZ-K50/1	FAZ-K50/2	FAZ-K50/3
63	FAZ-K63/1	FAZ-K63/2	FAZ-K63/3

### Four-Pole



### Single-Pole + Neutral



### Three-Pole + Neutral



### K Curve (8–12X $I_n$ Current Rating) – Designed for Inductive Loads, continued <sup>①②</sup>

Amperes	Four-Pole <sup>③</sup> Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-K0.5/4	FAZ-K0.5/1N	FAZ-K0.5/3N
1	FAZ-K1/4	FAZ-K1/1N	FAZ-K1/3N
1.6	FAZ-K1.6/4	FAZ-K1.6/1N	FAZ-K1.6/3N
2	FAZ-K2/4	FAZ-K2/1N	FAZ-K2/3N
3	FAZ-K3/4	FAZ-K3/1N	FAZ-K3/3N
4	FAZ-K4/4	FAZ-K4/1N	FAZ-K4/3N
6	FAZ-K6/4	FAZ-K6/1N	FAZ-K6/3N
8	FAZ-K8/4	FAZ-K8/1N	FAZ-K8/3N
10	FAZ-K10/4	FAZ-K10/1N	FAZ-K10/3N
13	FAZ-K13/4	FAZ-K13/1N	FAZ-K13/3N
16	FAZ-K16/4	FAZ-K16/1N	FAZ-K16/3N
20	FAZ-K20/4	FAZ-K20/1N	FAZ-K20/3N
25	FAZ-K25/4	FAZ-K25/1N	FAZ-K25/3N
32	FAZ-K32/4	FAZ-K32/1N	FAZ-K32/3N
40	FAZ-K40/4	FAZ-K40/1N	FAZ-K40/3N
50	FAZ-K50/4	FAZ-K50/1N	FAZ-K50/3N
63	FAZ-K63/4	FAZ-K63/1N	FAZ-K63/3N

### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② These breakers are available by special order and may result in additional delivery time.
- ③ Two-piece box order, quantities of 2.

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

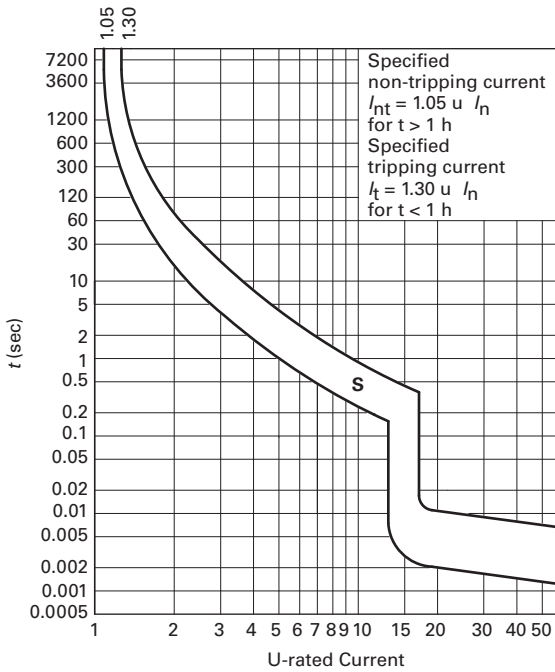
### UL 1077 DIN Rail Supplementary Protectors

1

#### FAZ S curve (13–17X $I_n$ current rating)

- Designed for control circuits with high inrush
- Response time of instantaneous trip: 13–17X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where high levels of inrush current are expected. Instantaneous trip is 13–17X rating of device ( $I_n$ ). The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.



#### Single-Pole



#### Two-Pole



#### S Curve (13–17X $I_n$ Current Rating) — Designed for Inductive Loads ①②

Amperes	Single-Pole ③ Catalog Number	Two-Pole Catalog Number
1	FAZ-S1/1	FAZ-S1/2
2	FAZ-S2/1	FAZ-S2/2
3	FAZ-S3/1	FAZ-S3/2
4	FAZ-S4/1	FAZ-S4/2
6	FAZ-S6/1	FAZ-S6/2
10	FAZ-S10/1	FAZ-S10/2
16	FAZ-S16/1	FAZ-S16/2
20	FAZ-S20/1	FAZ-S20/2
25	FAZ-S25/1	FAZ-S25/2
32	FAZ-S32/1	FAZ-S32/2
40	FAZ-S40/1	FAZ-S40/2

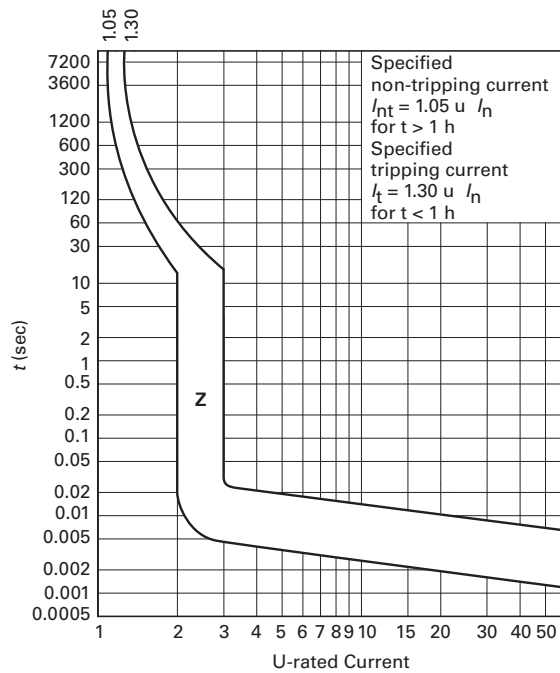
#### Notes

- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② These breakers are available by special order and may result in additional delivery time.
- ③ Two-piece box order, quantities of 2.

### FAZ Z curve (2–3X $I_n$ current rating)

- Designed for protection of electronic devices
- Response time of instantaneous trip: 2–3X  $I_n$  current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)

Suitable for applications where low levels of inrush current are expected. Instantaneous trip is 2–3X rating of device ( $I_n$ ). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



#### Single-Pole



### Z Curve (2–3X $I_n$ Current Rating)— Designed for Inductive Loads ①②

Amperes	Single-Pole ③ Catalog Number	Two-Pole Catalog Number
0.5	FAZ-Z0.5/1	FAZ-Z0.5/2
1	FAZ-Z1/1	FAZ-Z1/2
1.6	FAZ-Z1.6/1	FAZ-Z1.6/2
2	FAZ-Z2/1	FAZ-Z2/2
3	FAZ-Z3/1	FAZ-Z3/2
4	FAZ-Z4/1	FAZ-Z4/2
6	FAZ-Z6/1	FAZ-Z6/2
8	FAZ-Z8/1	FAZ-Z8/2
10	FAZ-Z10/1	FAZ-Z10/2
13	FAZ-Z13/1	FAZ-Z13/2
16	FAZ-Z16/1	FAZ-Z16/2
20	FAZ-Z20/1	FAZ-Z20/2
25	FAZ-Z25/1	FAZ-Z25/2
32	FAZ-Z32/1	FAZ-Z32/2
40	FAZ-Z40/1	FAZ-Z40/2
50	FAZ-Z50/1	FAZ-Z50/2
63	FAZ-Z63/1	FAZ-Z63/2

#### Two-Pole



#### Three-Pole



### Z Curve (2–3X $I_n$ Current Rating)— Designed for Inductive Loads, continued ①②

Amperes	Three-Pole Catalog Number	Four-Pole Catalog Number
0.5	FAZ-Z0.5/3	FAZ-Z0.5/4
1	FAZ-Z1/3	FAZ-Z1/4
1.6	FAZ-Z1.6/3	FAZ-Z1.6/4
2	FAZ-Z2/3	FAZ-Z2/4
3	FAZ-Z3/3	FAZ-Z3/4
4	FAZ-Z4/3	FAZ-Z4/4
6	FAZ-Z6/3	FAZ-Z6/4
8	FAZ-Z8/3	FAZ-Z8/4
10	FAZ-Z10/3	FAZ-Z10/4
13	FAZ-Z13/3	FAZ-Z13/4
16	FAZ-Z16/3	FAZ-Z16/4
20	FAZ-Z20/3	FAZ-Z20/4
25	FAZ-Z25/3	FAZ-Z25/4
32	FAZ-Z32/3	FAZ-Z32/4
40	FAZ-Z40/3	FAZ-Z40/4
50	FAZ-Z50/3	FAZ-Z50/4
63	FAZ-Z63/3	FAZ-Z63/4

#### Four-Pole


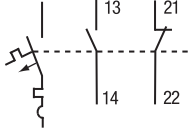


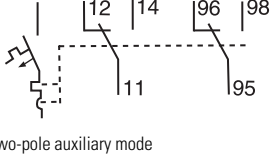
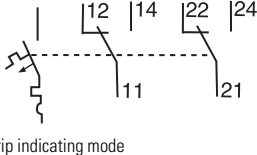






#### Notes

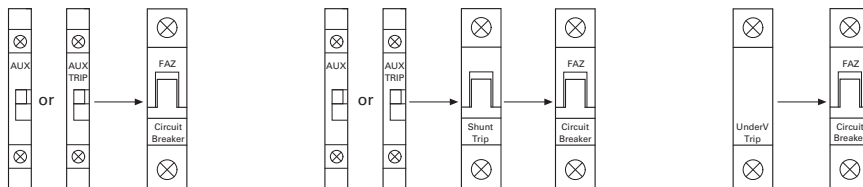
- ① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
- ② These breakers are available by special order and may result in additional delivery time.
- ③ Two-piece box order, quantities of 2.

#### Accessories

#### FAZ Auxiliary Contacts and Voltage Trips

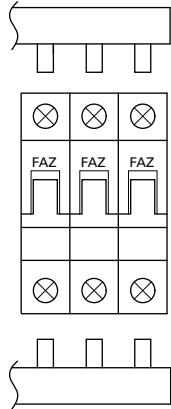
	Circuit Diagram	Description	Rated Operational Voltage	Catalog Number
<b>Standard Auxiliary Contacts</b>				
		<ul style="list-style-type: none"> <li>1NO/1NC</li> <li>Installs on left side of FAZ or shunt trip</li> <li>Max. one per FAZ (1077) device</li> <li>Switches when FAZ is tripped electrically or manually</li> </ul>	230 Vac	<b>FAZ-XHIN11</b>
		<ul style="list-style-type: none"> <li>1 changeover contact</li> <li>Installs on left side of FAZ or shunt trip</li> <li>Max. one per FAZ (1077) device</li> <li>Switches when FAZ is tripped electrically or manually</li> </ul>	230 Vac	<b>FAZ-XHINW1</b>
<b>Auxiliary/Trip Indicating Contact</b>				
	 <p>Two-pole auxiliary mode</p>  <p>Trip indicating mode</p>	<ul style="list-style-type: none"> <li>Small selector screw changes mode</li> <li>Two Form C (changeover) contacts</li> <li>Installs on left side of FAZ or shunt trip</li> <li>Auxiliary contacts switch when FAZ is tripped electrically or manually</li> <li>Trip indicating contact switches only when FAZ is tripped electrically</li> </ul>	230 Vac	<b>FAZ-XAM002</b>
<b>Undervoltage Trip</b>				
		<ul style="list-style-type: none"> <li>Prevents FAZ from operating unless voltage is present</li> <li>Installs on left side of FAZ</li> <li>Includes test button</li> </ul>	115 Vac 230 Vac 400 Vac	<b>FAZ-XUA(115VAC)</b> <b>FAZ-XUA(230VAC)</b> <b>FAZ-XUA(400VAC)</b>
<b>Shunt Trip</b>				
		<ul style="list-style-type: none"> <li>Allows remote trip of FAZ</li> <li>Installs on left side of FAZ</li> </ul>	12–110 Vac 12–60 Vdc 110–415 Vac 110–230 Vdc	<b>FAZ-XAA-C-12-110VAC</b> <b>FAZ-XAA-C-110-415VAC</b>

#### Allowable Combinations of Accessories



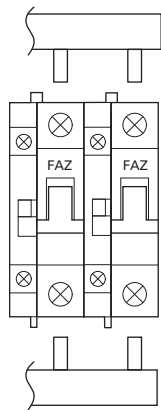
### Busbar System

Description	Rated Operational Current	Number of Poles per Device	Number of Terminals	Catalog Number <sup>①</sup>
<b>Without Auxiliary Contacts</b>				
For connecting FAZ supplementary protectors without auxiliary contacts. May be fed from line or load side.	80A	1	57	<b>BB-UL-18/1P-1M/57</b>
		2	56	<b>BB-UL-18/2P-2M/56</b>
		3	57	<b>BB-UL-18/3P-3M/57</b>
100A	1	57	<b>BB-UL-25/1P-1M/57</b>	
	2	56	<b>BB-UL-25/2P-2M/56</b>	
	3	57	<b>BB-UL-25/3P-3M/57</b>	



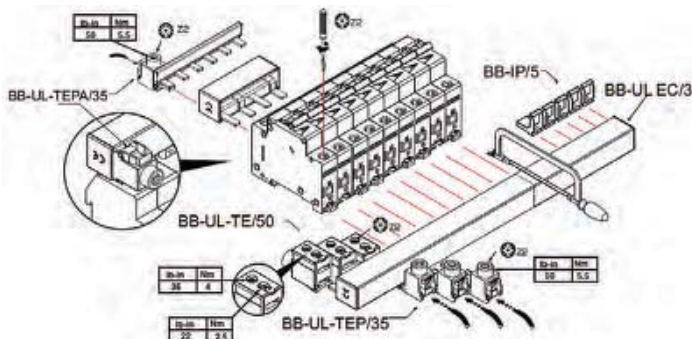
### Auxiliary/Trip Indicating Contacts

For connecting FAZ supplementary protectors with auxiliary contacts. May be fed from line or load side.	80A	1	37	<b>BB-UL-18/1P-1,5M/37</b>
		2	46	<b>BB-UL-18/2P+AS-2,5M/46</b>
		3	48	<b>BB-UL-18/3P+AS-3,5M/48</b>
100A	1	37	<b>BB-UL-25/1P-1,5M/37</b>	
	2	46	<b>BB-UL-25/2P+AS-2,5M/46</b>	
	3	48	<b>BB-UL-25/3P+AS-3,5M/48</b>	



### Note

① Bus may be center fed for high current capacity.





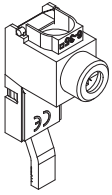
# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

1

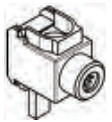
#### Incoming Terminal



#### Pin Type Incoming Supply Terminals

Description	Catalog Number
<ul style="list-style-type: none"> <li>Accommodates conductors from 6–35 mm<sup>2</sup>/#10–2 AWG</li> <li>4–5.5 Nm/35–50 lb-in</li> <li>Two- and three-pole</li> </ul>	<b>BB-UL-TEP/35</b>

#### Incoming Terminal



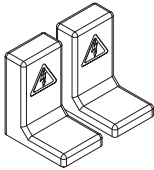
#### Pin Type Incoming Supply Terminals—Single-Phase Only

Description	Catalog Number
<ul style="list-style-type: none"> <li>Accommodates conductors from 6–35 mm<sup>2</sup>/#10–2 AWG</li> <li>4–5.5 Nm/35–50 lb-in</li> </ul>	<b>BB-UL-TEPA/35</b>

#### Protective Accessories

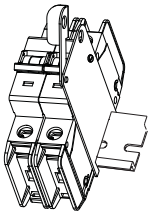
Description	Catalog Number
For covering unused terminals	<b>BB-IP/5</b>

#### Busbar Terminal Cover



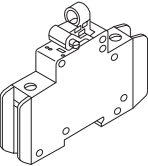
#### Lockoff Device

UL lockoff device	<b>FAZPLOFF</b>
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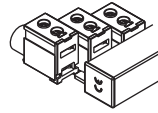


#### Padlock Hasp

<ul style="list-style-type: none"> <li>Prevents reactivation of the device during maintenance</li> <li>Holds one padlock</li> </ul>	<b>Z-IS/SPE-1TE</b>
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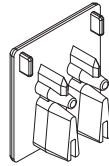
#### Incoming Terminal



#### Bus Incoming Supply Terminals

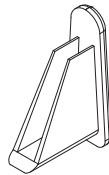
Description	Catalog Number
<ul style="list-style-type: none"> <li>50 mm<sup>2</sup></li> <li>#14–1 AWG</li> <li>75 Deg wire</li> <li>115 A/Y, 480V UL</li> <li>160 A/Y 690V IEC</li> </ul>	<b>BB-UL-TE/50</b>

#### Fork Connector



#### Busbar End Cap

Description	Poles	Catalog Number
Install after cutting busbar	2 and 3	<b>BB-EV-EC/3</b>
Protects end of busbar	1	<b>BB-UL-EC/1</b>





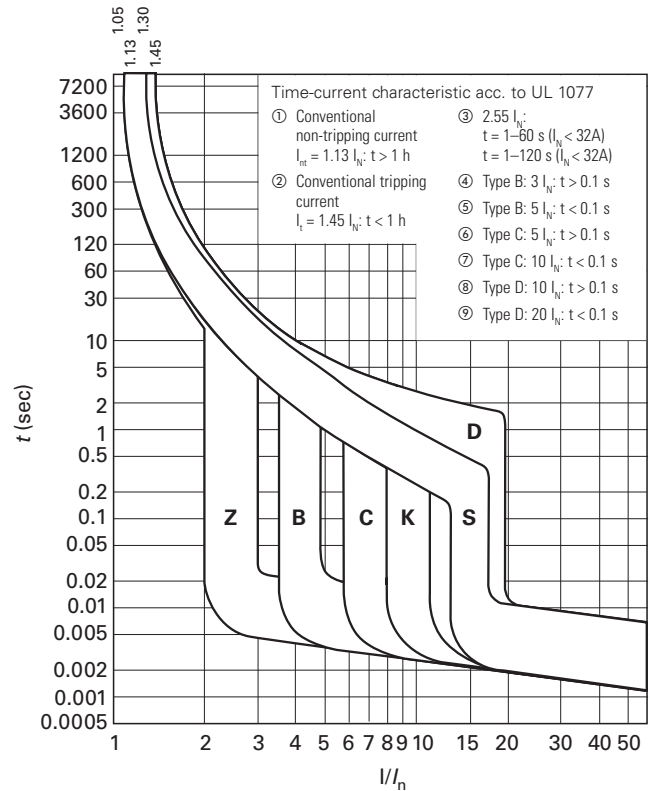
### Technical Data and Specifications

#### Trip Curves Chart

Eaton FAZ supplementary protectors are available with six different tripping characteristics, including Type B, C, D, K, S and Z. Definitions for each trip curve are contained on the ordering pages and can be used to determine the optimal characteristic for your application. For example, low-level short-circuit faults in control wiring, such as PLCs, are best protected by devices with Type B trip characteristics (3–5X continuous rating of the device ( $I_n$ )).

Even though not required by NEC or CEC for supplementary protectors, Eaton’s FAZ devices are current limiting, which means that they interrupt fault currents within one half cycle. Current limiting devices offer superior protection by reducing peak let-through current and energy.

#### Tripping Characteristics



# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

1

#### FAZ Miniature Circuit Breakers Technical Data

Description	B Curve	C Curve	D Curve
<b>Electrical</b>			
Approvals	UR (UL 1077), CSA (CSA 22.2 No. 235), CE		
Standards	IEC/EN 60947-2		
Short-circuit trip response	3–5 $I_n$	5–10 $I_n$	10–20 $I_n$
<b>Supplementary Protectors—UL/CSA</b>			
Current range	1–63A	0.5–63A	0.5–40A
Maximum voltage ratings—UL/CSA			
Single-pole, single-pole + neutral	277 Vac 48 Vdc	277 Vac 48 Vdc	277 Vac 48 Vdc
Two-, three-pole, four-pole and three-pole + neutral	480Y/277 Vac	480Y/277 Vac	480Y/277 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C
Multi-pole	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C
Short-circuit ratings (at max. voltage)			
Single-pole	10 kA (5 kA for 40–63A device)	10 kA (5 kA for 40–63A device)	5 kA
Two-, three-pole	10 kA (5 kA for 40–63A device)	10 kA (5 kA for 40–63A device)	5 kA
Single-pole	10 kA @ 48 Vdc	10 kA @ 48 Vdc	10 kA @ 48 Vdc
Two poles in series	10 kA @ 96 Vdc	10 kA @ 96 Vdc	10 kA @ 96 Vdc
<b>Miniature Circuit Breaker—IEC</b>			
Current range	1–63A	0.5–63A	0.5–63A
Maximum voltage ratings—IEC 68898-1			
Single-pole	230 Vac	230 Vac	230 Vac
Two-, three-pole	230/400 Vac	230/400 Vac	230/400 Vac
Maximum voltage ratings—IEC 60947-2			
Single-pole	240 Vac 48 Vdc	240 Vac 48 Vdc	240 Vac 48 Vdc
Two-, three-pole	240/415 Vac	240/415 Vac	240/415 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	> 1 hour @ 1.05 x $I_n$	> 1 hour @ 1.05 x $I_n$	> 1 hour @ 1.05 x $I_n$
Multi-pole	< 1 hour @ 1.3 x $I_n$	< 1 hour @ 1.3 x $I_n$	< 1 hour @ 1.3 x $I_n$
Interrupt ratings (at max. voltage)			
IEC 60947-2	15 kA	15 kA	15 kA (10 kA for 50 and 63A)
IEC 60898	10 kA	10 kA	10 kA (50 and 63A not available)
Operational switching capacity	7.5 kA	7.5 kA	7.5 kA
Max. backup fuse [gL/gG]	125A	125A	125A
Rated impulse withstand— $U_{imp}$	4000 Vac	4000 Vac	4000 Vac
Rated insulation voltage— $U_i$	440 Vac	440 Vac	440 Vac
<b>Environmental/General</b>			
Selectivity class	3	3	3
Lifespan (operations)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)
Shock (IEC 68-2-22)	10g–120 ms	10g–120 ms	10g–120 ms
Operating temperature range	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)
Shipment and short-term storage	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)
Housing material	Nylon	Nylon	Nylon
<b>Mechanical</b>			
Standard front dimension			
Device height	80 mm	80 mm	80 mm
Terminal protection	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536
Mounting width per pole	17.5 mm	17.5 mm	17.5 mm
Mounting	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection	IP20	IP20	IP20
Terminals top and bottom	Twin-purpose terminals	Twin-purpose terminals	Twin-purpose terminals
Supply connection	Line or load side	Line or load side	Line or load side
Terminal capacity [mm <sup>2</sup> ]	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)
Torque	2.4 Nm	2.4 Nm	2.4 Nm
Imperial torque	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)
Thickness of busbar material	0.8–2 mm	0.8–2 mm	0.8–2 mm
Mounting position	As required	As required	As required

### FAZ Miniature Circuit Breakers Technical Data, continued

Description	K Curve	S Curve	Z Curve
<b>Electrical</b>			
Approvals	UR (UL 1077), CSA (CSA 22.2 No. 235), CE		
Standards	IEC/EN 60947-2, E177451, 204453		
Short-circuit trip response	8–12 $I_n$	13–17 $I_n$	2–3 $I_n$
<b>Supplementary Protectors—UL/CSA</b>			
Current range	0.5–63A	0.5–40A	1–63A
Maximum voltage ratings—UL/CSA			
Single-pole, single-pole + neutral	277 Vac 48 Vdc	277 Vac 48 Vdc	277 Vac 48 Vdc
Two-, three-, four-pole and three-pole + neutral	480Y/277 Vac	480Y/277 Vac	480Y/277 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C	1.35 x $I_n$ @ 40°C
Multi-pole	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C	1.45 x $I_n$ @ 40°C
Short-circuit ratings (at max. voltage)			
Single-pole	5 kA @ 277 Vac	5 kA @ 277 Vac	5 kA @ 277 Vac
Single-pole + neutral	5 kA @ 277 Vac	5 kA @ 277 Vac	5 kA @ 277 Vac
Two-, three-, four-pole	5 kA @ 480Y/277 Vac	5 kA @ 480Y/277 Vac	5 kA @ 480Y/277 Vac
Two poles in series	—	—	—
<b>Miniature Circuit Breaker—IEC</b>			
Current range	0.5–63A	0.5–40A	1–63A
Maximum voltage ratings—IEC 60947-2			
Single-pole, single-pole + neutral	240 Vac	240 Vac	240 Vac
Two-, three-, four-pole, three-pole + neutral	240/415 Vac	240/415 Vac	240/415 Vac
Thermal tripping characteristics			
Single-pole	> 1 Hour @ 1.05 x $I_n$	> 1 Hour @ 1.05 x $I_n$	> 1 Hour @ 1.05 x $I_n$
Multi-pole	< 1 Hour @ 1.3 x $I_n$	< 1 Hour @ 1.3 x $I_n$	< 1 Hour @ 1.3 x $I_n$
Interrupt ratings (at max. voltage)			
IEC 60947-2	15 kA	10 kA	10 kA
Operational switching capacity	7.5 kA	7.5 kA	7.5 kA
Max. backup fuse [gL/gG]	125A	125A	125A
Rated impulse withstand— $U_{imp}$	4000 Vac	4000 Vac	4000 Vac
Rated insulation voltage— $U_i$	440 Vac	440 Vac	440 Vac
<b>Environmental/General</b>			
Selectivity class	3	3	3
Lifespan (operations)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)
Shock (IEC 68-2-22)	10g–120 ms	10g–120 ms	10g–120 ms
Operating temperature range	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)
Shipment and short-term storage	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)
Housing material	Nylon	Nylon	Nylon
<b>Mechanical</b>			
Standard front dimension			
Device height	80 mm	80 mm	80 mm
Terminal protection	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536
Mounting width per pole	17.7 mm	17.7 mm	17.7 mm
Mounting	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection	IP20	IP20	IP20
Terminals top and bottom	Twin-purpose terminals	Twin-purpose terminals	Twin-purpose terminals
Supply connection	Line or load side	Line or load side	Line or load side
Terminal capacity [mm <sup>2</sup> ]	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)
Torque	2.4 Nm	2.4 Nm	2.4 Nm
Imperial torque	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)
Thickness of busbar material	0.8–2 mm	0.8–2 mm	0.8–2 mm
Mounting position	As required	As required	As required

# 1.3

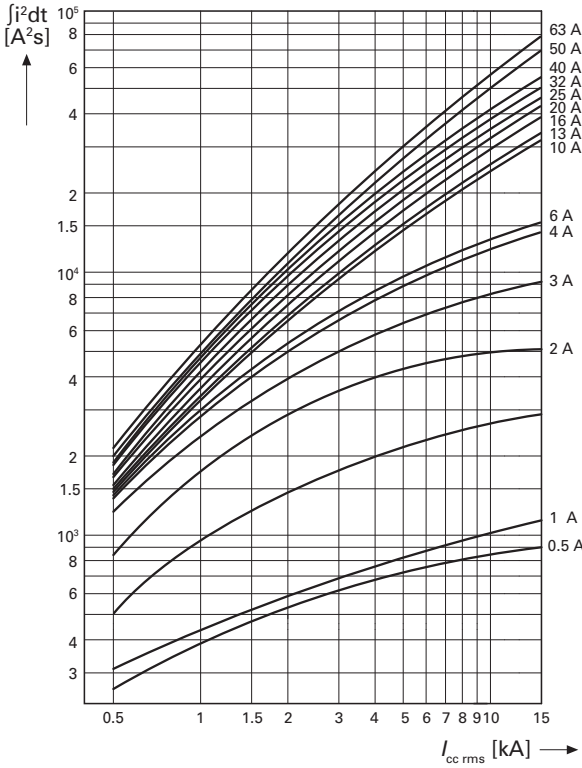
## Miniature Circuit Breakers and Supplementary Protectors

UL 1077 DIN Rail Supplementary Protectors

1

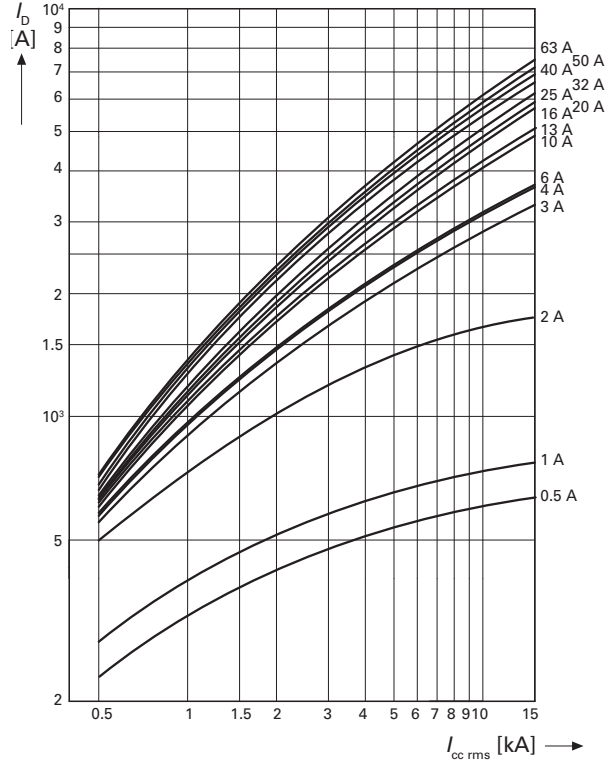
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#### Characteristic B and C

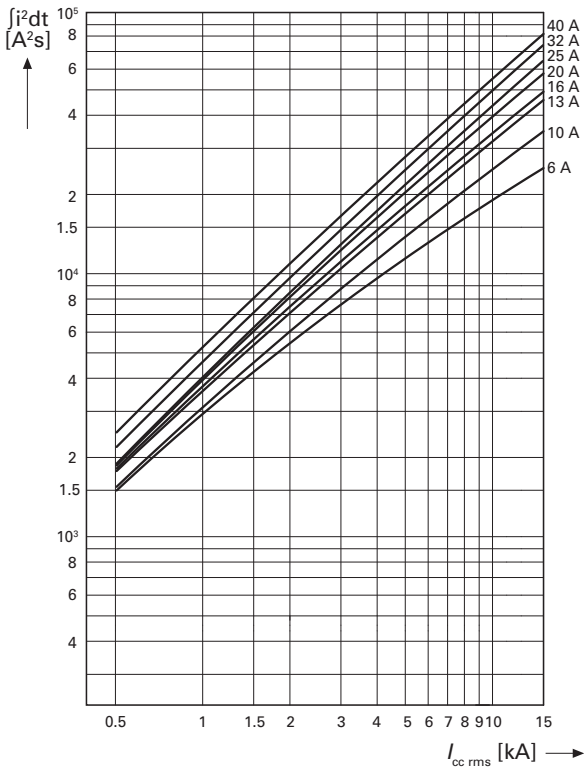


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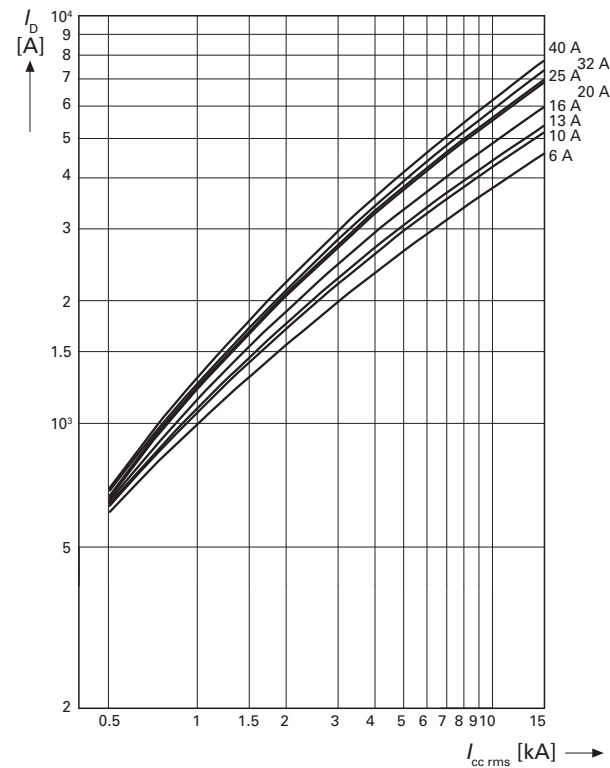
#### Characteristic B and C



#### Characteristic D

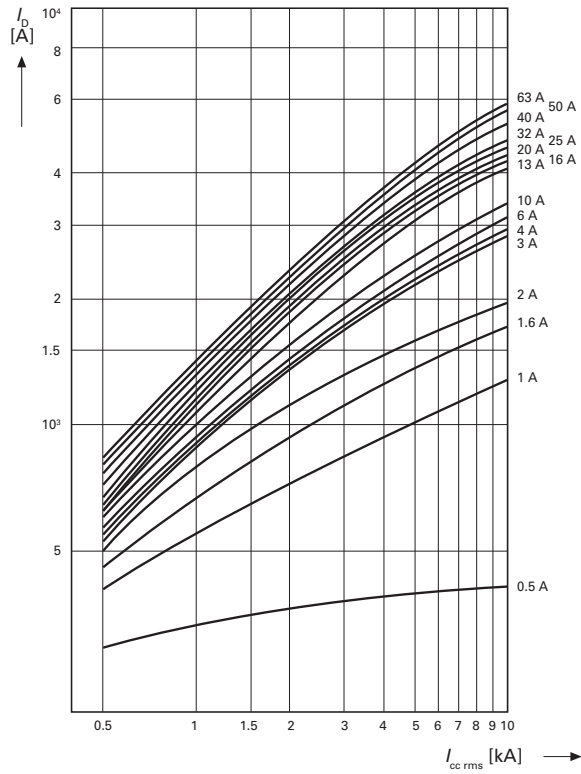


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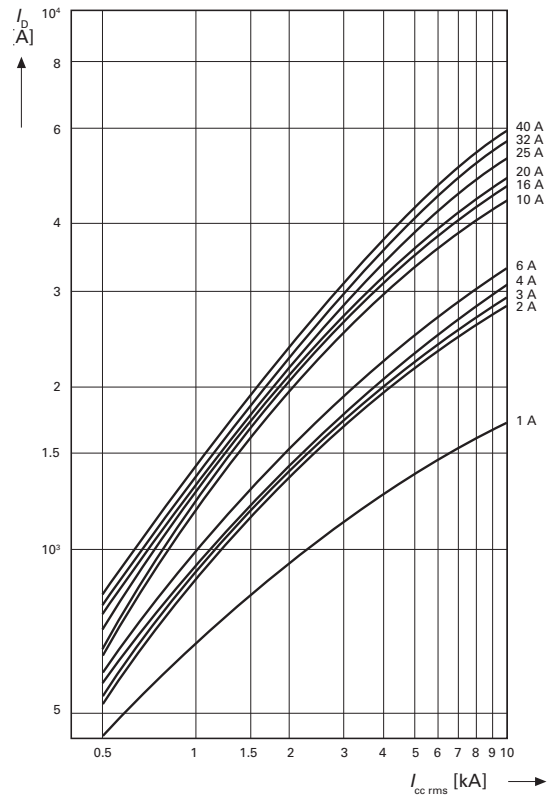


### Let-Through Energy $I^2t$

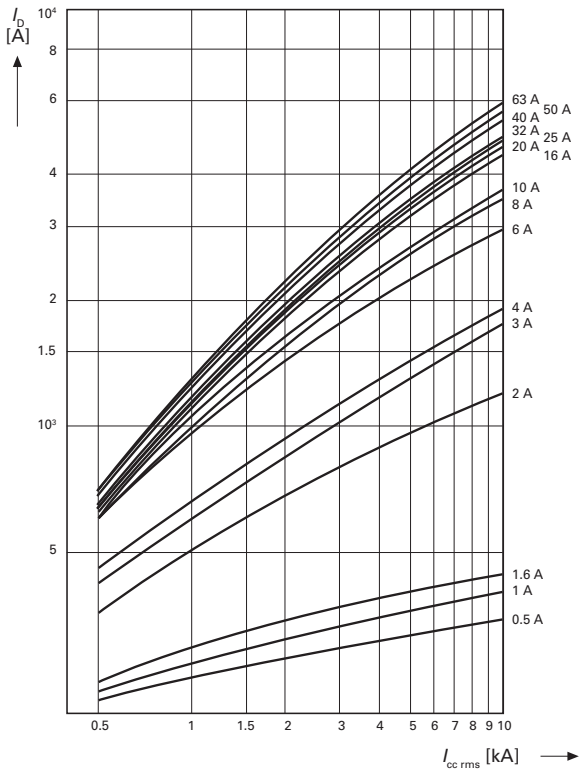
#### Characteristic K



#### Characteristic S



#### Characteristic Z



# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

1

#### Influence of the Ambient Temperature on the Thermal Tripping Behavior

Corrected values of the rated current dependent on the ambient temperature

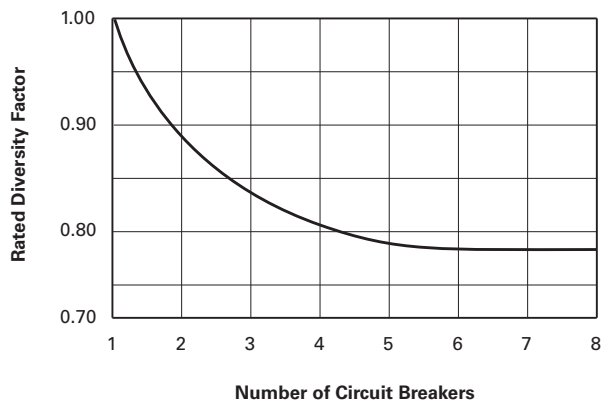
$I_n$ (A)	Ambient Temperature T																
	-40°C	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C	75°C
0.16	0.20	0.20	0.19	0.19	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13
0.25	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21
0.50	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41
0.75	0.96	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.74	0.73	0.71	0.69	0.68	0.66	0.65	0.64	0.62
1.00	1.30	1.20	1.20	1.20	1.10	1.10	1.00	1.00	0.99	0.97	0.95	0.93	0.90	0.89	0.87	0.85	0.83
1.50	1.90	1.90	1.80	1.70	1.70	1.60	1.60	1.50	1.50	1.50	1.40	1.40	1.40	1.30	1.30	1.30	1.20
1.60	2.00	2.00	1.90	1.90	1.80	1.70	1.70	1.60	1.60	1.50	1.50	1.50	1.40	1.40	1.40	1.40	1.30
2.00	2.60	2.50	2.40	2.30	2.20	2.20	2.10	2.00	2.00	1.90	1.90	1.90	1.80	1.80	1.70	1.70	1.70
2.50	3.20	3.10	3.00	2.90	2.80	2.70	2.60	2.50	2.50	2.40	2.40	2.30	2.30	2.20	2.20	2.10	2.10
3.00	3.80	3.70	3.60	3.50	3.40	3.30	3.10	3.00	3.00	2.90	2.80	2.80	2.70	2.70	2.60	2.50	2.50
3.50	4.50	4.40	4.20	4.10	3.90	3.80	3.70	3.50	3.40	3.40	3.30	3.20	3.20	3.10	3.00	3.00	2.90
4.00	5.10	5.00	4.80	4.70	4.50	4.30	4.20	4.00	3.90	3.90	3.80	3.70	3.60	3.50	3.50	3.40	3.30
5.00	6.40	6.20	6.00	5.80	5.60	5.40	5.20	5.00	4.90	4.80	4.70	4.60	4.50	4.40	4.30	4.20	4.10
6.00	7.70	7.50	7.20	7.00	6.70	6.50	6.30	6.00	5.90	5.80	5.70	5.60	5.40	5.30	5.20	5.10	5.00
7.00	9.00	8.70	8.40	8.20	7.80	7.60	7.40	7.00	6.90	6.80	6.70	6.50	6.30	6.20	6.10	6.00	5.80
8.00	10.20	9.90	9.60	9.30	9.00	8.70	8.40	8.00	7.90	7.70	7.60	7.40	7.20	7.10	6.90	6.80	6.60
10.00	13.00	12.00	12.00	12.00	11.00	11.00	10.00	10.00	9.90	9.70	9.50	9.30	9.00	8.90	8.70	8.50	8.30
12.00	15.00	15.00	14.00	14.00	13.00	13.00	13.00	12.00	12.00	12.00	11.00	11.00	11.00	11.00	10.00	10.00	10.00
13.00	17.00	16.00	16.00	15.00	15.00	14.00	14.00	13.00	13.00	13.00	12.00	12.00	12.00	12.00	11.00	11.00	11.00
15.00	19.00	19.00	18.00	17.00	17.00	16.00	16.00	15.00	15.00	15.00	14.00	14.00	14.00	13.00	13.00	13.00	12.00
16.00	20.00	20.00	19.00	19.00	18.00	17.00	17.00	16.00	16.00	15.00	15.00	15.00	14.00	14.00	14.00	14.00	13.00
20.00	26.00	25.00	24.00	23.00	22.00	22.00	21.00	20.00	20.00	19.00	19.00	19.00	18.00	18.00	17.00	17.00	17.00
25.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	25.00	24.00	24.00	23.00	23.00	22.00	22.00	21.00	21.00
32.00	41.00	40.00	38.00	37.00	36.00	35.00	33.00	32.00	32.00	31.00	30.00	30.00	29.00	28.00	28.00	27.00	26.00
35.00	45.00	43.00	41.00	41.00	38.00	38.00	36.00	35.00	35.00	34.00	33.00	32.00	32.00	32.00	30.00	29.00	29.00
40.00	51.00	50.00	48.00	47.00	45.00	43.00	42.00	40.00	39.00	39.00	38.00	37.00	36.00	35.00	35.00	34.00	33.00
50.00	64.00	62.00	60.00	58.00	56.00	54.00	52.00	50.00	49.00	48.00	47.00	46.00	45.00	44.00	43.00	42.00	41.00
63.00	81.00	78.00	76.00	73.00	71.00	68.00	66.00	63.00	62.00	61.00	60.00	58.00	57.00	56.00	55.00	53.00	52.00

#### Influence of the Mains Frequency

Influence of the mains frequency on the tripping behavior  $I_{MA}$  of the instantaneous release

	Mains Frequency f [Hz]						
	16 2/3	50	60	100	200	300	400
$I_{MA}(f)/I_{MA}(50\text{ Hz})$ [%]	91	100	101	106	115	134	141

#### Load Carrying Capacity of Adjoining Miniature Circuit Breakers



## Accessories Technical Data

Description	FAZ-XHIN FAZ-XAM002	FAZ-XAA-C	FAZ-XUA
<b>Electrical</b>			
Contact function	1A + 1B 2 C/O	—	—
Rated operational voltage $U_n$	250 Vac	—	115 Vac 230 Vac 400 Vac
Voltage range	—	12–110 Vac 12–60 Vdc	—
Voltage range	—	110–415 Vac 110–230 Vdc	—
Closing threshold [x $U_n$ ]	—	—	0.8
Tripping threshold [x $U_n$ ]	—	—	0.5
Rated frequency $f$	50/60 Hz	50/60 Hz	50/60 Hz
General use (UL/CSA) AC—230/240 Vac DC—110/120 Vdc	2/2A 0.5/0.5A	—	—
Pilot duty	A600/Q600	—	—
Conventional free air thermal current $I_{th}$	4A	—	—
Rated operational current AC-13 $I_g$ AC-15 $I_g$ DC-13 $I_g$	3A (250 Vac) 2A (250 Vac) 0.5A (110 Vdc)	—	—
Rated insulation voltage $U_i$	250 Vac	—	—
Minimum operating voltage per contract $U_{min}$	5 Vdc	—	—
Rated impulse withstand voltage (1.2/50 $\mu$ ) $U_{imp}$	2.5 kV	—	—
Rated conditional short-circuit current with 6A backup fuse $I_{SC}$	1 kA	—	—
Max. admissible backup fuse	4A gL	—	—
<b>Mechanical</b>			
Standard front dimension	45 mm	45 mm	45 mm
Device height	80 mm	80 mm	80 mm
Mounting width	8.8 mm	17.6 mm	17.8 mm
Mounting	On MCB	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection enclosed	IP40	IP40	IP40
Terminal protection	Protection against electric shock to IEC 536	Protection against electric shock to IEC 536	Protection against electric shock to IEC 536
Terminals	Lift terminals	Twin-purpose terminals	Twin-purpose terminals
Terminal capacity Solid Flexible	0.5–2.5 mm <sup>2</sup> 0.5–2.5 mm <sup>2</sup>	1–2.5 mm <sup>2</sup> 1–2.5 mm <sup>2</sup>	2 x (1–2.5) mm <sup>2</sup> 2 x (1–2.5) mm <sup>2</sup>
Tightening torque of terminal screws	0.8–1.0 Nm (7–9 lb-in)	2.4 Nm (21 lb-in)	0.8 Nm (7 lb-in)

# 1.3

## Miniature Circuit Breakers and Supplementary Protectors

### UL 1077 DIN Rail Supplementary Protectors

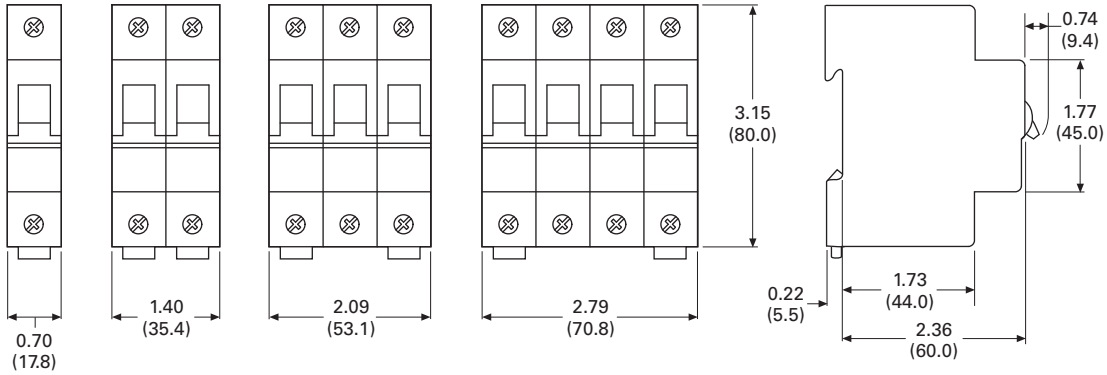
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#### Dimensions

Approximate Dimensions in Inches (mm)

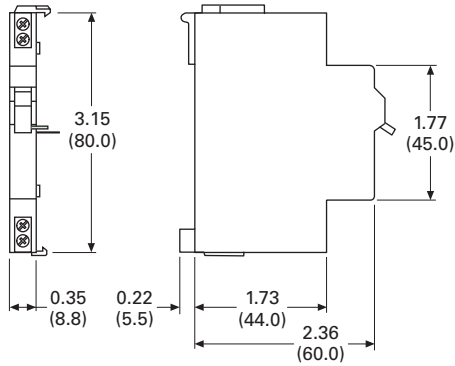
#### Miniature Circuit Breakers

##### FAZ

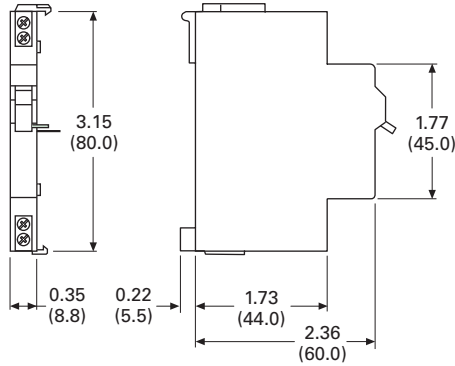


#### Auxiliary Contacts

##### FAZ-XHI11 and FAZ-XH1NW1

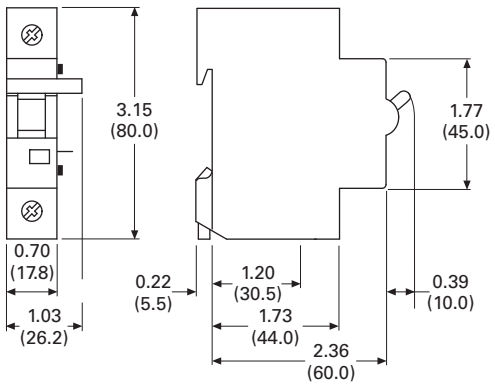


##### FAZ-XAM002



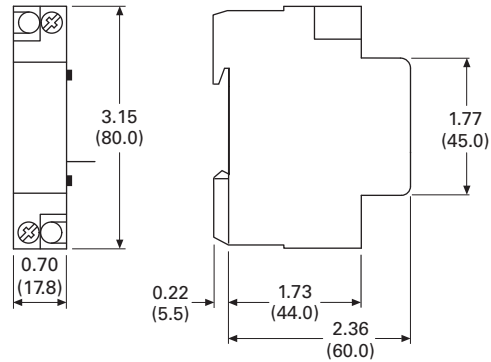
#### Shunt Releases

##### FAZ-XAA



#### Undervoltage Releases

##### FAZ-XUA

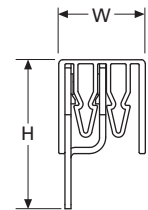
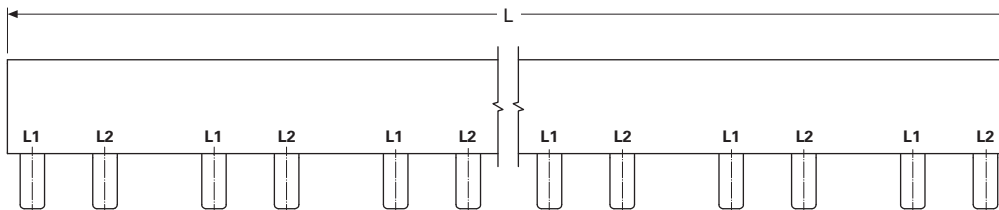




Approximate Dimensions in Inches (mm)

### Busbar and Accessory Weights and Dimensions

Unit Weight (kg)	Length	Width	Height	Catalog Number
0.29	39.72 (1009.0)	0.59 (15.0)	0.59 (15.0)	<b>BB-UL-18/1P-1M/57</b>
0.64	39.02 (991.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-18/2P-2M/56</b>
0.83	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-18/3P-3M/57</b>
0.26	38.78 (985.0)	0.59 (15.0)	0.59 (15.0)	<b>BB-UL-18/1P-1.5M/37</b>
0.63	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-18/2P+AS-2.5M/46</b>
0.79	38.66 (982.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-18/3P+AS-3.5M/48</b>
0.36	39.72 (1009.0)	0.59 (15.0)	0.59 (15.0)	<b>BB-UL-25/1P-1M/57</b>
0.79	39.02 (991.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-25/2P-2M/56</b>
1.04	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-25/3P-3M/57</b>
0.31	38.78 (985.0)	0.59 (15.0)	0.59 (15.0)	<b>BB-UL-25/1P-1.5M/37</b>
0.73	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-25/2P+AS-2.5M/46</b>
0.97	38.66 (982.0)	0.87 (22.0)	1.46 (37.0)	<b>BB-UL-25/3P+AS-3.5M/48</b>
0.03	2.36 (60.0)	0.67 (17.0)	1.14 (29.0)	<b>BB-UL-TEP/35</b>
0.03	1.42 (36.0)	0.67 (17.0)	1.14 (29.0)	<b>BB-UL-TEPA/35</b>
0.03	1.57 (40.0)	0.71 (18.0)	1.18 (30.0)	<b>BB-UL-TE/50</b>
0.003	3.35 (85.0)	0.47 (12.0)	0.94 (24.0)	<b>BB-IP/5</b>
0.001	0.55 (14.0)	0.20 (5.0)	0.39 (10.0)	<b>BB-EV-EC/3</b>
0.001	0.94 (24.0)	0.87 (22.0)	0.39 (10.0)	<b>BB-UL-EC/1</b>



**UL 1053 DIN Rail RCCB**



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**UL 1053 DIN Rail RCCB 480/277 Vac**

**Product Overview**

Optimum product quality, tested reliability and safety stand for best protection of installations and plant. Eaton’s UL 1053 Residual Current Circuit Breaker (RCCB) is designed for use in residual current applications.

**Application Description**

- Motor control circuits
- HVAC internal/external equipment
- PLCs
- HMIs
- Equipment protection
- European housing

**Features**

- Wide range of compact RCCB types serving as fault-current and additional protection according to UL 1053 and IEC/EN 61008 standards, suitable for worldwide use
- Type A or Type G/A (with delay) protection available
- Comprehensive range of accessories
- Real contact position indicator
- Fault current tripping indicator
- Transparent designation plate
- Trip-free design—RCCB can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost

**Standards and Certifications**

- UL 1053
- IEC/EN 61008
- CSA
- ÖVE
- CE Marked



## Product Selection

### UL 1053 RCCB 480Y/277V Type A

#### Two-Pole



#### Conditionally Surge Current–Proof 250A, Sensitive to Residual Pulsating DC, Type A

##### Two-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167113	FRCmM-25/2/003-A-NA
	300	167116	FRCmM-25/2/03-A-NA
40	30	167114	FRCmM-40/2/003-A-NA
	300	167117	FRCmM-40/2/03-A-NA
63	30	167115	FRCmM-63/2/003-A-NA
	300	167118	FRCmM-63/2/03-A-NA

#### Four-Pole



#### Conditionally Surge Current–Proof 250A, Sensitive to Residual Pulsating DC, Type A

##### Four-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167125	FRCmM-25/4/003-A-NA
	300	167104	FRCmM-25/4/03-A-NA
40	30	167102	FRCmM-40/4/003-A-NA
	300	167105	FRCmM-40/4/03-A-NA
63	30	167103	FRCmM-63/4/003-A-NA
	300	167106	FRCmM-63/4/03-A-NA

### UL 1053 RCCB 480Y/277V Type G/A

Type G/A has a 10 ms delay.

#### Two-Pole



#### Surge Current–Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)

##### Two-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167119	FRCmM-25/2/003-G/A-NA
	300	167122	FRCmM-25/2/03-G/A-NA
40	30	167120	FRCmM-40/2/003-G/A-NA
	300	167123	FRCmM-40/2/03-G/A-NA
63	30	167121	FRCmM-63/2/003-G/A-NA
	300	167124	FRCmM-63/2/03-G/A-NA

#### Four-Pole



#### Surge Current–Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)

##### Four-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167107	FRCmM-25/4/003-G/A-NA
	300	167110	FRCmM-25/4/03-G/A-NA
40	30	167108	FRCmM-40/4/003-G/A-NA
	300	167111	FRCmM-40/4/03-G/A-NA
63	30	167109	FRCmM-63/4/003-G/A-NA
	300	167112	FRCmM-63/4/03-G/A-NA

#### Note

<sup>①</sup> Has no thermal element; must be paired with FAZ-NA or FAZ per application.

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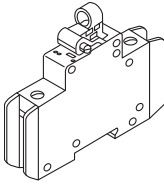
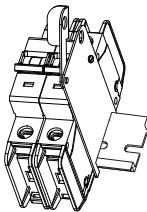
## Miniature Circuit Breakers and Supplementary Protectors

UL 1053 DIN Rail RCCB

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### Accessories

#### UL 1053 DIN Rail RCCB 480/277 Vac

	Description	Catalog Number		Description	Catalog Number
<b>Contact</b> 	Two-pole contact or auxiliary contact / trip indicating contact	<b>Z-NHK</b> ①	<b>Padlock Hasp</b> 	Padlock hasp	<b>Z-IS/SPE-1TE</b>
			<b>Lockoff Device</b> 	UL lockoff device	<b>FAZPLOFF</b>

**Note**

① Voltage of FAZ-NA circuit breaker is limited to 300V with this auxiliary contact installed.

### Technical Data and Specifications

- Residual current devices
- Has no thermal protection; must be paired with FAZ-NA or FAZ per application
- Captive screw terminals
- Universal tripping signal switch, also suitable for Z-A; can be mounted subsequently
- Auxiliary switch Z-HK can be mounted subsequently
- Red-green contact position indicator
- White-blue tripping indicator
- Delayed types recommended for use with standard fluorescent tubes with or without electronic ballast (30mA-RCD: 30 units per phase conductor, 100mA-RCD: 90 units per phase conductor)
- The device functions irrespective of the position of installation
- Tripping is line voltage-independent. Consequently, the RCD is suitable for “fault current/residual current protection” and “additional protection” within the meaning of the applicable installation rules
- Reverse-feed permitted
- The four-pole device can also be used for two-pole connection. For this purpose, use terminals 5-6 and N-N
- The test key “T” must be pressed every month. The system operator must be informed of this obligation and responsibility in a way that can be proven (self-adhesive RCD-label enclosed)
- Pressing the test key “T” serves the only purpose of function testing the residual current device (RCD). This test does not make earthing resistance measurement (RE) or proper checking of the earth conductor condition redundant, which must be performed separately
- **Type -A:** Protects against special forms of residual pulsating DC that have not been smoothed
- **Type -G/A:** Additionally protects against special forms of residual pulsating DC that have not been smoothed

### UL 1053 DIN Rail RCCB Technical Data

Description	Specification	
<b>Electrical According to IEC/EN 61008</b>		
Design according to	IEC/EN 61008	
	ÖVE E 8601	
Current test marks as printed onto the device		
Tripping Type G	10 ms delay	
Rated voltage $U_n$	230/400V, 50 Hz	
Rated tripping current $I_{\Delta n}$	30, 300 mA	
Sensitivity	AC and pulsating DC	
Rated insulation voltage $U_i$	440V	
Rated impulse withstand voltage $U_{imp}$	4 kV	
Rated short-circuit capacity $I_{nc}$	10 kA	
Maximum backup fuse	Overload protection	Short-circuit protection
$I_n = 25-40A$	25A gG/gL	63A gG/gL
$I_n = 63A$	40A gG/gL	63A gG/gL
Rated breaking capacity $I_m$ bzw. Rated fault breaking capacity $I_{\Delta m}$		
$I_n = 25-40A$	500A	
$I_n = 63A$	630A	
Voltage range of test button	Two-pole	184–250V~
	Four-pole	184–440V~
Endurance	Electrical	>4000 operating cycles
	Mechanical	>20,000 operating cycles
Overvoltage category	III	

### UL 1053 DIN Rail RCCB Technical Data, continued

Description	Specification	
<b>Electrical According to UL 1053</b>		
Design according to	UL 1053	
Current test marks as printed onto the device		
Tripping Type G	8 ms delay	
Rated voltage $U_n$	480Y/277V, 60 Hz	
Pickup current	22, 200 mA	
Sensitivity	AC and pulsating DC	
Overvoltage tested	530V	
Rated impulse withstand voltage $U_{imp}$	4 kV	
Rated short-circuit capacity $I_{nc}$	5 kA according to CSA	
Maximum backup fuse	Overload protection	Short-circuit protection
$I_n = 25-40A$	25A gG/gL	63A gG/gL
$I_n = 63A$	40A gG/gL	63A gG/gL
Rated breaking capacity $I_m$ or Rated fault breaking capacity $I_{\Delta m}$		
$I_n = 25-40A$	500A	
$I_n = 63A$	630A	
Voltage range of test button	Two-pole	184–305V~
	Four-pole	184–528V~
Endurance	Electrical	>4000 operating cycles
	Mechanical	>20,000 operating cycles
<b>Mechanical</b>		
Frame size	45.0 mm	
Device height	80.0 mm	
Device width	35 mm (2TE), 70 mm (4TE)	
Device width	Quick fastening with two lock-in positions on DIN rail IEC/EN 60715	
Degree of protection, built-in	IP40	
Degree of protection in moisture-proof enclosure	IP54	
Upper and lower terminals	Lift terminals	
Terminal protection	Finger and hand touch safe BGV A3, ÖVE-EN 6	
Terminal capacity	1.5–35 mm <sup>2</sup> single-wire	
	2 x 16 mm <sup>2</sup> multi-wire	
Busbar material thickness	0.8–2 mm	
Tripping temperature	–25°C to +60°C	
Resistance to climatic conditions	According to IEC 61008	
Humidity	5–95%	

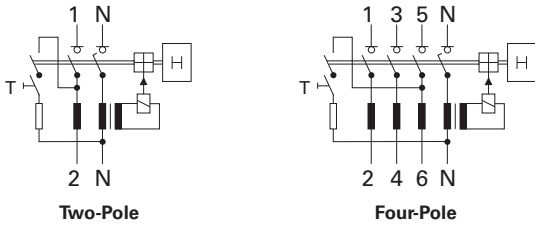
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## Miniature Circuit Breakers and Supplementary Protectors

UL 1053 DIN Rail RCCB

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### Connection Diagram



### Impact of Ambient Temperature on the Maximum Permanent Current Allowed (A)

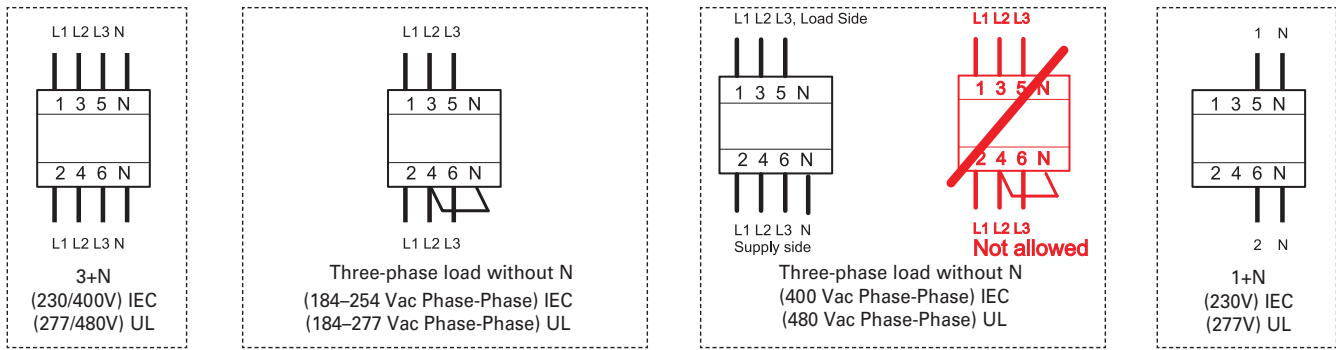
Tripping Temperature	16A		25A		40A		63A	
	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole
40°C	16	16	25	25	40	40	63	63
45°C	14	14	21	22	37	37	59	59
50°C	11	11	18	19	33	34	55	55
55°C	9	9	14	16	30	31	50	50
60°C	①	—	—	—	26	27	45	45

#### Notes

① Do not use.

Please make sure that these values are not exceeded and that any upstream overload protection switches off in time.

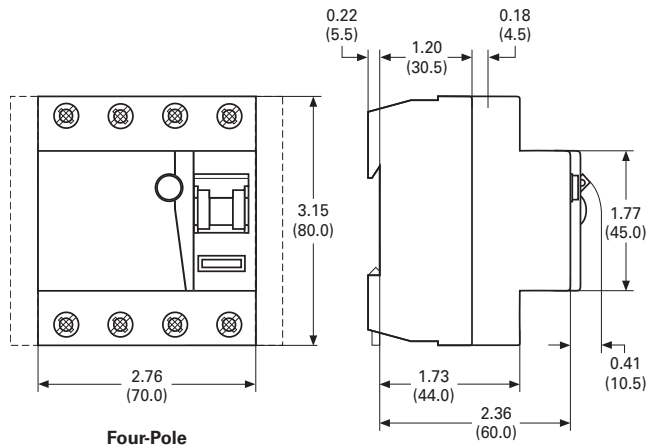
### Correct Connection



### Dimensions

Approximate Dimensions in Inches (mm)

### UL 1053 DIN Rail RCCB



## Accessories Technical Data

Description	Z-NHK
<b>Electrical</b>	
Contact function	2C0
Rated voltage	230V
Frequency	50/60 Hz
Rated current	2A
Rated thermal current $I_{th}$	2A
Utilization category AC13 Rated operational current $I_e$	3A/250 Vac
Utilization category AC15 Rated operational current $I_e$	2A/250 Vac
Utilization category DC12 Rated operational current $I_e$	0.5A/110 Vdc
Rated insulation voltage $U_i$	250 Vac
Minimum operational voltage per contact $U_{min}$	5 Vdc
Minimum operational current $I_{min}$	10 mA DC
Rated peak withstand voltage $U_{imp}$ (1.2/50 $\mu$ )	2.5 kV
Conditional short-circuit current $I_k$ with backup fuse 6A	1 kA
Maximum backup fuse, overload and short circuit	6A gL
<b>Mechanical</b>	
Tripping indicator "electrical tripping"	Blue/white
Frame size	45 mm
Device height	80 mm
Device width	8.8 mm (0.5MU)
Mounting	Onto switching device
Degree of protection, built-in	IP40
Terminal protection	Finger and hand touch safe According to BGV A3, ÖVE-EN 6
Terminals	Lift terminals
Terminal capacity	20–14 AWG
Terminal screws	M3 (Posidrive Z0)
Fastening torque of terminal screws	7 lb-in maximum

**UL 1053 DIN Rail RCCB**



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**Description**

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**UL 1053 DIN Rail RCCB 208Y/120 Vac**

**Product Overview**

Optimum product quality, tested reliability and safety stand for best protection of installations and plant. Eaton’s UL 1053 Residual Current Circuit Breaker (RCCB) is designed for use in residual current applications.

**Application Description**

- Motor control circuits
- HVAC internal/external equipment
- PLCs
- HMIs
- Equipment protection

**Features**

- Wide range of compact RCD type serving as fault-current and additional protection according to UL 1053 and IEC/EN 61008 standards, suitable for worldwide use in the 110V range of applications
- Type A or Type G/A (with delay) protection available
- Comprehensive range of accessories
- Real contact position indicator
- Fault current tripping indicator
- Transparent designation plate
- Trip-free design—RCCB can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost

**Standards and Certifications**

- UL 1053
- IEC/EN 61008





## Product Selection

### UL 1053 RCCB 208Y/120 Vac Type A

#### Four-Pole



#### Conditionally Surge Current–Proof 250A, Sensitive to Residual Pulsating DC, Type A

##### Four-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167699	FRCmM-25/4/003-A-NA-110
	300	167702	FRCmM-25/4/03-A-NA-110
40	30	167700	FRCmM-40/4/003-A-NA-110
	300	167703	FRCmM-40/4/03-A-NA-110
63	30	167701	FRCmM-63/4/003-A-NA-110
	300	167704	FRCmM-63/4/03-A-NA-110

### UL 1053 RCCB 208Y/120 Vac Type G/A

Type G/A has a 10 ms delay.

#### Two-Pole



#### Surge Current–Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)

##### Two-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167693	FRCmM-25/2/003-G/A-NA-110
	300	167696	FRCmM-25/2/03-G/A-NA-110
40	30	167694	FRCmM-40/2/003-G/A-NA-110
	300	167697	FRCmM-40/2/03-G/A-NA-110
63	30	167695	FRCmM-63/2/003-G/A-NA-110
	300	167698	FRCmM-63/2/03-G/A-NA-110

#### Four-Pole



#### Surge Current–Proof 3 kA, Sensitive to Residual Pulsating DC, Type G/A (ÖVE E 8601)

##### Four-Pole

Amperes	GF Sensitivity (mA)	Catalog Number <sup>①</sup>	Designation
25	30	167705	FRCmM-25/4/003-G/A-NA-110
	300	167708	FRCmM-25/4/03-G/A-NA-110
40	30	167706	FRCmM-40/4/003-G/A-NA-110
	300	167709	FRCmM-40/4/03-G/A-NA-110
63	30	167707	FRCmM-63/4/003-G/A-NA-110
	300	167710	FRCmM-63/4/03-G/A-NA-110

#### Note

<sup>①</sup> Has no thermal element; must be paired with FAZ-NA or FAZ per application.

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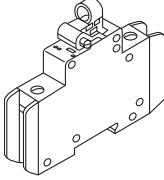
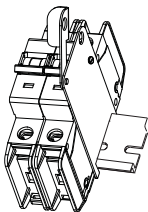
## Miniature Circuit Breakers and Supplementary Protectors

UL 1053 DIN Rail RCCB

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### Accessories

#### UL 1053 DIN Rail RCCB 208Y/120 Vac

	Description	Catalog Number		Description	Catalog Number
<b>Contact</b> 	Two-pole contact or auxiliary contact / trip indicating contact	<b>Z-NHK</b> ①	<b>Padlock Hasp</b> 	Padlock hasp	<b>Z-IS/SPE-1TE</b>
			<b>Lockoff Device</b> 	UL lockoff device	<b>FAZPLOFF</b>

**Note**

① Voltage of FAZ-NA circuit breaker is limited to 300V with this auxiliary contact installed.

### Technical Data and Specifications

- Residual current devices
- Has no thermal protection; must be paired with FAZ-NA or FAZ per application
- Captive screw terminals
- Universal tripping signal switch, also suitable for Z-A; can be mounted subsequently
- Auxiliary switch Z-HK can be mounted subsequently
- Red-green contact position indicator
- White-blue tripping indicator
- Delayed types recommended for use with standard fluorescent tubes with or without electronic ballast (30mA-RCD: 30 units per phase conductor, 100mA-RCD: 90 units per phase conductor)
- The device functions irrespective of the position of installation
- Tripping is line voltage-independent. Consequently, the RCD is suitable for “fault current/residual current protection” and “additional protection” within the meaning of the applicable installation rules
- Reverse-feed permitted
- The four-pole device can also be used for two-pole connection. For this purpose, use terminals 5-6 and N-N
- The test key “T” must be pressed every month. The system operator must be informed of this obligation and responsibility in a way that can be proven (self-adhesive RCD-label enclosed)
- Pressing the test key “T” serves the only purpose of function testing the residual current device (RCD). This test does not make earthing resistance measurement (RE) or proper checking of the earth conductor condition redundant, which must be performed separately
- **Type -A:** Protects against special forms of residual pulsating DC that have not been smoothed
- **Type -G/A:** Additionally protects against special forms of residual pulsating DC that have not been smoothed

### UL 1053 DIN Rail RCCB Technical Data

Description	Specification
<b>Electrical According to IEC/EN 61008</b>	
Design according to	IEC/EN 61008 ÖVE E 8601
Current test marks as printed onto the device	
Tripping Type G	10 ms delay
Rated voltage $U_n$	230/400V, 50 Hz
Rated tripping current $I_{\Delta n}$	30, 300 mA
Sensitivity	AC and pulsating DC
Rated insulation voltage $U_i$	440V
Rated impulse withstand voltage $U_{imp}$	4 kV
Rated short-circuit capacity $I_{nc}$	10 kA
Maximum backup fuse	Overload protection      Short-circuit protection
$I_n = 25-40A$	25A gG/gL                      63A gG/gL
$I_n = 63A$	40A gG/gL                      63A gG/gL
Rated breaking capacity $I_m$ bzw. Rated fault breaking capacity $I_{\Delta m}$	
$I_n = 25-40A$	500A
$I_n = 63A$	630A
Voltage range of test button	Two-pole                      100–132V~ Four-pole                      100–230V~
Endurance	Electrical                      >4000 operating cycles Mechanical                      >20,000 operating cycles
Overvoltage category	III

### UL 1053 DIN Rail RCCB Technical Data, continued

Description	Specification
<b>Electrical According to UL1053</b>	
Design according to	UL 1053
Current test marks as printed onto the device	
Tripping Type G	8 ms delay
Rated voltage $U_n$	208Y/120V, 60 Hz
Pickup current	22, 200 mA
Sensitivity	AC and pulsating DC
Overvoltage tested	530V
Rated impulse withstand voltage $U_{imp}$	4 kV
Rated short-circuit capacity $I_{nc}$	5 kA according to CSA
Maximum backup fuse	Overload protection      Short-circuit protection
$I_n = 25-40A$	25A gG/gL                      63A gG/gL
$I_n = 63A$	40A gG/gL                      63A gG/gL
Rated breaking capacity $I_m$ or Rated fault breaking capacity $I_{\Delta m}$	
$I_n = 25-40A$	500A
$I_n = 63A$	630A
Voltage range of test button	Two-pole                      100–121V~ Four-pole                      100–210V~
Endurance	Electrical                      >4000 operating cycles Mechanical                      >20,000 operating cycles
<b>Mechanical</b>	
Frame size	45.0 mm
Device height	80.0 mm
Device width	35 mm (2TE), 70 mm (4TE)
Device width	Quick fastening with two lock-in positions on DIN rail IEC/EN 60715
Degree of protection, built-in	IP40
Degree of protection in moisture-proof enclosure	IP54
Upper and lower terminals	Lift terminals
Terminal protection	Finger and hand touch safe BGV A3, ÖVE-EN 6
Terminal capacity	1.5–35 mm <sup>2</sup> single-wire 2 x 16 mm <sup>2</sup> multi-wire
Busbar material thickness	0.8–2 mm
Tripping temperature	–25°C to +60°C
Resistance to climatic conditions	According to IEC 61008
Humidity	5–95%

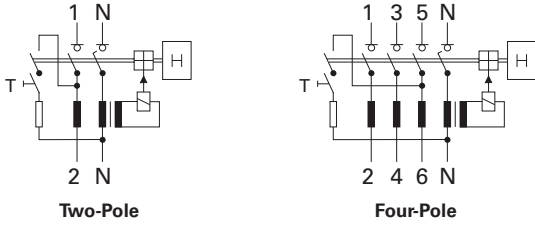
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## Miniature Circuit Breakers and Supplementary Protectors

UL 1053 DIN Rail RCCB

1

### Connection Diagram



### Impact of Ambient Temperature on the Maximum Permanent Current Allowed (A)

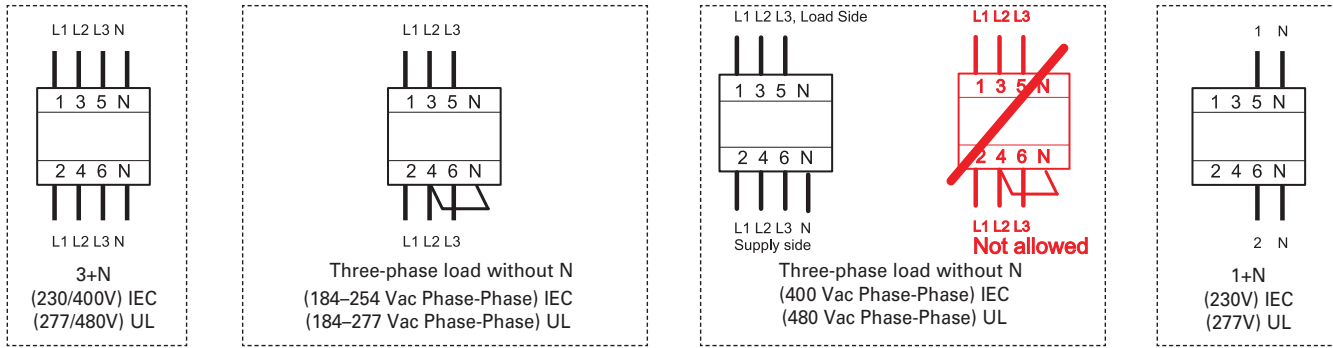
Tripping Temperature	16A		25A		40A		63A	
	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole	Two-Pole	Four-Pole
40°C	16	16	25	25	40	40	63	63
45°C	14	14	21	22	37	37	59	59
50°C	11	11	18	19	33	34	55	55
55°C	9	9	14	16	30	31	50	50
60°C	①	—	—	—	26	27	45	45

#### Notes

① Do not use.

Please make sure that these values are not exceeded and that any upstream overload protection switches off in time.

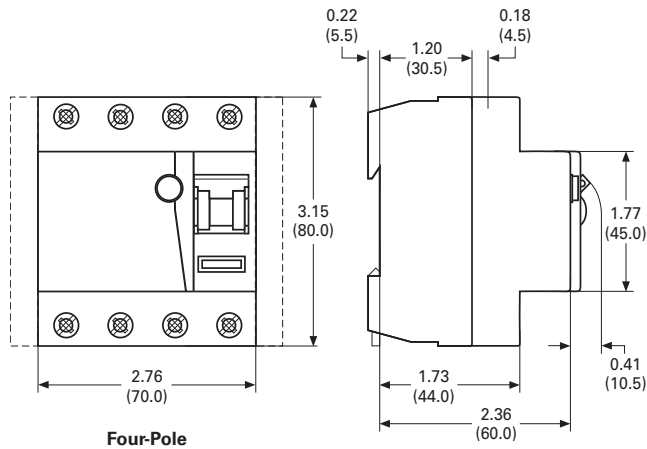
### Correct Connection



### Dimensions

Approximate Dimensions in Inches (mm)

### UL 1053 DIN Rail RCCB



## Accessories Technical Data

Description	Z-NHK	Z-IHK-NA
<b>Electrical</b>		
Contact function	2CO	1NO + 1NC
Rated voltage	230V	250V
Frequency	50/60 Hz	50/60 Hz
Rated current	2A	6A
Rated thermal current $I_{th}$	2A	6A
Utilization category AC13 Rated operational current $I_e$	3A/250 Vac	3A/250 Vac
Utilization category AC15 Rated operational current $I_e$	2A/250 Vac	2A/250 Vac
Utilization category DC12 Rated operational current $I_e$	0.5A/110 Vdc	0.5A/110 Vdc 0.25A/220 Vdc
Rated insulation voltage $U_i$	250 Vac	250 Vac
Minimum operational voltage per contact $U_{min}$	5 Vdc	5 Vdc
Minimum operational current $I_{min}$	10 mA DC	10 mA AC/DC
Rated peak withstand voltage $U_{imp}$ (1.2/50 $\mu$ )	2.5 kV	4 kV
Conditional short-circuit current $I_k$ with backup fuse 6A	1 kA	1 kA
Maximum backup fuse, overload and short circuit	6A gL	—
<b>Mechanical</b>		
Tripping indicator "electrical tripping"	Blue/white	—
Frame size	45 mm	45 mm
Device height	80 mm	80 mm
Device width	8.8 mm (0.5MU)	8.8 mm (0.5MU)
Mounting	Onto switching device	—
Degree of protection, built-in	IP40	IP40
Terminal protection	Finger and hand touch safe According to BGV A3, ÖVE-EN 6	Finger and hand touch safe According to BGV A3, ÖVE-EN 6
Terminals	Lift terminals	Lift terminals
Terminal capacity	20–14 AWG	0.5–2.5 mm <sup>2</sup>
Terminal screws	M3 (Posidrive Z0)	M3 (Posidrive Z0)
Fastening torque of terminal screws	7 lb-in maximum	1.2 Nm

# Molded Case Circuit Breakers

**Power Defense Molded Case Circuit Breakers**



**Series G Circuit Breakers**



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### Molded Case Circuit Breakers



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### Product Overview

Eaton’s Electrical Sector, under the Eaton brand, offers the widest variety of molded case circuit breakers available today. Designed for electrical and machinery OEMs serving a range of industries and applications, these proven designs incorporate the latest in innovation with the high reliability that has been our hallmark since the advent of the circuit breaker in the 1920s.

The Power Defense family is Eaton’s premier MCCB globally rated line, incorporating Power Xpert Release electronic trip units with best-in-class safety and protection features. It includes ratings from 15 to 12,500 amperes, thermal-magnetic and electronic breakers, and modular field-installable accessories. Power Defense breakers meet the requirements of UL, CSA, CE and CCC.

The Series G line features an average 35% size reduction, common field-installable internal accessories and advanced trip unit functionality that eliminates the need for rating plugs. These breakers meet the requirements of UL, CSA, IEC, CCC and CE, allowing the OEM to standardize on a design that meets the needs of their global customer base.

The Series C family ranges from 15 to 2500 amperes and includes thermal-magnetic breakers, electronic trip breakers, molded case switches, motor circuit protectors and specially designed breakers for engine generator, DC and mining applications.

### Application Description

Eaton molded case circuit breakers cover the widest range of applications in the industry:

- Electrical OEMs
- Machinery OEMs
- Navy breakers:
  - UL 489 Supplement SB
  - MIL-C-17588
  - MIL-C-17361
  - ABS/NVR
- Mining breakers up to 1100 Vac
- Earth leakage
- DC breakers 125–750 Vdc
- Engine generator breakers 15–1200 amperes
- Current limiting breakers

## Typical Applications

### **Machine Tool Control Panels and Motor Control Centers**

Designed for these equipment requirements, including new world-class accessories.

### **Panelboards**

As both main and branch circuit protection devices.

### **Feeder Pillars**

In distribution systems to provide main and branch circuit protection.

### **Switchgear**

In distribution systems to provide main and branch circuit protection up to 2500 amperes (RG-Frame).

### **Busbar Trunking Tap-Offs**

In busbar trunking tap-offs to provide circuit protection.

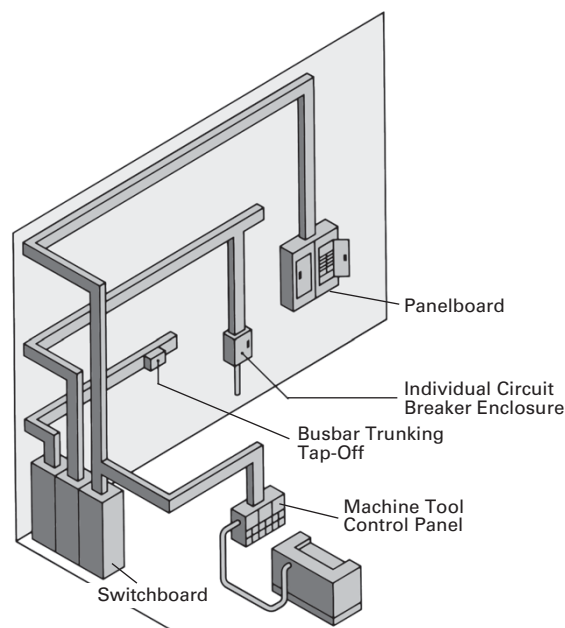
### **Individual Enclosures**

Completely assembled in enclosures to meet specific customer requirements.

### **Additional Applications**

Special versions of each Eaton frame are available to provide safe equipment control and protection in mining and other applications. Contact your Eaton agent or distributor for additional information.

## Typical Eaton Applications





## Power Defense Molded Case Circuit Breakers

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### Product Description

Eaton's globally accepted Power Defense™ molded case circuit breaker (MCCB) can:

- Connect to your network or the cloud with built-in communication capability
- Generate the data to help optimize your facility's performance
- Mitigate arc flash to keep your employees, customers and end users safe

The Power Defense MCCB portfolio is globally adaptive to your footprint no matter the application or project requirement. All frames have the availability of global certifications including IEC, CCC, UL® and CSA®. Eaton's best-in-class support enables you to order readily available product for on-time delivery, across the globe.

### Application Description

#### Power Xpert Release Electronic Trip Units

**Simpler communications.**  
**Better protection.**  
**Easier energy metering**

Embedded in the Power Defense portfolio, Power Xpert® Release (PXR) electronic trip units for global low-voltage commercial and industrial applications are Eaton's latest innovation in circuit protection technology. They are designed to help you simplify your communications, enhance your protection and support your energy metering.

- Unique Eaton trip unit platform enables you to easily change set points, test and configure circuit breakers, and meter energy and power information
- Enhanced, easy-to-use interface allows you to view and adjust the trip unit settings
- Intuitive interface provides simple scroll-through visibility for critical performance metrics such as metering, battery life, zone selective interlock settings and circuit breaker health

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### Features and Benefits

#### Trip Unit Configurations

##### Thermal-Magnetic

- Available with adjustable magnetic settings, and for IEC markets, adjustable thermal settings. For NEMA markets, fixed magnetic and fixed thermal settings are options. Four-pole options with 0%, 60% and 100% protection are available

##### PXR 10

- All of the advantages of an electronic trip unit in a simpler interface, which leads to easy setup. This trip unit is available with LSI protection and includes programmable settings so that it can be tailored for the specific application

##### PXR 20

- A fully adjustable trip unit with LSI and LSIG protection capabilities. This trip unit offers more advanced features than ever before at this level, including current metering, programmable relays, and optional embedded communications to enable seamless integration into control and communication systems
- The PXR 20 also offers cutting-edge safety features like the Arcflash Reduction Maintenance System™ and zone selective interlocking with new testing and status indication features, and cause of trip indication

**PXR 20D**

- Offers the same level of functionality as the PXR 20, but with a programmable interface that allows for additional flexibility in protection parameters and integration into inter-connected power distribution systems. The protection and safety functions can be programmed not only from the onboard LCD screen, but also through communications, making your system setup and commissioning easier and future-proofed

**PXR 25**

- Offers more functionality than ever before in a molded case circuit breaker trip unit. 1% accuracy for energy readings, coupled with the option for multiple communication protocols and embedded programmable relays, making this the ultimate example of an intelligent node in a power distribution system
- Leverage the capabilities of this product to eliminate meters and other components from the system, making the power distribution system cost-effective and smaller, with increased intelligence and connectivity

Each breaker frame section indicates the full range of trip units available for the frame. The wide range of trip unit options, coupled with field-replaceable trip units, enables compatibility with global requirements and allows upgrade from the most basic protective device to a high-end, intelligent node in a power system.

**Trip Unit Features****Breaker Health Feature and Programmable Alarms***Less Costly Downtime*

By enabling you to perform predictive and preventive maintenance on your power distribution system prior to component failure, the breaker health feature and programmable alarms will help you avoid costly downtime.

- Communicates circuit breaker status at customer determined levels to prompt for breaker maintenance or inspection
- Provides real-time evaluation of breaker condition by tracking and analyzing diagnostic details including breaker operations, short-circuit fault levels, operational time, internal temperature and overloads

**Zone Selective Interlocking***Reduction in Arc Flash Energy*

The zone selective interlocking (ZSI) feature communicates when a phase or ground fault is present.

- The breaker closest to the fault will override any customer-defined delay setting and open instantaneously to clear the fault, allowing line-side breakers to remain closed and online
- The PXR trip unit displays when the ZSI system is engaged, communicating, and helping to keep you and your employees safe—so you no longer have to just trust that the ZSI is operational, unlike with other MCCB offerings
- ZSI is also a proven solution for reducing arc flash incident energy when a fault is present

**Arcflash Reduction Maintenance System***Better Safety and Productivity*

For added protection, the Power Defense portfolio offers Eaton's patented Arcflash Reduction Maintenance System to reduce arc flash incident energy. This innovative safety feature can help you:

- Decrease personal protection equipment (PPE) requirements to enhance productivity
- Enhance the safety of your personnel

**Enhanced Ground Fault Protection and Coordination***Easier Phase or Ground Fault Detection and Warning*

Expanded protection of ground fault increases coordination capabilities and provides ability to turn protection off.

- ON/OFF feature simplifies system testing
- Ground fault trip units combine trip, alarm, and OFF in every unit, with programmable relays for alarm or pre-alarm functionality
- Expanded time profile selections include I<sup>2</sup>t and flat response profiles for more coordination options

**Industry Standard Communication**

Energy monitoring and system status with onboard serial and industrial network communications available through CAM modules in the PXR 20, 20D and 25 will offer a greater view and control into the machine or power distribution system.

Available features can offer:

- Easy connection to PLC building management systems, SCADA and cloud-based systems
- Remote monitoring and option control of breaker
- Metering and health data

**Power Xpert Protection Manager***Simpler Operation, Reduced Maintenance*

Once installed, your Power Xpert Release trip unit continues to provide cost savings and advanced functionality through the Power Xpert Protection Manager (PXPM) interface. This intuitive user interface allows for simple trip unit set up and programming, real-time reporting of power and energy metering, as well as the ability to check critical performance metrics, to meet your application needs while decreasing maintenance and in-field testing time. The testing features and functionality, which can be run through a personal computer, offers savings through labor hour reduction and avoiding the need for expensive proprietary testing kits.

- Ultimate control and data are at your fingertips:
  - Set point Configuration: Allows direct-to-trip unit or offline set up, including duplication of settings between units
  - Control Mode: Capture waveforms, reset TU or set the date/time
  - Test Mode: Run secondary injection and create test reports
  - Real-Time Data: Provides information regarding all status and metered data direction from the trip unit
  - Event Summaries: Stores up to 200 events, detailed information on the most recent (10) trip and (10) alarm events, and time adjustments to the real-time clock
  - Reports: Allows for the formatting and printing of real time data and of performed secondary injection tests

## Breaker Frame Overview

Power Defense molded case circuit breakers include six frames, PD-1 through PD-6, providing flexibility to meet protection needs up to 2500 A.

**PD-1**—Compact frame covering range of 15 A through 125 A with fixed thermal-magnetic trip unit, and with current limiting options. Additionally, motor circuit protectors covering a range from 3 A through 100 A with adjustable magnetic settings of 3x to 11x.

**PD-2**—Standard frame covering a range of 15 A through 225 A with trip unit options, from a fixed thermal-magnetic to the most advanced Power Xpert™ Release (PXR) electronic units. PD-2 also has current limiting options available. Additionally, motor protection circuit breakers ranging from 15 A through 200 A with PXR electronic trip units, as well as motor circuit protectors ranging from 3 A through 150 A with adjustable magnetic settings from 3x to 10x.

**PD-3**—Covers a range of 45 A through 600 A with field-installable trip units, including fixed thermal/adjustable magnetic and all PXR electronic trip unit options in two frame options: 400 A and 600 A. PD-3 also has 100% UL ratings and current limiting options. Additionally, motor protection circuit breakers ranging from 45 A through 600 A with PXR electronic trip units, as well as motor circuit protectors ranging from 70 A through 600 A with adjustable magnetic settings from 5x to 10x.

**PD-4**—Covers a range of 300 A through 800 A with field-installable trip units, including fixed thermal/adjustable magnetic, and all PXR electronic trip unit options (PXR 10, PXR 20, PXR 20D and PXR 25), and 100% UL rating options.

**PD-5**—Covers a range of 320 A through 1200 A with field-installable PXR electronic trip units, PXR 20, PXR 20D and PXR 25, as well as 100% UL rating options.

**PD-6**—Covers a range of 700 A through 2500 A with field-installable PXR electronic trip units, PXR 20, PXR 20D and PXR 25, as well as 100% UL rating options.

## Interrupting Ratings

The Power Defense molded case circuit breaker line is a global product, with interrupting ratings across a broad range of voltages. These interrupting ratings are optimized for power distribution and meet the broadest range of application needs. See each frame for the specific interrupting levels.

## Modular Accessories

The Power Defense molded case circuit breakers feature new, modular accessories that are designed to make customization of the breaker for the unique requirements of the application easier than ever before. A common line of auxiliary switch and bell alarms allow for interchangeability between the different Power Defense breaker frames, enabling the final configuration of the breaker at the point of use and minimizing the amount of inventory required. Compact, modular shunt trips and under voltage releases have been designed to be easily installed and removed as the project or application dictates.

Some of the most common accessories and their function are described below.

### Internal Accessories

**Auxiliary Switches**—Provide circuit breaker primary contact status information. The auxiliary switch is used for remote indication and interlock system verification. These switches mount internal to the breaker in the right side accessory cavity.

**Alarm Switches**—Used for remote indication of automatic trip operation. The switch automatically resets when the circuit breaker is reset. These switches mount internal to the breaker in the right side accessory cavity.

**Shunt Trip**—Provides capability to trip the breaker by remote control. Shunt trips are designed to be applied at specific AC or DC voltages. These devices are installed internal to the breaker in the left side accessory cavity.

### Undervoltage Release

**(UVR)**—Monitors a voltage, typically of a line voltage, and trips the circuit breaker when the voltage falls below 70% of the nominal voltage designated for the UVR. These devices are installed internal to the breaker in the left side accessory cavity.

**External Accessories**

**Terminals**—Multiple cable terminal options are available for each frame, providing alternatives to connect primary power and loads to the circuit breaker.

Additionally, control wire terminals provide a means to tap off control power. Multi-wire terminals on the load side of the breaker can also be used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

**Terminal Shields**—Provide protection against accidental contact with live terminations, as well as clearance between circuit breaker poles or adjacent circuit breakers, and are required for some terminal applications.

**Interphase Barriers**—Offer additional electrical clearance between circuit breaker poles for special termination applications.

**Operating Mechanisms**—Manually operated mechanisms designed to open, close and reset circuit breakers. These are available in three basic configurations—flange mounted, through-the-door and direct (close-coupled)—to provide a variety of options for different applications.

**Remote/Electrical Operators**—A motor driven, stored energy operator that enables a user to locally or remotely switch the breaker between the OFF, ON and TRIP positions, including reset switching. These operators mount on the front cover of the circuit breaker, within the trim line of the circuit breaker, and are designed to be applied at specific AC or DC voltages.

**Locking Devices**—Offer the capability to lock the breaker handle in the OFF or ON position (trip-free operation allows the breaker to trip when locked in the ON position). Power Defense offers three primary types, including handle blocks, padlockable hasps, and provisions for Kirk trapped key locks (Kirk lock must be purchased separately).

**Walking Beam Interlock**—Provides a mechanical interlock between two adjacent circuit breakers of the same frame size and pole configuration, preventing both breakers from being switched ON at the same time. To install a walking beam interlock, the circuit breakers must be ordered with the factory modification to accept the interlock.

**Plug-In Adapters**—Provide a rear connection and mounting base to simplify installation and front removal of circuit breakers. Plug-in adapters are available for frames PD-1, PD-2 and PD-3.

**Drawout Configurations**—Provide a robust system to remove or exchange breakers and is typically used in critical power operations. It provides a rear connection and cell, and provides indication of the circuit breaker position. Drawout configurations are available for frames PD-3, PD-4 and PD-5.

**Standards and Certifications**

Power Defense circuit breakers meet applicable:

- UL 489
- CSA, C22.2 No. 5-02
- IEC 60947-2
- GB 14048.2-2008



#### Catalog Numbering System Overview

##### Breakers

Power Defense breakers are configured using a 20-digit catalog number that can be divided into two sections:

- Base breaker catalog number = digits 1–14
- Factory modifications = digits 15–20

Product may be ordered using the base breaker catalog number (*14 digits*) only. However, if factory modifications are required, including installation of accessories, the full breaker catalog number plus factory modifications (*20 digits*) for a configured breaker must be used.

Note that most of the accessories for Power Defense molded case circuit breakers are field installable. When field installing accessories, the best practice to follow is to order a base breaker with the 14-digit catalog number, and order the accessories separate for field installation.

A configured breaker (*20 digits*) catalog number should only be used when it is necessary to have a factory modification of the circuit breaker.

##### Base Breaker Catalog Number (14 digits)

The catalog number has fixed positions for each breaker characteristic. The fixed format allows a customer to determine the performance characteristics of the product by parsing the catalog number. The format of the Power Defense breaker catalog number is as follows:

Catalog Number Digits	PD (1, 2)	G (3)	3 (4)	3 (5)	F (6)	0400 (7–10)	TFA (11–13)	J (14)
Meaning	Power Defense	Certifications and standards	Frame size	Poles	Interrupting rating	Continuous current rating	Trip unit type	Terminals

##### Certifications and Standards (Digit 3)

The certifications and standards selection (*digit 3*) denotes the global standards and certifications met by the product, and, as such, indicates the respective markings found on the product. Defined values and their meaning are as follows:

Value	Meaning	Marks on Product
G	Global ratings	UL, CSA, CE, CCC
F	Global ratings with 100% UL rating	UL, CSA, CE, CCC
D	Rated to 240 V	UL, CSA
J	UL and CSA	UL, CSA
C	IEC and GB	CE, CCC
E	IEC only	CE

##### Poles (Digit 5)

The poles selection (*digit 5*) is mostly self-explanatory, with the exception of 4-pole breakers, which may use the values 4 (100% protected neutral pole), 0 (no protection on neutral pole), or 6 (60% protected neutral pole).

Other selections are self-explanatory, and further defined in each frame-specific section relative to the specific frame or product type.

##### Configured Breaker Catalog Number (20 digits)

For breakers with factory modifications, product must be ordered using the complete 20-digit configured breaker catalog number. This 20-digit number includes the base breaker catalog number plus an additional 6 digits to denote the factory modifications.

Factory modifications on Power Defense catalog numbers are also based on fixed positions within digits 15–20 of the catalog number. Digits 15–16 are always used for indicating accessories, 17–18 for tripping accessories and 19–20 for other accessories or modifications. When not used, the modification code digits default to the letter **N**.

##### Example

An example of a full catalog number with modification codes would be as follows:

Catalog Number Digits	PDG33F0400TFAJ (1–14)	CC (15, 16)	SP (17, 18)	WB (19, 20)
Meaning	Base breaker catalog number	Indicating accessories (auxiliary and/or alarm switches)	Tripping accessories (shunt trip or UVR)	Other accessories or modifications



### Indicating Accessories (Digits 15, 16)

The two digits used for indicating accessories (*digits 15, 16*) denote the type of accessory(-ies) installed, the type of termination of those accessories, and the configuration.

Digit 16 determines the configuration of the switches, such as Form A (normally open or NO), Form B (normally closed or NC), or Form C (change-over or CO, or NO/NC).

Digit 15 specifically designates the accessory type and termination, as shown below (note that not all frames offer all the options shown).

Type	Accessory Terminations	Digit 15 Selection
Auxiliary switch only	Pigtail (30-inch)	<b>A</b>
	Pigtail (3-meter)	<b>D</b>
	Screw terminal	<b>X</b>
	Spring cage clamp	<b>U</b>
Alarm switch only	Pigtail (30-inch)	<b>B</b>
	Pigtail (3-meter)	<b>E</b>
	Screw terminal	<b>Y</b>
	Spring cage clamp	<b>V</b>
Auxiliary and alarm	Pigtail (30-inch)	<b>C</b>
	Pigtail (3-meter)	<b>F</b>
	Screw terminal	<b>Z</b>
	Spring cage clamp	<b>W</b>

### Tripping Accessories (Digits 17, 18)

The two digits used for tripping accessories (*digits 17, 18*) denote the type of accessory installed, the type of termination, and the nominal voltage rating of the accessory. Digit 17 specifically designates the type of accessory and type of termination, as shown below.

Digit 18 designates the nominal voltage rating of the shunt trip or UVR, for which options available vary by frame and are detailed in each frame section of the catalog.

Type	Accessory Terminations	Digit 17 Selection
Shunt trip	Pigtail (30-inch)	<b>S</b>
	Pigtail (3-meter)	<b>R</b>
	Screw terminal	<b>T</b>
Under voltage release	Pigtail (30-inch)	<b>U</b>
	Pigtail (3-meter)	<b>W</b>
	Screw terminal	<b>V</b>

### Other Accessories (Digits 19, 20)

Other factory-installed accessories and factory modifications available (*digits 19, 20*) are detailed on a frame-by-frame basis in the respective section of the catalog.

### Trip Units and Accessories for Field Installation or Replacement

Power Defense circuit breakers are designed to have field-installable accessories, and for frame sizes 3, 4, 5 and 6, field installable and replaceable trip units. As such, breaker frames, trip units and accessories may be purchased separately for field configuration. Trip units and accessories also have designated catalog numbers for identification and ordering purposes.

Breaker frames are configured using the base breaker catalog number (*14 digits*), as detailed in each section.

In general, when ordering accessory or trip unit field installation kits, the format of the catalog number begins with a description of the frame or frames for which it is applicable (e.g., PDG3), followed by a separator digit (X), and ending with a descriptive section, as follows:

### Trip Units and Accessories

Catalog Number Example	PDG3	X	Descriptive Section
<b>Meaning</b>	Power Defense Global Standards Frame 3	Separator digit	May include voltage, functionality or other description of accessory or trip unit.

### Trip Units

Trip units may be ordered installed as part of a base or configured breaker, with (*digits 11–13*) denoting the functionality and features included. Additionally, trip units may be ordered separately, using the trip unit designated catalog numbers. Below, it is explained how separate trip unit catalog numbers are set up, as well as their relationship with their designation in digits 11–13 of the breaker catalog number for the same trip unit.

### Thermal-Magnetic Trip Units (TMTU)

Power Defense TMTUs are available in frame sizes 1 through 4, covering a continuous current range of 15 A through 800 A.

### Thermal (overload) settings

—Functionality and configurations are available based on the standard to which the breaker is certified, with all trip units carrying UL and CSA certifications (PDG, PDF, etc) having a fixed thermal setting.

### Magnetic (short circuit) settings

—For frame sizes 1 and 2 that include UL and CSA certifications, magnetic settings are fixed. For frame sizes 3 and 4, the trip unit includes an adjustment for the short circuit protection setting of the trip unit, with the range dependent on the frame.

# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

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When ordered individually, thermal-magnetic trip unit catalog numbers include a Descriptive Section to denote the tripping characteristics of the unit, the pole configuration and continuous current rating.

The information in the description, TFA30400, is also used in the base breaker catalog number.

#### Example

An individual TMTU catalog number takes the form of:

Catalog Number	PDG3	X	TFA	3	0400
<b>Description</b>	Power Defense Frame Size	Separator digit	Trip unit tripping characteristics	Poles	Continuous current rating

Specific to TMTUs, the trip unit characteristics used in the base breaker catalog number denote the thermal and magnetic tripping characteristics of the unit.

Thermal-magnetic trip units (or breakers) may also be ordered calibrated to 50 °C ambient temperature by using a V in the trip unit type designator. Breakers with 50 °C calibrated trip units do not carry a UL Listing.

TM trip unit tripping characteristics options:

Configured Breaker Digit	Separate TM Trip Unit Digit	Designator	Option	Meaning
11	6	Trip unit type	<b>T</b>	Thermal-magnetic trip unit
			<b>V</b>	50 °C thermal-magnetic trip unit
12	7	Thermal type	<b>F</b>	Fixed
			<b>A</b>	Adjustable
13	8	Magnetic type	<b>F</b>	Fixed
			<b>A</b>	Adjustable

**Note:** IEC rated circuit thermal-magnetic trip units that are included with PDC or PDE breakers are typically fully adjustable (thermal and magnetic). Please consult with the product line for additional details.

#### Power Xpert Release (PXR) Electronic Trip Units (ETUs)

PXR ETUs are available in frame sizes 2 through 6, covering a continuous current range of 15 A through 2500 A.

When ordered individually, PXR trip unit catalog numbers also include a Descriptive Section denoting the functionality and configuration of the trip unit.

Sections of the PXR ETU catalog number are also used in the Base Breaker that is outfitted with the same trip unit.

#### Power Xpert Release (PXR) Electronic Trip Units (ETUs)

Catalog Number	PDG3	X	PXR	3	0400	P2M
<b>Description</b>	Power Defense Frame Size	Separator digit	PXR ETU	Poles	Maximum continuous current rating	Trip unit functionality

The three digit code at the end of the trip unit catalog number, or digits 11–13 for a base catalog number, denote the trip unit type, protection features and options included with the trip unit.

**Example**

Trip unit features and options:

Configured Breaker Digit	Separate PXR Trip Unit Digit	Designator	Option	Meaning
11	14	Trip unit type	<b>B</b>	PXR 10 Basic ETU
			<b>E</b>	PXR 20
			<b>D</b>	PXR 20D
			<b>P</b>	PXR 25
12	15	Protection type	<b>2</b>	LSI
			<b>3</b>	LSIG
			<b>4</b>	LSI with ARMS (ALSI)
			<b>5</b>	LSIG with ARMS (ALSIG)
			<b>8</b>	LSI Motor (MLSI)
			<b>9</b>	LSIG Motor (MLSIG)
13	16	Options included	<b>N</b>	None
			<b>R</b>	Programmable relays
			<b>M</b>	Modbus and relays
			<b>Z</b>	ZSI and relays
			<b>C</b>	CAM Link and relays
			<b>W</b>	Modbus, ZSI, and relays
			<b>X</b>	CAM Link, ZSI, and relays
			<b>D</b>	Modbus, CAM Link, and relays
		<b>Y</b>	Modbus, CAM Link, ZSI and relays	

Each frame section provides details on which options are available for the frame and includes a table similar to the one below, denoting the options that may be combined by following horizontal lines and selecting one item per section, such as E2Z or P3W below.

**Power Xpert Release (PXR) Trip Unit Options**

Trip Unit Type (Character 11)	Protection Type (Character 12)	Available Configured Options (Character 13)											
		LSI	LSIG	LSI with ARMS	LSIG with ARMS	Relays	Relays Modbus	Relays ZSI	Relays CAM				
PXR 10	<b>B</b>	<b>2</b>	—	—	—	<b>N</b>	—	—	—	—	—	—	
PXR 20	<b>E</b>	<b>2</b>	—	—	—	<b>N</b>	<b>R</b>	<b>M</b>	<b>Z</b>	<b>C</b>	<b>W</b>	<b>X</b>	—
		—	<b>3</b>	<b>4</b>	<b>5</b>	—	<b>R</b>	<b>M</b>	<b>Z</b>	<b>C</b>	<b>W</b>	<b>X</b>	—
PXR 20D	<b>D</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	—	—	<b>M</b>	—	—	<b>W</b>	—	<b>D</b>
PXR 25	<b>P</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	—	—	<b>M</b>	—	—	<b>W</b>	—	<b>D</b>

**Accessories**

Power Defense accessory catalog numbers also follow a format with a frame description, separator digit (X) and descriptive section, similar to trip units.

Accessory catalog numbering format:

Catalog Number Example	PDG3	X	ST130ACDCS
<b>Meaning</b>	Power Defense Global Standards Frame 3	Separator digit	Descriptive section. May include voltage, functionality, or other description of accessory.

In cases where an accessory is used on multiple frames, multiple frames may be listed in the Frame Description, such as “PDG34” for some rotary handles. Accessory catalog numbers are listed with descriptions in each frame section.



#### Technical Data

#### Technical Data—Frame Sizes 1 and 2

2



**Frame Size 1—125 A,  
1-, 2-, 3- and 4-Pole**



**Frame Size 2—225 A,  
1-, 2-, 3- and 4-Pole**

Description	Unit	Frame Size 1—125 A, 1-, 2-, 3- and 4-Pole								Frame Size 2—225 A, 1-, 2-, 3- and 4-Pole						
		C	F	G	K	M	N <sup>①</sup>	P <sup>①</sup>	F	G	K	M	N	P		
Interrupting rating / breaking capacity	50–60 Hz	kA														
NEMA UL/CSA	240 Vac		25	35	65	85	100	150	200	35	65	85	100	150	200	
	480 Vac (277 Vac for 1 pole)		18	25	35	50	65	85	100	25	35	50	65	85	100	
	600 Vac (347 Vac for 1 pole) <sup>②③</sup>		10	14	18	22	25	30	35	14	18	22	25	30/25	35/25	
	125 Vdc <sup>④</sup>		10	22	22	35	42	42	42	10	10	10	10	10	10	
	250 Vdc <sup>④</sup>		10	22	22	35	42	42	42	10	10	10	22	22	22	
IEC 60947-2	220–240 Vac	<i>I<sub>cu</sub></i>	25	35	55	85	100	150	200	35	55	85	100	150	200	
		<i>I<sub>cs</sub></i>	25	35	55	85	100	100	150	35	55	85	100	100	150	
	380–415 Vac	<i>I<sub>cu</sub></i>	20	25	36	50	70	70	100	25	36	50	70	70	100	
		<i>I<sub>cs</sub></i>	20	25	36	50	50	70	100	25	36	50	53	70	70	
	440 Vac	<i>I<sub>cu</sub></i>	—	—	—	—	—	—	—	25	30	35	50	70	100	
		<i>I<sub>cs</sub></i>	—	—	—	—	—	—	—	20	22.5	35	40	50	65	
	480 Vac	<i>I<sub>cu</sub></i>	—	—	—	—	—	—	—	20	25	35	50	65	65	
		<i>I<sub>cs</sub></i>	—	—	—	—	—	—	—	20	20	22.5	30	40	40	
	525 Vac <sup>②</sup>	<i>I<sub>cu</sub></i>	—	—	—	—	—	—	—	18	20	30/25	30/25	30/25	35/25	
		<i>I<sub>cs</sub></i>	—	—	—	—	—	—	—	15/13	15/13	15/13	15/13	15/13	18/13	
	660–690 Vac	<i>I<sub>cu</sub></i>	—	—	—	—	—	—	—	—	8	10	10	10	10	
		<i>I<sub>cs</sub></i>	—	—	—	—	—	—	—	—	4	5	5	5	5	
	125 Vdc <sup>④</sup>	<i>I<sub>cu</sub></i>	10	22	22	35	42	42	42	10	10	10	10	10	10	
		<i>I<sub>cs</sub></i>	10	22	22	35	42	42	42	10	10	10	10	10	10	
	250 Vdc <sup>④</sup>	<i>I<sub>cu</sub></i>	10	22	22	35	42	42	42	10	10	10	22	22	22	
		<i>I<sub>cs</sub></i>	10	22	22	35	42	42	42	10	10	10	22	22	22	
Rated short circuit making capacity (I <sub>cm</sub> )	220–240 Vac		52.5	73.5	121	187	220	330	440	73.5	121	187	220	330	440	
	380–415 Vac		42	53	76	105	154	154	220	52.5	75.6	105	154	154	220	
	440 Vac		—	—	—	—	—	—	—	52.5	63	73.5	105	154	220	
	480 Vac		—	—	—	—	—	—	—	42	52.5	73.5	105	143	143	
	525 Vac		—	—	—	—	—	—	—	37.8	42	63/52.5	63/52.5	73.5	73.5	
	660–690 Vac		—	—	—	—	—	—	—	—	16.8	21	21	21	21	
Withstand/threshold of the frame	<i>I<sub>cw</sub></i>	kA	—								1.8					
Trip unit			No								No					
Interchangeable			No								No					
Thermal-magnetic ( <b>T</b> )			Fixed-Fixed								Fixed-Fixed					
Motor circuit protector ( <b>M</b> )			Adjustable Mag Only (3 pole)								Adjustable Mag Only (3 pole)					
Electronics																
Basic—PXR 10 ( <b>B</b> )											LSI, MLSI					
Standard—PXR 20 ( <b>E</b> )											LSI, LSIG					
Ammeter—PXR 20D ( <b>D</b> )											LSI, LSIG					
Energy / programmable—PXR 25 ( <b>P</b> )											LSI, LSIG, MLSI, MLSIG					

**Note**

- ① N and P ratings not available for 1 pole breakers.
- ② First listed interrupting rating applies to thermal-magnetic breakers; the second rating applies to electronic breakers.
- ③ PDG1 breakers are rated for use in 347Y/600 Vac systems.
- ④ 125 Vdc ratings are for single-pole breakers. 250 Vdc require two poles in series.

## Technical Data—Frame Sizes 1 and 2, continued


**Frame Size 1—125 A,  
1-, 2-, 3- and 4-Pole**

**Frame Size 2—225 A,  
1-, 2-, 3- and 4-Pole**

Description		Unit	Frame Size 1—125 A, 1-, 2-, 3- and 4-Pole	Frame Size 2—225 A, 1-, 2-, 3- and 4-Pole
UL File Number			E7819	E7819
UL 100% rated breaker			—	—
Amperage range	Thermal-magnetic	A	15–125	15–225 (1 pole: 15–150; 15–30 for 1-pole N and P ratings)
	Electronics		—	15–225
Selectivity category			A	A
Reference standard			UL/CSA/IEC/CCC	UL/CSA/IEC/CCC
Rated insulation voltage $U_i$ , according to IEC 60947–2	Main conducting paths	V	500	800 (TMTU) 690 (ETU)
	Auxiliary circuits	V	500	690
Rated impulse withstand voltage $U_{imp}$	Main conducting paths	kV	6	8 (TMTU) 6 (ETU)
	Auxiliary circuits		4	4
Rated operational voltage $U_e$ (AC)	IEC/CCC	Vac	415	690
	UL/CSA	Vac	600/347	600
Rated operational voltage $U_e$ (DC)	IEC/CCC	Vdc	250	250
	UL/CSA	Vdc	250	250
Permissible ambient temperature range (for storage and operation)		°C	–20 to +70	–20 to +70
Product complies with IEC 60–068		Shock	Yes	Yes
Permissible load for various ambient temperatures close to the circuit breaker, related to the rated current of the circuit breaker				
Thermal Magnetic Breakers		40 °C	100%	100%
		45 °C	98%	100%
		50 °C	96%	100%
		55 °C	93%	98%
		60 °C	91%	95%
		70 °C	86%	90%
PXR Electronic Breakers (including motor protection circuit breakers)		40 °C	—	100%
		45 °C	—	100%
		50 °C	—	100%
		55 °C	—	98%
		60 °C	—	92%
		70 °C	—	80%
Altitude derating factor			See Special Applications Section	See Special Applications Section
400 Hz derating factor			—	See Special Applications Section
Endurance (operating cycles) no-load (mechanical endurance)			10,000	20,000
Endurance (operating cycles) with load (electrical endurance) at 415 V			125 A: 4000; 100 A: 6000	8,000
Maximum switching frequency (per minute)			125 A: 5; 100 A: 6	2

#### Technical Data—Frame Sizes 1 and 2, continued

2

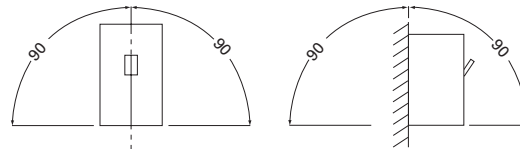


**Frame Size 1—125 A,  
1-, 2-, 3- and 4-Pole**



**Frame Size 2—225 A,  
1-, 2-, 3- and 4-Pole**

Description		Unit	Frame Size 1—125 A, 1-, 2-, 3- and 4-Pole	Frame Size 2—225 A, 1-, 2-, 3- and 4-Pole
Dimensions (H x W x D)	1-pole	inch (mm)	5.5 x 1.0 x 3.0 (139.7 x 25.4 x 76.2)	6.0 x 1.4 x 3.5 (152.4 x 35.1 x 88.9)
	2-pole		5.5 x 2.0 x 3.0 (139.7 x 50.8 x 76.2)	6.0 x 2.8 x 3.5 (152.4 x 71.1 x 88.9)
	3-pole		5.5 x 3.0 x 3.0 (139.7 x 76.2 x 76.2)	6.0 x 4.1 x 3.5 (152.4 x 104.6 x 88.9)
	4-pole		5.5 x 4.0 x 3.0 (139.7 x 101.6 x 76.2)	6.0 x 5.5 x 3.5 (152.4 x 139.5 x 88.9)
Pole to pole distance		inch (mm)	1.000 (24.40)	1.375 (34.93)
Approximate weight		lb (kg)		
Breaker	3-pole / 4-pole		2.29 (1.04) / 2.84 (1.29)	4.21 (1.82) / 5.69 (2.46)
Breaker with Plug-in	3-pole / 4-pole		—	6.00 (2.72) / 8.09 (3.67)
Power loss per circuit breaker at maximum rated current in fixed breaker (3P)—for plant protection	W		31	48 (TMTU); 38 (ETU)
Suitable for reverse-feed applications			Yes (except MCP)	Yes (except MCP)
Blow out dimension		Inch (mm)	3.75 (95.3)	1.00 (25.4)
Required spacing between circuit breakers		Inch (mm)	0	0
Installation methods	Fixed		Yes	Yes
	Plug-in		Yes	Yes
	Drawout		—	—
	DIN rail		Yes	Yes ①
IP Protection	With accessories		IP30	IP2X with finger protection
Pollution degree			III	III
Overtoltage category			III	III
Annex H IT capability	at 415 V		Yes	Yes
Permissible mounting positions				



**Note**

① Consult with product line for availability.

### Technical Data—Frame Sizes 3 and 4



**Frame Size 3—400 A,  
2-, 3- and 4-Pole**



**Frame Size 3—600 A,  
2-, 3- and 4-Pole**



**Frame Size 4—800 A,  
2-, 3- and 4-Pole**

Description	Unit	Frame Size 3—400 A, 2-, 3- and 4-Pole						Frame Size 3—600 A, 2-, 3- and 4-Pole						Frame Size 4—800 A, 2-, 3- and 4-Pole			
		F	G	K	M	N	P	F	G	K	M	N	P	G	K	M	
Interrupting rating / breaking capacity	50–60 Hz	kA															
NEMA UL/CSA	240 Vac	35	65	85	100	150	200	35	65	85	100	150	200	65	85	100	
	480 Vac	25	35	50	65	85	100	25	35	50	65	85	100	35	50	65	
	600 Vac	14	18	25	35	50	65	14	18	25	35	50	65	18	25	35	
	125 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	250 Vdc <sup>①</sup>	22	22	22	42	42	42	22	22	22	42	42	42	22	22	25	
IEC 60947-2	220–240 Vac	$I_{cu}$	35	55	85	100	150	200	35	55	85	100	150	200	55	85	100
		$I_{cs}$	35	55	85	100	100	150	35	55	85	100	100	150	55	85	100
	380–415 Vac	$I_{cu}$	25	36	50	70	70	100	25	36	50	70	70	100	36	50	70
		$I_{cs}$	25	36	50	53	70	70	25	36	50	53	70	70	36	50	53
	440 Vac	$I_{cu}$	25	30	35	50	70	100	25	30	35	50	70	100	30	35	50
		$I_{cs}$	20	22.5	35	40	50	50	20	22.5	35	40	50	50	22.5	35	40
	480 Vac	$I_{cu}$	20	25	35	50	65	85	20	25	35	50	65	85	25	35	50
		$I_{cs}$	20	20	22.5	30	40	40	20	20	22.5	30	40	40	20	22.5	30
	525 Vac	$I_{cu}$	18	20	25	30	35	40	18	20	25	30	35	40	20	25	30
		$I_{cs}$	5	7.5	10	15	25	25	5	7.5	10	15	25	25	16.5	20	25
	660–690 Vac	$I_{cu}$	—	8	10	15	20	20	—	8	10	15	20	20	8	10	15
		$I_{cs}$	—	4	5	7.5	10	10	—	4	5	7.5	10	10	4	5	7.5
	125 Vdc	$I_{cu}$	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		$I_{cs}$	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	250 Vdc <sup>①</sup>	$I_{cu}$	22	22	22	42	42	42	22	22	22	42	42	42	22	22	25
		$I_{cs}$	10	10	10	22	22	22	22	22	22	42	42	42	22	22	25
Rated short circuit making capacity (I <sub>cm</sub> )	220–240 Vac	73.5	121	187	220	330	440	73.5	121	187	220	330	440	121	187	220	
	380–415 Vac	52.5	75.6	105	154	154	220	52.5	75.6	105	154	154	220	75.6	105	154	
	440 Vac	52.5	63	73.5	105	154	220	52.5	63	73.5	105	154	220	63	73.5	105	
	480 Vac	42	52.5	73.5	105	143	187	42	52.5	73.5	105	143	187	52.5	73.5	105	
	525 Vac	37.8	42	52.5	63	73.5	84	37.8	42	52.5	63	73.5	84	42	52.5	63	
	660–690 Vac	—	16.8	21	31.5	42	42	—	16.8	21	31.5	42	42	16.8	21	31.5	
Withstand/threshold of the frame	$I_{cw}$	kA															
		4						4						6			
Trip unit																	
Interchangeable		Yes						Yes						Yes			
Thermal-magnetic (T)		Fixed-Adjustable						Fixed-Adjustable						Fixed-Adjustable			
Motor circuit protector (M)		Adjustable Mag Only (3 pole)						Adjustable Mag Only (3 pole)						—			
Adjustable Magnetic only (3-pole)—PXR 10 (B)		LSI, MLSI						LSI, MLSI						LSI			
Standard—PXR 20 (E)		LSI, LSIG, ALSI, ALSIG						LSI, LSIG, ALSI, ALSIG						LSI, LSIG, ALSI, ALSIG			
Ammeter—PXR 20D (D)		LSI, LSIG, ALSI, ALSIG						LSI, LSIG, ALSI, ALSIG						LSI, LSIG, ALSI, ALSIG			
Energy / programmable—PXR 25 (P)		LSI, LSIG, ALSI, ALSIG, MLSI, MLSIG						LSI, LSIG, ALSI, ALSIG, MLSI, MLSIG						LSI, LSIG, ALSI, ALSIG			

**Note**

<sup>①</sup> 2P in series.

#### Technical Data—Frame Sizes 3 and 4, continued



**Frame Size 3—400 A,  
2-, 3- and 4-Pole**



**Frame Size 3—600 A,  
2-, 3- and 4-Pole**



**Frame Size 4—800 A,  
2-, 3- and 4-Pole**

Description	Unit	Frame Size 3—400 A, 2-, 3- and 4-Pole	Frame Size 3—600 A, 2-, 3- and 4-Pole	Frame Size 4—800 A, 2-, 3- and 4-Pole
UL File Number		E7819	E7819	E7819
UL 100% rated breaker		Yes (ETU)	Yes (TMTU and ETU)	Yes (ETU)
Amperage range	Thermal-magnetic	A	100–400	250–600
	Electronics		45–400	90–600
Selectivity category		A	A	A
Reference standard		UL/CSA/IEC/CCC	UL/CSA/IEC/CCC	UL/CSA/IEC/CCC
Rated insulation voltage $U_i$ , according to IEC 60947–2	Main conducting paths	V	800	800 (TMTU); 690 (ETU)
	Auxiliary circuits	V	690	690
Rated impulse withstand voltage $U_{imp}$	Main conducting paths	kV	8 (TMTU); 6 (ETU)	8 (TMTU); 6 (ETU)
	Auxiliary circuits		4	4
Rated operational voltage $U_e$ (AC)	IEC/CCC	Vac	690	690
	UL/CSA	Vac	600	600
Rated operational voltage $U_e$ (DC)	IEC/CCC	Vdc	250	250
	UL/CSA	Vdc	250	250
Permissible ambient temperature range (for storage and operation)	°C	–20 to +70	–20 to +70	–20 to +70
Product complies with IEC 60– Shock 068		Yes	Yes	Yes
Permissible load for various ambient temperatures close to the circuit breaker, related to the rated current of the circuit breaker				
Thermal Magnetic Breakers		40 °C	100%	100%
		45 °C	95.5%	97%
		50 °C	91%	94%
		55 °C	86%	91%
		60 °C	82%	88%
		70 °C	70%	80%
PXR Electronic Breakers (including motor protection circuit breakers)		40 °C	100%	100%
		45 °C	100%	100%
		50 °C	100%	100%
		55 °C	86%	91%
		60 °C	82%	88%
		70 °C	70%	80%
Altitude derating factor		See Special Applications Section	See Special Applications Section	See Special Applications Section
400 Hz derating factor		See Special Applications Section	See Special Applications Section	See Special Applications Section
Endurance (operating cycles) no-load (mechanical endurance)		15,000	15,000	10,000
Endurance (operating cycles) with load (electrical endurance) at 415 V		5000	5000	3000
Maximum switching frequency (per minute)		1	1	1

## Technical Data—Frame Sizes 3 and 4, continued

Description		Unit	Frame Size 3—400 A, 2-, 3- and 4-Pole	Frame Size 3—600 A, 2-, 3- and 4-Pole	Frame Size 4—800 A, 2-, 3- and 4-Pole
Dimensions (H x W x D)	1-pole	inch (mm)	—	—	—
	2-pole		10.1 x 5.5 x 4.3 (257.1 x 138.9 x 109.1)	10.1 x 5.5 x 4.3 (257.1 x 138.9 x 109.1)	16.0 x 8.3 x 4.4 (406.4 x 209.6 x 111.2)
	3-pole		10.1 x 5.5 x 4.3 (257.1 x 138.9 x 109.1)	10.1 x 5.5 x 4.3 (257.1 x 138.9 x 109.1)	16.0 x 8.3 x 4.4 (406.4 x 209.6 x 111.2)
	4-pole		10.1 x 7.2 x 4.3 (257.1 x 182.9 x 109.1)	10.1 x 7.2 x 4.3 (257.1 x 182.9 x 109.1)	16.0 x 11.0 x 4.4 (406.4 x 279.4 x 111.2)
Pole to pole distance	inch (mm)	1.719 (43.66)	1.719 (43.66)	2.750 (69.85)	
Approximate weight	lb (kg)				
Breaker	3-pole / 4-pole		11.02 (5.00) 13.77 (6.25)	12.79 (5.80) 17.42 (7.90)	30.00 (13.60) 39.90 (18.08)
	Breaker with Plug-in	3-pole / 4-pole	18.07 (8.20) 20.82 (9.44)	19.84 (9.01) 26.87 (12.19)	—
Power loss per circuit breaker at maximum rated current $I_n$ fixed breaker (3P)—for plant protection	W		70 (TMTU); 64 (ETU)	130 (TMTU); 110 (ETU)	291 (TMTU); 270 (ETU)
Suitable for reverse-feed applications			Yes	Yes	Yes
Blow out dimension	Inch (mm)		1.00 (25.4)	1.00 (25.4)	2.36 (60.0)
Required spacing between circuit breakers	Inch (mm)		0	0	0
Installation methods	Fixed		Yes	Yes	Yes
	Plug-in		Yes	Yes	—
	Drawout		Yes <sup>①</sup>	Yes <sup>①</sup>	Yes <sup>①</sup>
	DIN rail		—	—	—
IP Protection	With accessories		IP2X with Finger Protection	IP2X with Finger Protection	IP2X Protection
Pollution degree			III	III	III
Overvoltage category			III	III	III
Annex H IT capability at 415 V			Yes	Yes	Yes
Permissible mounting positions					

**Note**

<sup>①</sup> Consult with product line for availability.

# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

#### Technical Data—Frame Sizes 5 and 6

2



Frame Size 5—800, 1200, 1600 (IEC)  
2-, 3- and 4-Pole



Frame Size 6—1600, 2000, 2500  
2-, 3- and 4-Pole

Description	Unit	Frame Size 5—800, 1200, 1600 (IEC) 2-, 3- and 4-Pole					Frame Size 6—1600, 2000, 2500 2-, 3- and 4-Pole			
		K	M	N	P	T <sup>①</sup>	M	N	P	
Interrupting rating / breaking capacity	50–60 Hz	kA								
NEMA UL/CSA	240 Vac	85	100	150	200	200	125	150	200	
	480 Vac (277 Vac for 1 pole)	50	65	85	100	150	65	85	100	
	600 Vac (347 Vac for 1 pole)	25	35	50	65	65	35	50	65	
	125 Vdc	—	—	—	—	—	—	—	—	
	250 Vdc	—	—	—	—	—	—	—	—	
IEC 60947-2	220–240 Vac	$I_{cu}$	85	100	150	200	—	135	150	200
		$I_{cs}$	85	100	100	150	—	100	100	100
	380–415 Vac	$I_{cu}$	50	70	70	100	—	70	70	100
		$I_{cs}$	50	53	50	50	—	50	50	50
	440 Vac	$I_{cu}$	35	50	70	100	—	50	70	100
		$I_{cs}$	35	40	50	50	—	40	50	50
	480 Vac	$I_{cu}$	35	50	65	85	—	50	65	85
		$I_{cs}$	22.5	30	40	40	—	30	40	40
	525 Vac	$I_{cu}$	25	30	35	40	—	30	35	40
		$I_{cs}$	20	25	25	25	—	25	25	25
	660–690 Vac	$I_{cu}$	10	15	20	35	—	15	20	35
		$I_{cs}$	5	7.5	10	18	—	7.5	13	18
	125 Vdc	$I_{cu}$	—	—	—	—	—	—	—	—
		$I_{cs}$	—	—	—	—	—	—	—	—
	250 Vdc	$I_{cu}$	—	—	—	—	—	—	—	—
$I_{cs}$		—	—	—	—	—	—	—	—	
Rated short circuit making capacity (I <sub>cm</sub> )	220–240 Vac	187	220	330	440	—	297	330	440	
	380–415 Vac	105	154	154	220	—	154	154	220	
	440 Vac	73.5	105	154	220	—	105	154	220	
	480 Vac	73.5	105	143	187	—	105	143	187	
	525 Vac	52.5	63	73.5	84	—	63	73.5	84	
	660–690 Vac	21	31.5	42	73.5	—	31.5	42	73.5	
Withstand/threshold of the frame	$I_{cw}$	kA					20			
Trip unit										
Interchangeable	Yes					Yes				
Thermal-magnetic (T)	—									
Motor circuit protector (M)	—									
Electronics										
Basic—PXR 10 (B)	—									
Standard—PXR 20 (E)	LSI, LSIG, ALSI, ALSIG					LSI, LSIG, ALSI, ALSIG				
Ammeter—PXR 20D (D)	LSI, LSIG, ALSI, ALSIG					LSI, LSIG, ALSI, ALSIG				
Energy / programmable—PXR 25 (P)	LSI, LSIG, ALSI, ALSIG					LSI, LSIG, ALSI, ALSIG				

**Note**

① PDJ (UL/CSA only), 3-pole only; 800 A.

Technical Data—Frame Sizes 5 and 6, continued



**Frame Size 5—800, 1200, 1600 (IEC)  
2-, 3- and 4-Pole**



**Frame Size 6—1600, 2000, 2500  
2-, 3- and 4-Pole**

Description	Unit	Frame Size 5—800, 1200, 1600 (IEC) 2-, 3- and 4-Pole	Frame Size 6—1600, 2000, 2500 2-, 3- and 4-Pole
UL File Number		E7819	E7819
UL 100% rated breaker		Yes	Yes (up to 2000 A)
Amperage range	Thermal-magnetic A	—	—
	Electronics	320–1200 (1600 IEC)	700–2500
Selectivity category		A	A
Reference standard		UL/CSA/IEC/CCC	UL/CSA/IEC/CCC
Rated insulation voltage U <sub>i</sub> , according to IEC 60947–2	Main conducting paths V	690 (ETU)	690 (ETU)
	Auxiliary circuits V	690	690
Rated impulse withstand voltage U <sub>imp</sub>	Main conducting paths kV	6 (ETU)	6 (ETU)
	Auxiliary circuits	4	4
Rated operational voltage U <sub>e</sub> (AC)	IEC/CCC Vac	690	690
	UL/CSA Vac	600	600
Rated operational voltage U <sub>e</sub> (DC)	IEC/CCC Vdc	—	—
	UL/CSA Vdc	—	—
Permissible ambient temperature range (for storage and operation)	°C	–20 to +70	–20 to +70
Product complies with IEC 60–068	Shock	Yes	Yes
Permissible load for various ambient temperatures close to the circuit breaker, related to the rated current of the circuit breaker			
Thermal Magnetic Breakers	40 °C	—	—
	45 °C	—	—
	50 °C	—	—
	55 °C	—	—
	60 °C	—	—
	70 °C	—	—
PXR Electronic Breakers (including motor protection circuit breakers)	40 °C	100%	100%
	45 °C	95.5%	95.5%
	50 °C	91%	91%
	55 °C	85%	85%
	60 °C	81%	81%
	70 °C	70%	70%
Altitude derating factor		See Special Applications Section	See Special Applications Section
400 Hz derating factor		See Special Applications Section	See Special Applications Section
Endurance (operating cycles) no-load (mechanical endurance)		3000	3000
Endurance (operating cycles) with load (electrical endurance) at 415 V		500	500
Maximum switching frequency (per minute)		1	1



#### Technical Data—Frame Sizes 5 and 6, continued

2

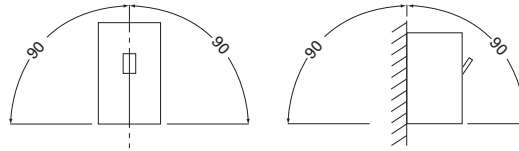


**Frame Size 5—800, 1200, 1600 (IEC)  
2-, 3- and 4-Pole**



**Frame Size 6—1600, 2000, 2500  
2-, 3- and 4-Pole**

Description		Unit	Frame Size 5—800, 1200, 1600 (IEC) 2-, 3- and 4-Pole	Frame Size 6—1600, 2000, 2500 2-, 3- and 4-Pole
Dimensions (H x W x D)	1-pole	inch (mm)	—	—
	2-pole		16.0 x 8.3 x 5.5 (406.4 x 209.5 x 139.7)	16.0 x 15.5 x 9.8 (406.4 x 393.7 x 247.65)
	3-pole		16.0 x 8.3 x 5.5 (406.4 x 209.5 x 139.7)	16.0 x 15.5 x 9.8 (406.4 x 393.7 x 247.65)
	4-pole		16.0 x 11.1 x 5.5 (406.4 x 282.7 x 139.7)	16.0 x 20.0 x 9.8 (406.4 x 508 x 247.65)
Pole to pole distance		inch (mm)	2.750 (69.85)	4.500 (114.30)
Approximate weight		lb (kg)		
Breaker	3-pole / 4-pole		46.80 (21.30) / 58.00 (26.31)	135.00 (61.23) / 182.00 (82.55)
Breaker with Plug-in	3-pole / 4-pole		—	—
Power loss per circuit breaker at maximum rated current in fixed breaker (3P)—for plant protection		W	87 (800 A) 195 (1200 A and 1600 A)	220 (1600 A); 270 (2000 A); 400 (2500 A)
Suitable for reverse-feed applications			Yes	Yes
Blow out dimension		Inch (mm)	13.125 (333.38)	2.625 (66.68)
Required spacing between circuit breakers		Inch (mm)	0	0
Installation methods	Fixed		Yes	Yes
	Plug-in		—	—
	Drawout		Yes <sup>①</sup>	—
	DIN rail		—	—
IP Protection	With accessories		IP2X Protection	IP2X Protection
Pollution degree			III	III
Overvoltage category			III	III
Annex H IT capability	at 415 V		Yes	Yes



**Note**

<sup>①</sup> Consult with product line for availability.

## Power Defense Accessories

	PDG1	PDG2	PDG3	PDG4	PDG5	PDG6
<b>Auxiliary switches</b>						
Rated thermal current $I_{th}$	5 A	4 A	4 A	4 A	6 A	6 A
Rated operational voltage (AC)	125 V / 250 V / 600 V	230 V / 500 V / 600 V	230 V / 500 V / 600 V	230 V / 500 V / 600 V	600 V	600 V
Rated operational current (AC)	5 A / 5 A / 2 A	4 A / 1 A / 0.6 A	4 A / 1 A / 0.6 A	4 A / 1 A / 0.6 A	6 A	6 A
Rated operational voltage (DC)	125 V	220 V	220 V	220 V	125 V / 250 V	125 V / 250 V
Rated operational current (DC)	1 A	0.3 A	0.3 A	0.3 A	0.5 A / 0.25 A	0.5 A / 0.25 A
Backup fuse <sup>①</sup>	4 A	4 A	4 A	4 A	4 A	4 A
<b>Undervoltage releases</b>						
Response voltage						
Drop (breaker tripped) $U_s$	0.35-0.70	0.35-0.70	0.35-0.70	0.35-0.70	0.35-0.70	0.35-0.70
Pickup (breaker may be switched on) $U_s$	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1
Power consumption in continuous operation:						
50/60 Hz 24 Vac	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 11 W	≤ 9.6 W
50/60 Hz 110-130 Vac	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 11 W	≤ 9.6 W
50/60 Hz 208-240 Vac	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 11 W	≤ 9.6 W
50/60 Hz 380-440 Vac	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 11 W	≤ 9.6 W
50/60 Hz 480-525 Vac	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 11 W	≤ 9.6 W
50/60 Hz 600 Vac	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
12 Vdc	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
24 Vdc	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
48 Vdc	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
60 Vdc	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
125 Vdc	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
250 Vdc	≤ 4.3 W	≤ 3 W	≤ 3 W	≤ 3 W	≤ 6.25 W	≤ 7.5 W
Maximum opening time (ms)	≤ 50	≤ 20	≤ 20	≤ 20	≤ 46	≤ 77
<b>Shunt trips</b>						
Shunt trips ("f" releases) response voltage						
Pickup (breaker tripped) $U_s$	0.7-1.1	0.7-1.1	0.7-1.1	0.7-1.1	0.7-1.1	0.7-1.1
Power consumption in (short time) at:						
50/60 Hz 24 Vac/24 Vdc	41 / 120	≤ 3 W	≤ 3 W	≤ 3 W	475/610	612/396
50/60 Hz 110-130 Vac/125 Vdc	572 / 121	≤ 3 W	≤ 3 W	≤ 3 W	100/150	1896/475
50/60 Hz 208-240 Vac/250 Vdc	2280 / N/A	≤ 3 W	≤ 3 W	≤ 3 W	432/55	1896/475
50/60 Hz 380-440 Vac	572	≤ 3 W	≤ 3 W	≤ 3 W	110	2156
50/60 Hz 480-525 Vac	840	≤ 3 W	≤ 3 W	≤ 3 W	32	289
50/60 Hz 600 Vac	1080	≤ 3 W	≤ 3 W	≤ 3 W	42	384
12 Vdc	201	≤ 3 W	≤ 3 W	≤ 3 W	145	—
48 Vdc	475	≤ 3 W	≤ 3 W	≤ 3 W	67	403
60 Vdc	720	≤ 3 W	≤ 3 W	≤ 3 W	102	666
Maximum load duration						
Maximum opening time (ms)	≤ 50	<20	<20	<20	<30	<62

**Note**

① Proper system design should size the backup fuse to the rated current going through the auxiliary switch.

Power Defense Molded Case Circuit Breakers—Frame Size 1

2



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### Power Defense Molded Case Circuit Breakers—Frame Size 1

#### Product Description

Frame Size 1 covers a range of 15 A through 125 A with fixed-fixed thermal-magnetic trip units. PD-1 is available in 1-, 2-, 3- and 4-pole configurations, with the 4-pole configuration available with no protection on the neutral pole, or fully protected.

#### Application Description

Frame Size 1 can be used to meet a wide range of circuit protection and power distribution needs, including current limiting applications. PD-1 is a cable-in / cable-out MCCB.

#### Features and Benefits

Frame Size 1 breakers are available in multiple ratings from 15 A through 125 A. They are of a modular design with field installable accessories and terminals, which may also be factory installed.

#### Standards and Certifications

Power Defense breakers are designed and tested to meet stringent requirements for:

- UL
- CSA
- IEC (CE)
- CB (CCC)



**Catalog Number / Product Selection****Power Defense—Frame Size 1 (15–125 A)**

Frame Size 1 covers a range of 15 A through 125 A using thermal-magnetic trip units. It is available in configurations of single-pole, 2-pole, 3-pole and 4-pole.

**Interrupting Ratings (2-, 3- and 4-Pole)**

Catalog Designator	C		F		G		K		M <sup>①</sup>		N <sup>①②</sup>		P <sup>①②</sup>	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms		kA rms		kA rms	
240 Vac	25		35		65		85		100		150		200	
480 Vac	18		25		35		50		65		85		100	
347/600 Vac	10		14		18		22		25		30		35	
250 Vdc <sup>③</sup>	10		22		22		35		35		42		42	
IEC	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
240 Vac	25	25	35	35	55	55	85	85	100	100	150	150	200	200
380–415 Vac	20	20	25	25	36	36	50	50	70	50	70	70	100	100
250 Vdc <sup>③</sup>	10	10	22	22	22	22	35	35	35	35	42	42	42	42

**Interrupting Ratings (Single-Pole)**

Catalog Designator	C		F		G		K		M <sup>①</sup>	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms	
120 Vac	35		—		100		—		200	
240 Vac	25		35		65		85		100	
277 Vac	18		25		35		50		65	
347 Vac	10		14		18		22		25	
125 Vdc	10		22		22		35		35	
IEC	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
240 Vac	25	25	35	35	55	55	85	85	100	100
125 Vdc	10	10	22	22	22	22	35	35	35	35

**Notes**

- ① UL current limiting.
- ② Available in 3- and 4-pole configurations only.
- ③ Must use 2 poles in series for 250 Vdc.

# 2.2

## Molded Case Circuit Breakers

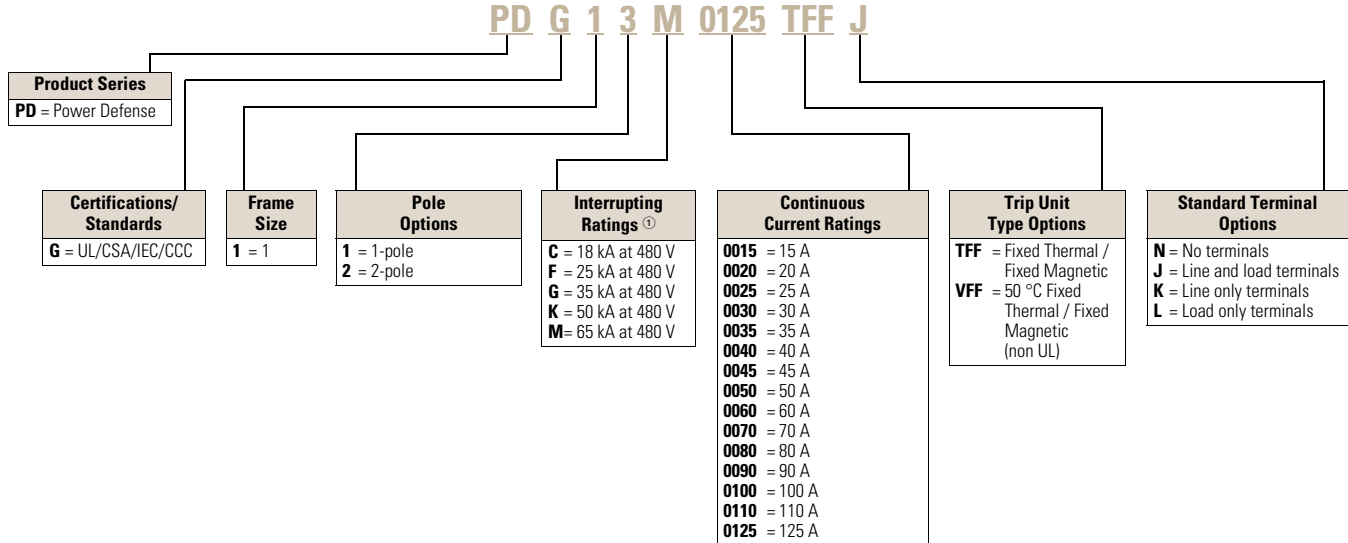
### Power Defense Molded Case Circuit Breakers

2

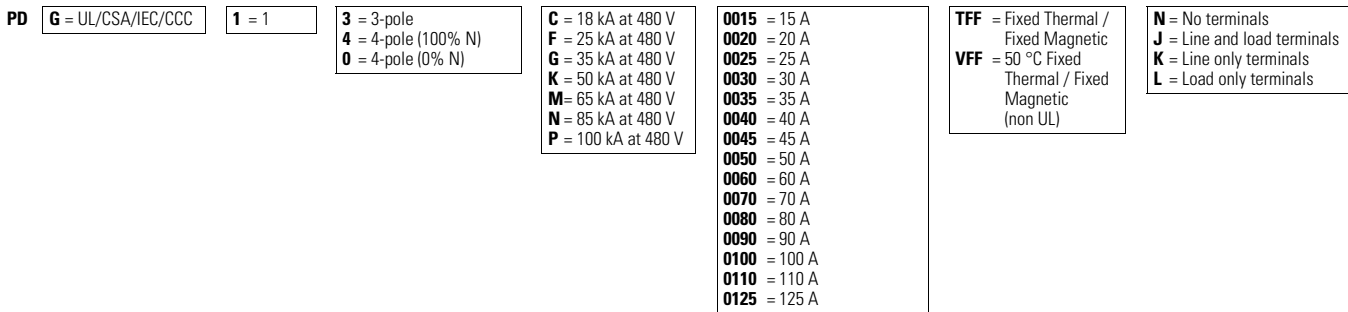
#### Power Defense—Frame Size 1 (15–125 A)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

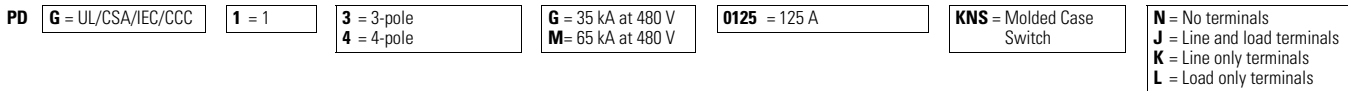
#### Molded Case Circuit Breakers (Single- and Two-Pole) with Thermal-Magnetic Trip Units—Globally Rated



#### Molded Case Circuit Breakers (Three- and Four-Pole) with Thermal-Magnetic Trip Units—Globally Rated



#### Molded Case Switches—Globally Rated ②



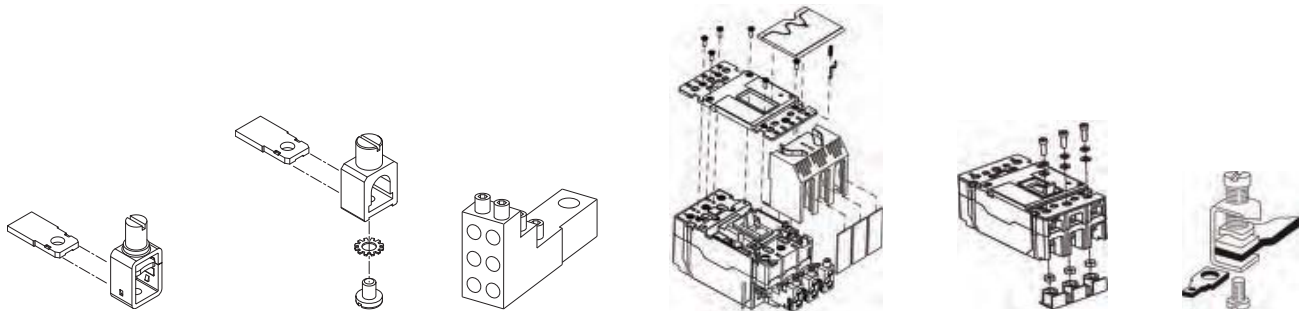
#### Notes

- ① Ratings at 277 Vac for single-pole.
- ② Molded case switch may open above 1250 A.

### Terminals—Frame Size 1

Catalog numbers shown are for a single side of a 3-pole breaker.  
 For 2- and 4-pole options, replace the **X3** with **X2** or **X4**, respectively.  
 Example: PDG1**X3**T125 becomes PDG1**X2**T125 for two-pole.

### Terminal Types



PDG1X3T125	PDG1X3TA125	PDG1X3TA1256W	PDG1X3TA1253W	PDG1X3TS125	GCWTK
------------	-------------	---------------	---------------	-------------	-------

**Note:** Pictures are for reference only.

### Terminals

Maximum Breaker Amperes	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number	Included Accessories	Digit 14 Designation			
									Line and Load	Line Only	Load Only	Standard on Amperes
<b>Standard Terminals</b>												
125	Steel	Al or Cu	B, C	1	14-3/0	2.08-85	PDG1X3T125	—	J	K	L	15-125
<b>Alternate Terminals</b>												
125	Aluminum	Cu/Al	B, C	1	14-1/0	2.08-53.5	PDG1X3TA125	—	T	U	V	15-125
<b>Multi-wire Terminals</b>												
125	Aluminum	Cu	B, C	6	14-2	2.08-33.6	PDG1X3TA1256W	Terminal shield	—	—	G	15-125
125	Aluminum	Cu	B, C	3	14-6	2.08-13.3	PDG1X3TA1253W	Terminal shield	—	—	H	15-125
<b>End Cap Kit/Screw Terminals</b>												
—	—	—	—	—	—	—	PDG1X3TS125	—	S	D	E	15-125

**Note:** Wire capacity is based on standard imperial wire sizes; metric sizes provided in table are a direct conversion to demonstrate maximum capacity, not to denote metric wire sizes.

### Control Wire Tabs

Use	Package Quantity	Catalog Number
15-125 A	12	GCWTK

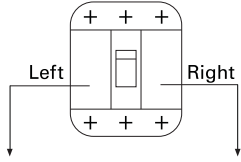
**Note:** Control wire tabs can be installed with terminals listed above.

#### Accessories

##### Internal Accessory Configurations—Frame Size 1<sup>①</sup>

2

##### 3- and 4-Pole Circuit Breakers



##### Tripping Accessory Options

None



Qty: 1



Qty: 1

##### Indicating Accessory Options

None

1 Make/1 Break Alarm Switch

2 Make/2 Break Alarm Switch

1A/1B Auxiliary Switch

2A/2B Auxiliary Switch

1A/1B Alarm, 1A/1B Auxiliary Combination

#### Alarm and Auxiliary Switches

Alarm and auxiliary switches are plug-and-play accessories designed to be field installable. However, Eaton also offers the service of field installation in our factories.

Breaker catalog numbers with alarm and auxiliary switch combinations require a complete 20-digit catalog number, adding the alarm and auxiliary switch functionality in digits 15–16 and adhering to the following conditions and tables:

- Digit 15 denotes the type of accessory(-ies) installed and the terminal types
- Digit 16 denotes number of switches installed
- If no other accessories are selected, use NNNN for the final 4 digits of the catalog number

#### Alarm and Auxiliary Switch—Field Installation Kits<sup>②</sup>

	Auxiliary Switch	Catalog Number		
	Three-Pole	None	1NO/1NC (1 Form C)	2NO/2NC (2 Form C)
Alarm Switch	None	—	AUX1A1BPK	AUX2A2BPK
	1NO/1NC (1 Form C)	ALM1M1BEPK	AUXALRMEPK	—
	2NO/2NC (2 Form C)	ALM2M2BEPK	—	—

#### Alarm and Auxiliary Switch Factory Installation (Digits 15–16)<sup>②</sup>

	Auxiliary Switch	Breaker Catalog Number (Digit 15–16 Suffix)		
	Three-Pole	None	1NO/1NC (1 Form C)	2NO/2NC (2 Form C)
Alarm Switch	None	NN	AC	A1
	1NO/1NC (1 Form C)	BC	CC	—
	2NO/2NC (2 Form C)	B1	—	—

#### Notes

- ① 2-pole PD-1 breakers have an accessory pocket compatible with indicating accessory options only.
- ② All options come with pigtail terminations.

**Tripping Accessories—Frame Size 1****Shunt Trips**

Pigtail (29 in / 0.75 m) Voltage	Breaker Catalog Number Digit 17-18 Suffix	Catalog Number
12 Vdc	SH	SNT012CPK
24 Vac/Vdc	SN	SNT024CPK
48–60 Vdc	—	SNT4860CPK
110–125 Vdc	—	SNT125DPK
250 Vdc	—	SNT250DPK
48–60 Vac	—	SNT4860CPK
110–240 Vac	—	SNT120CPK
380–600 Vac	—	SNT480CPK

**Undervoltage Releases**

Pigtail (29 in / 0.75 m) Voltage	Breaker Catalog Number Digit 17-18 Suffix	Catalog Number
24 Vdc	UG	UVR024DPK
48 Vdc	UJ	UVR048DPK
60 Vdc	UK	UVR048DPK
125 Vdc	—	UVR125DPK
250 Vdc	UM	UVR250DPK
24 Vac	UF	UVR024APK
48 Vac	—	UVR048APK
60 Vac	—	UVR048APK
125 Vac	—	UVR120APK
240 Vac	UB	UVR240APK
480 Vac	—	UVR480APK
525 Vac	UD	UVR600APK
600 Vac	UE	UVR600APK

**Handle Mechanisms—Frame Size 1****Universal Direct Rotary Handle Mechanism**

Description	NEMA 1/12 Black Handle Catalog Number	NEMA 1/12 Red Handle Catalog Number
With interlock	EHMCCBI	EHMCCRI
Without interlock	EHMCCB	EHMCCR

**Variable Depth Rotary Handle Mechanism**

Description	Catalog Number
Standard lockable handle with mechanism (black and gray) NEMA 1/3R/12/4/4X	PDG1XHMS
Emergency lockable handle with mechanism (red and yellow) NEMA 1/3R/12/4/4X	PDG1XHME
Mechanism only	EHMVDB
12-in (307 mm) handle mechanism shaft	PDG12XHMS307
20-in (507 mm) handle mechanism shaft	PDG12XHMS507
Standard NFPA79-compliant shaft handle (black and gray)	PDG12XHM79S
Emergency NFPA79-compliant shaft handle (red and yellow)	PDG12XHM79E

**Flex Shaft Handle Mechanism**

Cable Length (ft)	Metal Handle, NEMA 1/3R/12 Catalog Number	High Performance Handle, NEMA 1/3R/12 Catalog Number	Metal Handle, NEMA 4/4X Catalog Number	High Performance Handle, NEMA 4/4X Catalog Number
2	PDG1XFS02	PDG1XFS02HP	PDG1XFS02X	PDG1XFS02HPX
3	PDG1XFS03	PDG1XFS03HP	PDG1XFS03X	PDG1XFS03HPX
4	PDG1XFS04	PDG1XFS04HP	PDG1XFS04X	PDG1XFS04HPX
5	PDG1XFS05	PDG1XFS05HP	PDG1XFS05X	PDG1XFS05HPX
6	PDG1XFS06	PDG1XFS06HP	PDG1XFS06X	PDG1XFS06HPX
7	PDG1XFS07	PDG1XFS07HP	PDG1XFS07X	PDG1XFS07HPX
8	PDG1XFS08	PDG1XFS08HP	PDG1XFS08X	PDG1XFS08HPX
9	PDG1XFS09	PDG1XFS09HP	PDG1XFS09X	PDG1XFS09HPX
10	PDG1XFS10	PDG1XFS10HP	PDG1XFS10X	PDG1XFS10HPX

**Flex Shaft Handle Auxiliary Switch**

Description	Catalog Number
1A/1B, Early Break	AUX1EBFSEG



**Accessories—Frame Size 1****External Accessories**

Description	Fit Type	Catalog Number
Padlockable handle lock, Snap-on	Center	<b>PDG1XPLKSNAP</b>
Padlockable handle lock hasp	Top	<b>PDG1XPLKT</b>
Padlockable handle lock hasp, OFF only	Top	<b>PDG1XPLKTOFF</b>
	Right	<b>PDG1XPLKROFF</b>
Padlockable handle block	On handle	<b>PDG1XPHB</b>
Padlockable handle block, OFF only	On handle	<b>PDG1XPHBOFF</b>
Walking beam interlock	Three-pole	<b>PDG1XWBI3P</b>
	Four-pole	<b>PDG1XWBI4P</b>
Slide bar interlock	Field	<b>EFSBI</b>
Electrical operator	110–240 Vac/Vdc	<b>MOPEG240C</b>
	24/48 Vdc	<b>MOPEG48D</b>
Plug-in adapter, breaker and base	Three-pole	<b>PAD3E</b>
	Four-pole	<b>PAD4E</b>
Plug-in block interlock replacement kit	Field	<b>PIILEG</b>
Wohner bus bar adapter	Field top	<b>EG-BUS-T</b>
	Field bottom	<b>EG-BUS-B</b>
Terminal covers	Three-pole	<b>PDG1XTC3P</b>
	Four-pole	<b>PDG1XTC4P</b>
Interphase barriers	12 units	<b>PDG1XIB12</b>

**DIN Rail Mounting**

Description	Catalog Number
DIN rail adapter; single-pole	<b>PDG1XDIN1P</b>
Din rail adapter; two-, three- or four-pole	<b>PDG1XDIN234P</b>
DIN rail adapter; three- or four-pole	<b>PDG1XDIN34P</b>
Metal DIN rail adapter, three-pole	<b>PDG1XDINM3P</b>

**Base Mounting Hardware**

Description	Catalog Number
Single-pole metric	<b>8703C80G11</b>
Two-, three-, four-pole metric	<b>8703C80G08</b>
Single-pole English	<b>8703C80G12</b>
Two-, three-, four-pole English	<b>BMHE</b>

**Note:** Base mounting hardware is included with a circuit breaker or molded case switch.

**Dimensions and Weights—Frame Size 1****Approximate Dimensions in Inches (mm)**

Number of Poles	Width	Height	Depth
1	1.0 (25.4)	5.5 (139.7)	2.99 (76.0)
2	2.0 (50.8)	5.5 (139.7)	2.99 (76.0)
3	3.0 (76.2)	5.5 (139.7)	2.99 (76.0)
4	4.0 (101.6)	5.5 (139.7)	2.99 (76.0)

**Approximate Shipping Weight in lb (kg)**

Breaker Type	1-Pole	2-Pole	3-Pole	4-Pole
PDG1 125 A	0.85 (0.39)	1.57 (0.71)	2.3 (1.04)	2.84 (1.29)

Power Defense Molded Case Circuit Breakers—Frame Size 2



### Contents

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Frame Size 3 (45–600 A) . . . . .	<b>V4-T2-42</b>
Frame Size 4 (300–800 A) . . . . .	<b>V4-T2-57</b>
Frame Size 5 (320–1200 A) . . . . .	<b>V4-T2-70</b>
Frame Size 6 (700–2500 A) . . . . .	<b>V4-T2-79</b>
Motor Circuit Protectors (3–600 A) . . . . .	<b>V4-T2-87</b>
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Communications and Software . . . . .	<b>V4-T2-104</b>
Special Applications . . . . .	<b>V4-T2-106</b>

### Power Defense Molded Case Circuit Breakers—Frame Size 2

#### Product Description

Frame Size 2 covers a range of 15 A through 225 A with a complete offering of trip units, including PXR electronic trip units and fixed-fixed thermal-magnetic trip units.

#### Application Description

Frame Size 2 can be used to meet a wide range of circuit protection and power distribution needs, including ground fault protection and current limiting options. PXR trip units in PD-2 provide all levels of protection, including energy metering with multiple communication schemes, breaker health indication, and zone selective interlocking with visual indication.

#### Features and Benefits

Frame Size 2 breakers are available in multiple ratings from 15 A through 225 A. They are configured with a trip unit from the factory. Accessories are modular in design to allow for field installation or factory configuration. PXR trip units are available with advanced features to provide customers unparalleled situational awareness of their electrical system.

#### Standards and Certifications

Power Defense breakers are designed and tested to meet stringent requirements for:

- UL
- CSA
- IEC (CE)
- CB (CCC)



## Catalog Number / Product Selection

2

**Power Defense—Frame Size 2 (15–225 A)**

Frame Size 2 covers a range of 15 A through 225 A using electronic trip units or thermal-magnetic trip units. It is available in configurations of single-pole, 2-pole, 3-pole and 4-pole.

**Interrupting Ratings (2-, 3- and 4-Pole)**

Catalog Designator	F		G <sup>①</sup>		K <sup>①</sup>		M <sup>①</sup>		N <sup>①</sup>		P <sup>①</sup>	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms		kA rms	
240 Vac	35		65		85		100		150		200	
480 Vac	25		35		50		65		85		100	
600 Vac	14		18		22		25		30 / 25 <sup>③</sup>		35 / 25 <sup>③</sup>	
250 Vdc <sup>②</sup>	10		10		10		22		22		22	
IEC	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
240 Vac	35	35	55	55	85	85	100	100	150	100	200	150
380–415 Vac	25	25	36	36	50	50	70	53	70	70	100	70
440 Vac	25	20	30	22.5	35	35	50	40	70	50	100	65
480 Vac	20	20	25	20	35	22.5	50	30	65	40	65	40
525 Vac	18	15 / 13 <sup>③</sup>	20	15 / 13 <sup>③</sup>	30 / 25 <sup>③</sup>	15 / 13 <sup>③</sup>	30 / 25 <sup>③</sup>	15 / 13 <sup>③</sup>	30 / 25 <sup>③</sup>	15 / 13 <sup>③</sup>	35 / 25 <sup>③</sup>	18 / 13 <sup>③</sup>
660–690 Vac	—	—	8	4	10	5	10	5	10	5	10	5
250 Vdc <sup>②</sup>	10	10	10	10	10	10	22	22	22	22	22	22

**Interrupting Ratings (Single-Pole)**

Catalog Designator	F		G <sup>①</sup>		K <sup>①</sup>		M <sup>①</sup>		N <sup>①</sup>		P <sup>①</sup>	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms		kA rms	
277 Vac	25		35		50		65		85		100	
347 Vac	14		18		22		25		30		35	
125 Vdc	10		10		10		10		10		10	
IEC	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
240 Vac	25	25	36	36	50	50	70	70	85	70	100	70
125 Vdc	10	10	10	10	10	10	10	10	10	10	10	10

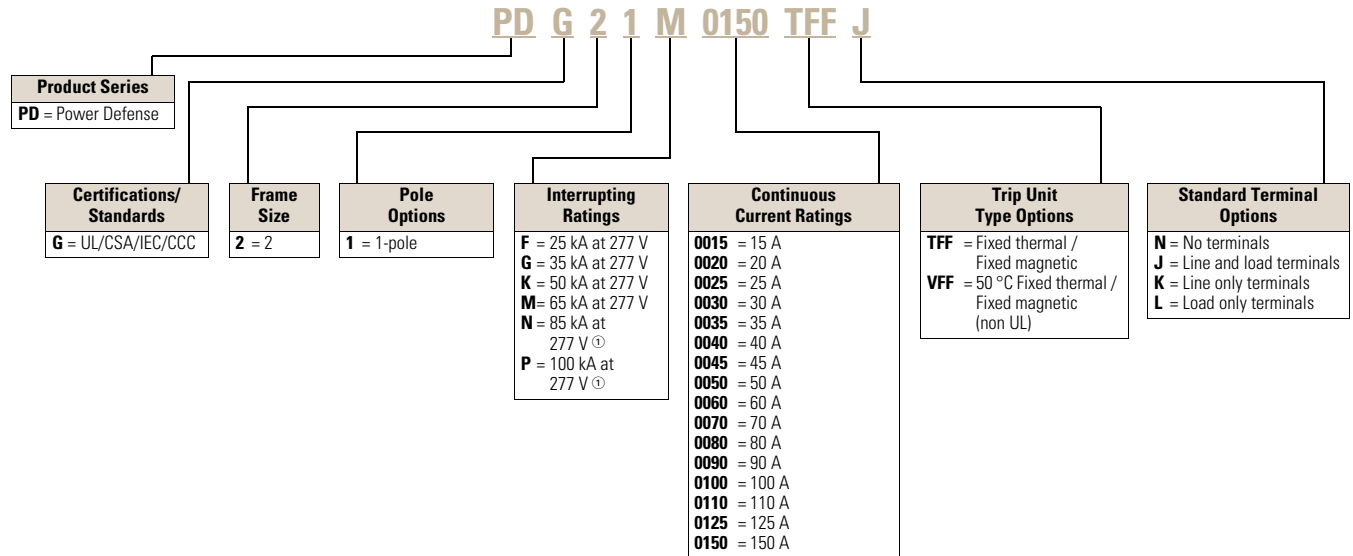
**Notes**

- ① UL current limiting.
- ② DC ratings available in thermal-magnetic breakers only. 250 Vdc is achieved using 2-poles in series.
- ③ First rating listed is for thermal-magnetic breakers, second rating is for breakers with PXR electronic trip units.

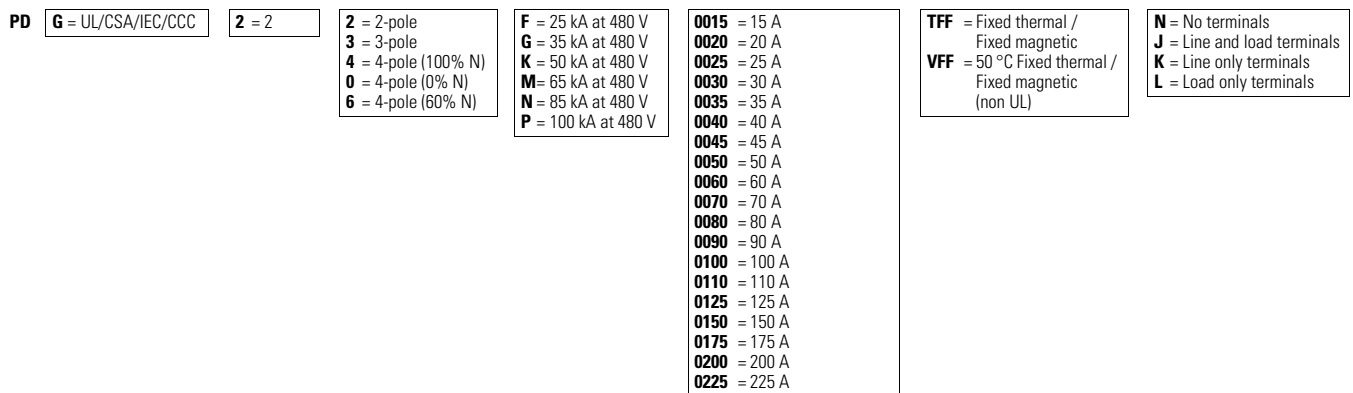
### Power Defense—Frame Size 2 (15–225 A)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

### Molded Case Circuit Breakers (Single-Pole) with Thermal-Magnetic Trip Units (TMTU)—Globally Rated



### Molded Case Circuit Breakers (Two-, Three- and Four-Pole) with Thermal-Magnetic Trip Units—Globally Rated



**Note**

① N and P ratings available for 15–30 A on single-pole breakers.

# 2.2

## Molded Case Circuit Breakers

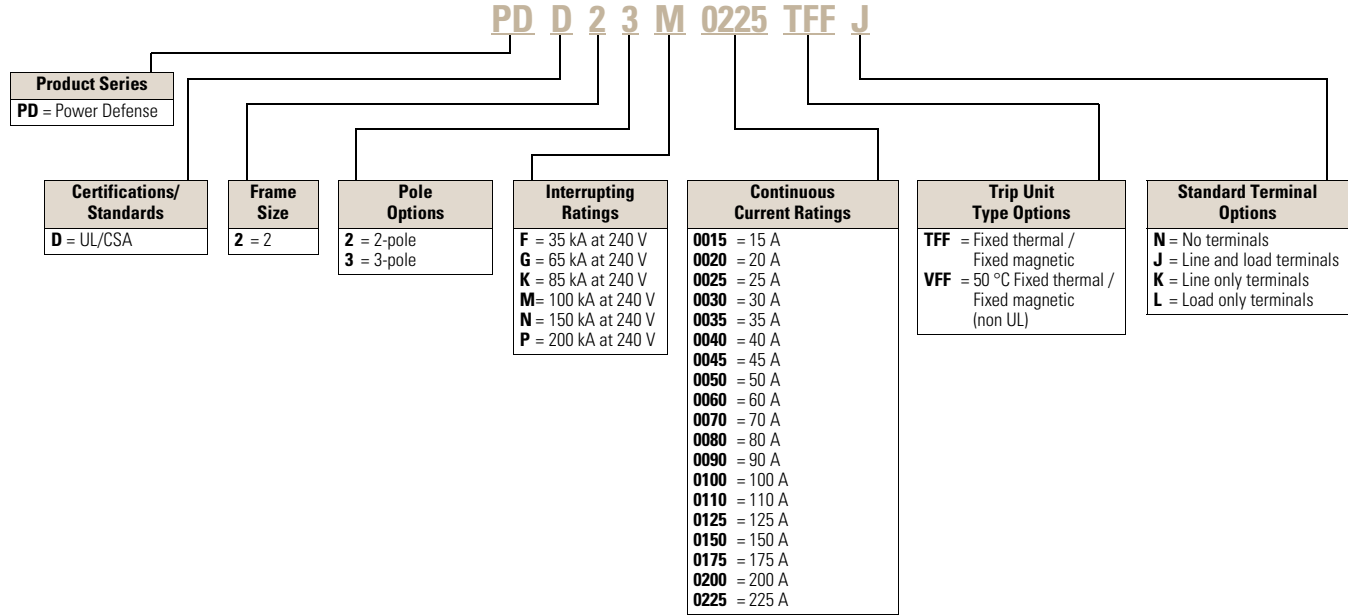
### Power Defense Molded Case Circuit Breakers

2

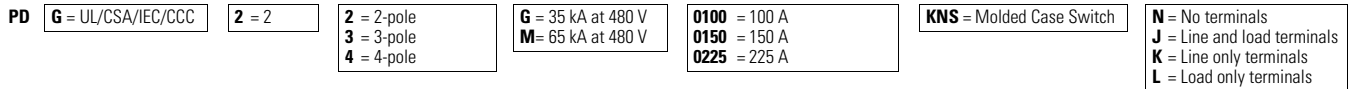
#### Power Defense—Frame Size 2 (15–225 A)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

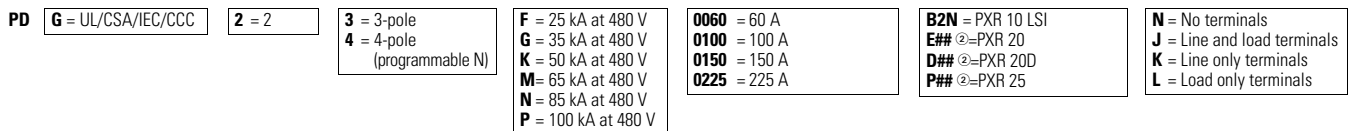
#### Molded Case Circuit Breakers with TMTU—UL/CSA Rated to 240 Vac



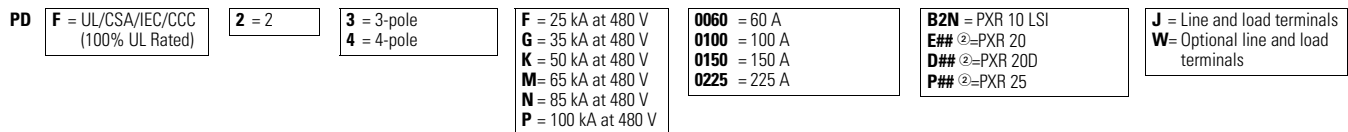
#### Molded Case Switches—Globally Rated ①



#### Molded Case Circuit Breakers with Power Xpert Release Electronic Trip Units (ETU)—Globally Rated



#### Molded Case Circuit Breakers with Power Xpert Release Electronic Trip Units (ETU)—100% UL Rated



#### Notes

① Molded case switch may open above 1800 A.

② See tables and descriptions on **Page V4-T2-33** for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).

**Power Xpert Release (PXR) Trip Unit Options—Frame Size 2****Power Xpert Release (PXR) Trip Unit Options**

PXR	ETU	#(1)—Protection Type		#(2)—Available Configured Options								
		LSI	LSIG	Relays	Relays Modbus	Relays ZSI	Relays CAM	Relays Modbus ZSI	Relays Modbus CAM	Relays Modbus ZSI CAM		
PXR 10	B	2	—	N	—	—	—	—	—	—	—	—
PXR 20	E	2	—	N	R	M	Z	C	W	X	—	—
		—	3	—	R	M	Z	C	W	X	—	—
PXR 20D	D	2	3	—	—	M	—	—	W	—	D	Y
PXR 25	P	2	3	—	—	M	—	—	W	—	D	Y

**Description of PXR Configured Options**

**Relays** ①—Form A contacts (rated for 240 Vac, 1 A)

- 2 available if Modbus RTU is not used; 1 available when used in conjunction with Modbus RTU
- Interface: 3 wires (ALM1, ALM2, ALM Common)
- Programmable to indicate breaker conditions
- Available as field-installable option if not pre-configured (catalog number **PDG2XRELAYS**) ②

**Modbus** ①—Modbus RTU directly from breaker

- Interface: 3 wires (MODBA, MODBB, MODBG)
- No additional modules required
- Available as field-installable option if not pre-configured (catalog number **PDG2XMODRTUREL**) ②

**ZSI**—Zone Selective Interlocking

- Includes ability to turn ON and OFF
- Interface: 3 wires (Zin, Zout, Zcomm)
- No additional modules required

**CAM**—CAM Link Connection (requires a CAM module per breaker)

- Interface: 5 wires (refer to CAM IL for details)
- Communications Adapter Modules available for Modbus TCP and PROFIBUS

**Auxiliary Power**

- Connection included with all PXR 20, 20D and 25 trip units
- Required for communications, relays and metering accuracy
- 24 Vdc, 0.5 A
- Interface: 2 wires (Aux +24 V, Aux 0 V)

**Available Continuous Current (I<sub>r</sub>) Settings on PXR Electronic Trip Units**

Option	Setting	Catalog Number Selection and Maximum Setting (I <sub>n</sub> )			
		0060 60 A	0100 100 A	0150 150 A	0225 225 A
PXR 10, PXR 20	1	15 A	32 A	50 A	80 A
	2	16 A	35 A	60 A	90 A
	3	20 A	40 A	63 A	100 A
	4	25 A	50 A	70 A	110 A
	5	30 A	60 A	80 A	125 A
	6	35 A	63 A	90 A	150 A
	7	40 A	70 A	100 A	160 A
	8	45 A	80 A	110 A	175 A
	9	50 A	90 A	125 A	200 A
	10 = I <sub>n</sub>	60 A	100 A	150 A	225 A
PXR 20D, PXR 25		Programmable from minimum to maximum values in 1 A increments.			

**Notes**

- ① Relays and/or Modbus RTU in PD-2 uses accessory pocket, therefore UVR and shunt trip use is not possible.  
 ② PD-2 can only be equipped with one field-installable communication option (PDG2XMODRTUREL or PDG2XRELAYS).

# 2.2

## Molded Case Circuit Breakers

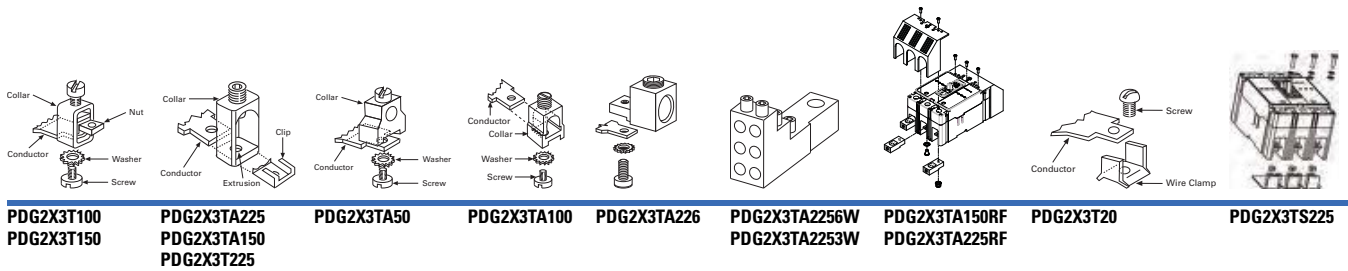
### Power Defense Molded Case Circuit Breakers

2

#### Terminals—Frame Size 2

Catalog numbers shown are for a single side of a 3-pole breaker.  
For 2- and 4-pole options, replace the **X3** with **X2** or **X4**, respectively.  
Example: PDG**2X3**T100 becomes PDG**2X2**T100 for 2-pole

#### Terminal Types



**Note:** Pictures are for reference only.

#### Terminals

Maximum Breaker Amperes	Breaker Frame ①	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG/kcmil Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number	Included Accessories	Digit 14 Designation			
										Line and Load	Line Only	Load Only	Standard on Amperes
<b>Standard Terminals</b>													
100	15–100	Steel	Cu/Al	B, C	1	14–1/0	2.08–53.5	PDG2X3T100 ②		J	K	L	15–100
225	60–225	Aluminum	Cu/Al	B, C	1	4–4/0	21.2–107	PDG2X3TA225		J	K	L	110–225
<b>Alternate Terminals</b>													
50	15–50	Aluminum	Cu/Al	B, C	1	14–4	2.08–21.2	PDG2X3TA50		T	U	V	15–50
100	60–100	Aluminum	Cu/Al	B, C	1	14–1/0	2.08–53.5	PDG2X3TA100		T	U	V	60–100
150	60–150	Aluminum	Cu/Al	B, C	1	14–4/0	2.08–107	PDG2X3TA150		T	U	V	110–150
225	175–225	Aluminum	Cu/Al	B, C	1	6–300	13.3–152	PDG2X3TA225K	Terminal shield	T	U	V	175–225
<b>Non-standard Terminals</b>													
100	15–100	Steel	Cu/Al	B, C	1	14–1/0	2.08–53.5	PDG2X3T100 ②		W	Y	Z	15–100
150	60–150	Stainless Steel	Cu	B, C	1	4–4/0	21.2–107	PDG2X3T150		W	Y	Z	110–150
225	60–225	Copper	Cu	B, C	1	4–4/0	21.2–107	PDG2X3T225		W	Y	Z	175–225
<b>Multi-wire Terminals</b>													
225	150–225	Aluminum	Cu/Al	B, C	6	14–6	2.08–13.3	PDG2X3TA2256W	Terminal shield	—	—	G	15–225
225	150–225	Aluminum	Cu/Al	B, C	3	14–2	2.08–33.6	PDG2X3TA2253W	Terminal shield	—	—	H	15–225
<b>Rear Fed Terminals ③</b>													
150	60–150	Aluminum	Cu/Al	B, C	1	14–4/0	2.08–107	PDG2X3TA150RF	Terminal shield	—	—	—	15–150
225	60–225	Aluminum	Cu/Al	B, C	1	6–300	13.3–152	PDG2X3TA225RF	Terminal shield	—	—	—	175–225
<b>Box Terminal</b>													
20	15–20	Steel	Cu/Al	B, C	1	14–10	2.08–5.26	PDG2X3T20		—	—	—	15–20
<b>Rear Connectors ③</b>													
225	—	—	—	—	—	—	—	PDG2X3TA225RC		R	—	—	15–25
<b>End Cap Kits/Screw Terminals</b>													
225	—	—	—	—	—	—	—	PDG2X3TS225		S	D	E	15–25

**Note:** Wire capacity is based on standard imperial wire sizes; metric sizes provided in table are a direct conversion to demonstrate maximum capacity, not to denote metric wire sizes.

#### Notes

① The “Breaker Frame” column provides information on the ampere ratings for which the terminal may be used (field installation); in some cases the range is limited by proper fit of the terminal onto the breaker conductor.

The column “Standard on Amperes” provides information on what terminal is used during factory configuration per Digit 14 of the breaker catalog number. The two may not match.

② Factory standard terminals and non-aluminum terminals for 100 A and below are the same terminals.

③ Breaker loses UL when fitted with rear-fed terminals or rear connectors.

#### Control Wire Tabs

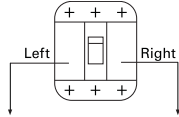
Use	Package Qty.	Catalog Number
15–150 A	12	FCWTK
175–225 A	12	FCWTK225

**Accessories**

**Internal Accessory Configurations—Frame Size 2**

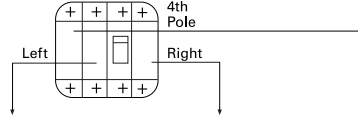
**Thermal-Magnetic Circuit Breakers ①②**

**3-Pole Circuit Breakers**



Tripping Accessory Options	Alarm (2 Spaces) Options	Aux (2 Spaces) Options
None	None	None
Shunt Trip	1NO (1 space) 1NC (1 space) 1NO/1NC (2 spaces)	1NO (1 space) 1NC (1 space) 1NO/1NC (2 spaces)
	2NO (2 spaces)	2NO (2 spaces)
UVR	2NC (2 spaces)	2NC (2 spaces)

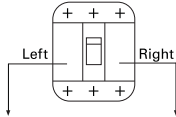
**4-Pole Circuit Breakers**



Tripping Accessory Options	Alarm (2 Spaces) Options	Aux (4 Spaces) Options
None	None	None
Shunt Trip	1NO (1 space) 1NC (1 space) 1NO/1NC (2 spaces)	1NO (1 space) 1NC (1 space) 1NO/1NC (2 spaces)
	2NO (2 spaces)	2NO (2 spaces)
UVR	2NC (2 spaces)	2NC (2 spaces) 2CO (4 spaces) 4NO (4 spaces) 4NC (4 spaces)

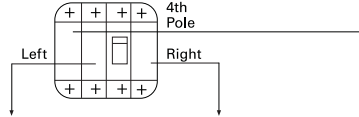
**Electronic Circuit Breakers**

**3-Pole Circuit Breakers**



Tripping Accessory Options	Alarm Options	Aux Options
None	None	1NO/1NC ③
Shunt Trip		
UVR		
Bell alarm (1NO/1NC—Form C)		
Qty: 1 Programmable relay with Modbus RTU		
Qty: 2 Programmable relays		

**4-Pole Circuit Breakers**



Tripping Accessory Options	Alarm Options	Aux (2 Spaces) Options
None	None	1NO/1NC ③
Shunt Trip		1NO/1NC ③ + 1NO (1 space) 1NO/1NC ③ + 1NC (1 space) 1NO/1NC ③ + 1NO/1NC (2 spaces) 1NO/1NC ③ + 2NO (2 spaces)
UVR		1NO/1NC ③ + 2NC (2 spaces)
Bell alarm (1NO/1NC—Form C)		
Qty: 1 Programmable relay with Modbus RTU		
Qty: 2 Programmable relays		

**Notes**

- ① 2-pole PD-2 breakers have an accessory pocket compatible with indicating accessory options only.
- ② Single-pole PD-2 breakers may be equipped with a Form C bell alarm as a factory installation only. Use “BC” as a suffix code in digits 15–16.
- ③ Qty: 1 1NO/1NC (Form C) auxiliary contact is automatically factory installed for all Frame 2 Power Defense breakers with electronic trip units.



# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

2

#### Alarm and Auxiliary Contact Blocks—Frame Size 2

Power Defense breakers have designated positions for alarm and auxiliary switches in the right-pole accessory cavity. For Frame 2, the two left-most positions are used for alarm switches, and the two right-most locations are used for auxiliary switches.

Power Defense breakers have secondary covers for ease of field installation of accessories, including alarm and auxiliary switches.

Power Defense alarm and auxiliary switches are available in contact blocks, in Form A (NO), Form B (NC) and Form C (NO-NC) types. Form A and Form B contacts take one position in the breaker accessory cavity, and Form C contacts take two positions in the cavity. Identical contact blocks are used for the alarm and auxiliary switch functions.

Frame 2 breakers with electronic trip units are automatically configured with a factory-installed Form C auxiliary contact block because the right-pole accessory cavity is not available for field modification. Trip position can also be communicated via communications and the PXR programmable relays.

#### Pigtail (29 in / 0.75 m) Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXA	PDGXAB	PDGXAC
Type	Form A / NO	Form B / NC	Form C / NO-NC

#### Screw Terminal Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXA	PDGXXB	PDGXA + PDGXXB
Type	Form A / NO	Form B / NC	For NO-NC, use two separate contact blocks

#### Push-In Clamp Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXUA	PDGXUB	PDGXUC
Type	Form A / NO	Form B / NC	Form C / NO-NC

#### Pigtail (118 in / 3.0 m) Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXDA	PDGXDB	PDGXDC
Type	Form A / NO	Form B / NC	Form C / NO-NC

#### Alarm Switch for Use with PXR Electronic Trip Units <sup>①</sup>

Catalog Number	PDG2XALMBC	PDG2XALMEC
Type	Form C / NO-NC	Form C / NO-NC
Termination	0.75 m pigtail	3.0 m pigtail

#### Note

<sup>①</sup> Frame 2 breakers with electronic trip units do not allow access to the right accessory pocket but are automatically configured with a factory installed Form C / NO-NC auxiliary switch. These alarm switches can be field or factory installed in the left accessory pocket in place of a shunt trip or UVR.

### Factory Installation of Alarm and Auxiliary Switches—Frame Size 2

Alarm and auxiliary switches are plug-and-play accessories designed to be field installable. However, Eaton also offers installation service in our factories.

Breaker catalog numbers with alarm and auxiliary switch combinations require a complete 20-digit catalog number, adding the alarm and auxiliary switch functionality in digits 15–16 and adhering to the following conditions and tables:

- Digit 15 denotes the type of accessory(-ies) installed and the terminal types

- Switches may be requested for alarm only, auxiliary only or a combination of the two
- Digit 16 denotes the number and type (NO, NC) of switches installed
- For Eaton factory installation, the same type of terminals (i.e. all pigtail 0.75 m, all screw, etc.) and same style of contact block (i.e., all 1NO/1NC, all 2NC, etc.) must be used in a factory configuration
- If no other accessories are selected, use NNNN for the final 4 digits of the catalog number
- Frame 2 breakers with electronic trip units do not allow access to the right accessory pocket but are automatically configured with a factory installed 1NO/1NC auxiliary switch. A bell alarm accessory is available for separate installation in the left accessory pocket.

**Note:** Though factory configuration options are limited, combinations of auxiliary switches and alarms using differing terminals and contact block styles are still available through field installation. Please see full auxiliary switch and alarm catalog numbers to order.

### Pigtails—29 in / 0.75 m (A, B, C)

Alarm Switch		Auxiliary Switch								
		Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
None	NN	AA	AB	AC	AD	AE	A1	A2	A3	
1NO	BA	CA	—	—	—	—	—	—	—	
1NC	BB	—	CB	—	—	—	—	—	—	
1NO/1NC <sup>①</sup>	BC	—	—	CC	—	—	C1	—	—	
2NO	BD	—	—	—	CD	—	—	C2	—	
2NC	BE	—	—	—	—	CE	—	—	C3	

### Screw Terminals (X, Y, Z)

Alarm Switch		Auxiliary Switch								
		Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
None	NN	XA	XB	XC	XD	XE	X1	X2	X3	
1NO	YA	ZA	—	—	—	—	—	—	—	
1NC	YB	—	ZB	—	—	—	—	—	—	
1NO/1NC	YC	—	—	ZC	—	—	Z1	—	—	
2NO	YD	—	—	—	ZD	—	—	Z2	—	
2NC	YE	—	—	—	—	ZE	—	—	Z3	

### Push-In Clamps (U, V, W)

Alarm Switch		Auxiliary Switch								
		Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
None	NN	UA	UB	UC	UD	UE	U1	U2	U3	
1NO	VA	WA	—	—	—	—	—	—	—	
1NC	VB	—	WB	—	—	—	—	—	—	
1NO/1NC	VC	—	—	WC	—	—	W1	—	—	
2NO	VD	—	—	—	WD	—	—	W2	—	
2NC	VE	—	—	—	—	WE	—	—	W3	

**Note**

<sup>①</sup> Single-pole breakers can be equipped with a 1NO/1NC alarm switch that must be factory installed; use suffix **BC** in digits 15–16. No other internal accessories are available for single-pole breakers.

#### Pigtails—118 in / 3.0 m (D, E, F)

	Alarm Switch	Auxiliary Switch Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
	None	NN	DA	DB	DC	DD	DE	D1	D2	D3
	1NO	EA	FA	—	—	—	—	—	—	—
	1NC	EB	—	FB	—	—	—	—	—	—
	1NO/1NC	EC	—	—	FC	—	—	F1	—	—
	2NO	ED	—	—	—	FD	—	—	F2	—
	2NC	EE	—	—	—	—	FE	—	—	F3

#### Factory Installation of Alarm Switch for Use with PXR Electronic Trip Units

##### Pigtails—29 in / 0.75 m

Auxiliary switch		Auxiliary Switch Three-Pole	
		None	1NO/1NC
Auxiliary switch	None	NN <sup>Ⓢ</sup>	AC <sup>Ⓢ</sup>
	1NO/1NC	—	CC

##### Pigtails—118 in / 3.0 m

Alarm switch		Auxiliary Switch Three-Pole	
		None	1NO/1NC
Alarm switch	None	NN <sup>Ⓢ</sup>	DC
	1NO/1NC	—	FC

#### Tripping Accessories—Frame Size 2

Power Defense breakers have designated positions for shunt trips and undervoltage releases (UVRs) in the left pole accessory cavity. Each breaker has space for one tripping accessory only.

Power Defense breaker have secondary covers for ease of field installation of tripping accessories.

#### Shunt Trips

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	PDG2XST12DCT	PDG2XST12DCS	PDG2XST12DCR
48 Vdc	PDG2XST48DCT	PDG2XST48DCS	PDG2XST48DCR
60 Vdc	PDG2XST60DCT	PDG2XST60DCS	PDG2XST60DCR
24 Vac/Vdc	PDG2XST24ACDCT	PDG2XST24ACDCS	PDG2XST24ACDCR
110-130 Vac/125 Vdc	PDG2XST130ACDCT	PDG2XST130ACDCS	PDG2XST130ACDCR
200-240 Vac/250 Vdc	PDG2XST250ACDCT	PDG2XST250ACDCS	PDG2XST250ACDCR
380-440 Vac	PDG2XST440ACT	PDG2XST440ACS	PDG2XST440ACR
480-525 Vac	PDG2XST525ACT	PDG2XST525ACS	PDG2XST525ACR
600 Vac	PDG2XST600ACT	PDG2XST600ACS	PDG2XST600ACR

#### Undervoltage Releases (UVRs)

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	PDG2XUV12DCV	PDG2XUV12DCU	PDG2XUV12DCW
24 Vdc	PDG2XUV24DCV	PDG2XUV24DCU	PDG2XUV24DCW
48 Vdc	PDG2XUV48DCV	PDG2XUV48DCU	PDG2XUV48DCW
60 Vdc	PDG2XUV60DCV	PDG2XUV60DCU	PDG2XUV60DCW
125 Vdc	PDG2XUV125DCV	PDG2XUV125DCU	PDG2XUV125DCW
250 Vdc	PDG2XUV250DCV	PDG2XUV250DCU	PDG2XUV250DCW
24 Vac	PDG2XUV24ACV	PDG2XUV24ACU	PDG2XUV24ACW
130 Vac	PDG2XUV130ACV	PDG2XUV130ACU	PDG2XUV130ACW
240 Vac	PDG2XUV240ACV	PDG2XUV240ACU	PDG2XUV240ACW
440 Vac	PDG2XUV440ACV	PDG2XUV440ACU	PDG2XUV440ACW
525 Vac	PDG2XUV525ACV	PDG2XUV525ACU	PDG2XUV525ACW
600 Vac	PDG2XUV600ACV	PDG2XUV600ACU	PDG2XUV600ACW

#### Note

<sup>Ⓢ</sup> 1NO/1NC (AC) is always included in breakers with PXR trip units; no selection or selection of **NN** in Digits 15–16 will result in AC.

**Factory Installed Tripping Accessories—Frame Size 2**

Shunt trips and under voltage releases (UVRs) are plug-and-play accessories designed to be field installable. However, Eaton also offers the service of installation in our factories.

Breaker catalog numbers with shunt trips or UVRs require a complete 20-digit catalog number, adding the tripping accessory functionality in digits 17 and 18 and adhering to the following conditions and tables.

- Digit 17 denotes the type of accessory installed and the terminal type
- Digit 18 denotes the voltage of the accessory
- If no accessories are selected, use NNNN for the final 4 digits of the catalog number
- Each breaker has space for one shunt trip or UVR tripping accessory only

**Shunt Trips**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	TH	SH	RH
48 Vdc	TJ	SJ	RJ
60 Vdc	TK	SK	RK
24 Vac/Vdc	TN	SN	RN
110–130 Vac/125 Vdc	TP	SP	RP
200–240 Vac/250 Vdc	TR	SR	RR
380–440 Vac	TC	SC	RC
480–525 Vac	TD	SD	RD
600 Vac	TE	SE	RE

**Undervoltage Releases (UVRs)**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	VH	UH	WH
24 Vdc	VG	UG	WG
48 Vdc	VJ	UJ	WJ
60 Vdc	VK	UK	WK
125 Vdc	VL	UL	WL
250 Vdc	VM	UM	WM
24 Vac	VF	UF	WF
130 Vac	VA	UA	WA
240 Vac	VB	UB	WB
440 Vac	VC	UC	WC
525 Vac	VD	UD	WD
600 Vac	VE	UE	WE

**Note:** Use suffix **US** for 18 Vdc when using Time Delay UVR.

**Handle Mechanisms—Frame Size 2****Direct Rotary Handle Mechanism** ①

Description	NEMA 1/12 Catalog Number	Factory Installed Digits 19–20
Standard lockable handle	PDG2XHMCS	HA
Standard handle with door interlock	PDG2XHMCSN	HB
Standard handle with mechanical padlock	PDG2XHMCSP	HC
Standard handle with door interlock and mechanical padlock	PDG2XHMCSNP	HE
Emergency lockable handle	PDG2XHMCE	H1
Emergency handle with door interlock	PDG2XHMCEH	H2
Emergency handle with mechanical padlock	PDG2XHMCEP	H3
Emergency handle with door interlock and mechanical padlock	PDG2XHMCEHP	H5

**Variable Depth Rotary Handle Mechanism** ①

Description	NEMA 1/3R/12/4/4X Catalog Number	Factory Installed Digits 19–20
Standard lockable handle	PDG2XHMDS	DA
Standard handle with mechanical padlock	PDG2XHMDS P	DC
Emergency lockable handle	PDG2XHMDE	D1
Emergency handle with mechanical padlock	PDG2XHMDE P	D3
12 in (307 mm) handle mechanism shaft	PDG12XHMS307	—
20 in (507 mm) handle mechanism shaft	PDG12XHMS507	—
Standard NFPA79-compliant shaft handle	PDG12XHM79S	—
Emergency NFPA79-compliant shaft handle	PDG12XHM79E	—

**Flex Shaft Handle Mechanism**

Cable Length (ft)	Metal Handle, NEMA 1/3R/12 Catalog Number	High Performance Handle, NEMA 1/3R/12 Catalog Number	Metal Handle, NEMA 4/4X Catalog Number	High Performance Handle, NEMA 4/4X Catalog Number
2	PDG2XFS02	PDG2XFS02HP	PDG2XFS02X	PDG2XFS02HPX
3	PDG2XFS03	PDG2XFS03HP	PDG2XFS03X	PDG2XFS03HPX
4	PDG2XFS04	PDG2XFS04HP	PDG2XFS04X	PDG2XFS04HPX
5	PDG2XFS05	PDG2XFS05HP	PDG2XFS05X	PDG2XFS05HPX
6	PDG2XFS06	PDG2XFS06HP	PDG2XFS06X	PDG2XFS06HPX
7	PDG2XFS07	PDG2XFS07HP	PDG2XFS07X	PDG2XFS07HPX
8	PDG2XFS08	PDG2XFS08HP	PDG2XFS08X	PDG2XFS08HPX
9	PDG2XFS09	PDG2XFS09HP	PDG2XFS09X	PDG2XFS09HPX
10	PDG2XFS10	PDG2XFS10HP	PDG2XFS10X	PDG2XFS10HPX

**Note**

① Standard handles are black and gray; Emergency handles are red and yellow.

**Accessories—Frame Size 2****External Accessories**

Description	Fit Type	Catalog Number	Factory Installed Digits 19–20	
Padlockable hasp	Top	PDG2XPLKT	L4	
	Left side	PDG2XPLKL	L5	
	Right side	PDG2XPLKR	L6	
	Snap on	PDG2XPLKSNAP	L0	
Padlockable hasp OFF only	Top	PDG2XPLKTOFF	L1	
	Left side	PDG2XPLKLOFF	L2	
	Right side	PDG2XPLKROFF	L3	
Padlockable handle block	On handle	PDG2XPHB	—	
Kirk lock provision <sup>①</sup>	Top	PDG2XKLPKPTFF	L7	
Walking beam interlock <sup>②③</sup>	Two-, three-, and four-pole	PDG2XWB1234P	—	
Electrical operator	24 Vdc	PDG2XR0P24DC	RG	
	48–60 Vdc	PDG2XR0P60DC	RJ or RK	
	125 Vdc	PDG2XR0P125DC	RL	
	250 Vdc	PDG2XR0P250DC	RM	
	110–130 Vac	PDG2XR0P130AC	RA	
	200–240 Vac	PDG2XR0P240AC	RB	
380–440 Vac	PDG2XR0P440AC	RC		
	Plug-in breaker base only	Three-pole	PDG2XPBB3P225A	—
		Four-pole	PDG2XPBB4P225A	—
Plug-in breaker parts kit	Three-pole	PDG2XPBK3P225A	—	
	Four-pole	PDG2XPBK4P225A	—	
Terminal covers	Two-pole	PDG2XTC2P	—	
	Three-pole	PDG2XTC3P	—	
	Four-pole	PDG2XTC4P	—	
Interphase barriers	Single-pole	PDG2XIB	—	
	Three-pole	PDG2XIB3P	—	
	Four-pole	PDG2XIB4P	—	
Finger protection	Three-pole	PDG2XFP3P	—	
	Four-pole	PDG2XFP4P	—	
60A–100 A residual current neutral sensor	Cable type	PDG2XNCTD0100	—	
150A–225 A residual current neutral sensor	Cable type	PDG2XNCTD0225	—	
60A–100 A residual current neutral sensor	Bus bar type	PDG2XNCTB0100	—	
150A–225 A residual current neutral sensor	Bus bar type	PDG2XNCTB0225	—	
Service entrance barrier kit	Three-pole	PRLSEBPD2	—	

**Base Mounting Hardware**

Description	Catalog Number
Single-pole metric	4218B80G09
Two-pole metric	4218B80G11
Three-, four-pole metric	BMH1M
Single-pole English	624B375G01
Two-pole English	4218B80G01
Three-, four-pole English	BMH1

**Note:** Base mounting hardware is included with a circuit breaker or molded case switch.

**Dimensions and Weights—Frame Size 2****Approximate Dimensions in Inches (mm)**

Number of Poles	Width	Height	Depth
1	1.38 (35.1)	6.00 (152.4)	3.50 (88.9)
2	2.75 (69.9)	6.00 (152.4)	3.50 (88.9)
3	4.12 (104.6)	6.00 (152.4)	3.50 (88.9)
4	5.49 (139.5)	6.00 (152.4)	3.50 (88.9)

**Approximate Shipping Weight in lb (kg)**

Breaker Type	1-Pole	2-Pole	3-Pole	4-Pole
PDG2 225 A	2.00 (0.91)	3.00 (1.36)	4.21 (1.82)	5.69 (2.46)

**Notes**

- ① Provision only. For use with Type FF Kirk keylock (sold separately).
- ② Breaker must be ordered with walking beam interlock ready modification from plant (factory suffix **WB**).
- ③ Requires two breakers.

Power Defense Molded Case Circuit Breakers—Frame Size 3

2



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Frame Size 3 (45–600 A)	
Catalog Number / Product Selection . . . . .	<b>V4-T2-43</b>
Accessories . . . . .	<b>V4-T2-50</b>
Dimensions and Weights . . . . .	<b>V4-T2-56</b>
Frame Size 4 (300–800 A) . . . . .	<b>V4-T2-57</b>
Frame Size 5 (320–1200 A) . . . . .	<b>V4-T2-70</b>
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Special Applications . . . . .	<b>V4-T2-106</b>

### Power Defense Molded Case Circuit Breakers—Frame Size 3

#### Product Description

Frame Size 3 covers a range of 45 A through 600 A with a complete offering of trip units, including PXR electronic trip units and fixed-adjustable thermal-magnetic trip units. PD-3 is available in two versions, with 400 A and 600 A constructions to optimize performance in multiple applications.

#### Application Description

Frame Size 3 can be used to meet a wide range of circuit protection and power distribution needs, including ground fault protection, current limiting, 100% UL ratings, and high instantaneous settings for selective coordination. PXR trip units in PD-3 provide all levels of protection, including energy metering with multiple communication schemes, breaker health indication, and arc flash reduction options.

#### Features and Benefits

Frame Size 3 breakers are modular and available as complete breakers from the factory, or as modular components, including frames, trip units, accessories and terminals to provide flexibility for customers. PXR trip units are available with advanced features to provide customers unparalleled situational awareness of their electrical system.

#### Standards and Certifications

Power Defense breakers are designed and tested to meet stringent requirements for:

- UL
- CSA
- IEC (CE)
- CB (CCC)



## Catalog Number / Product Selection

### Power Defense—Frame Size 3 (45–600 A)

Frame Size 3 covers a range of 45 A through 600 A using electronic trip units, and 100 A through 600 A using thermal-magnetic trip units. It is available in configurations of 2-pole, 3-pole and 4-pole, with the 2-pole being in the same physical size of a 3-pole variant. Frame 3 has two unique constructions: one for 400 A and a second one for 600 A. The 600 A construction provides a unique capability to be used at 400 A and below in critical coordination applications where a high level fixed instantaneous is required. This is accomplished by using a letter **H** in the 7th digit of the catalog number, as shown below.

### Interrupting Ratings

Catalog Designator	F		G		K		M <sup>①</sup>		N <sup>①</sup>		P <sup>①</sup>	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms		kA rms	
240 Vac	35		65		85		100		150		200	
480 Vac	25		35		50		65		85		100	
600 Vac	14		18		25		35		50		65	
125/250 Vdc <sup>②</sup>	22		22		22		42		42		42	
IEC	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	35	35	55	55	85	85	100	100	150	100	200	150
380–415 Vac	25	25	36	36	50	50	70	53	70	70	100	70
440 Vac	25	20	30	22.5	35	35	50	40	70	50	100	50
480 Vac	20	20	25	20	35	22.5	50	30	65	40	85	40
525 Vac	18	5	20	7.5	25	10	30	15	35	25	40	25
660–690 Vac	—	—	8	4	10	5	15	7.5	20	10	20	10
125/250 Vdc <sup>②</sup>	22	10 / 22 <sup>③</sup>	22	10 / 22 <sup>③</sup>	22	10 / 22 <sup>③</sup>	42	22 / 42 <sup>③</sup>	42	22 / 42 <sup>③</sup>	42	22 / 42 <sup>③</sup>

#### Notes

- ① UL current limiting.
- ② DC ratings available in thermal-magnetic breakers only. 250 Vdc is achieved using two poles in series.
- ③ First rating listed is for 400 A frame, second rating is for 600 A frame.



# 2.2

## Molded Case Circuit Breakers

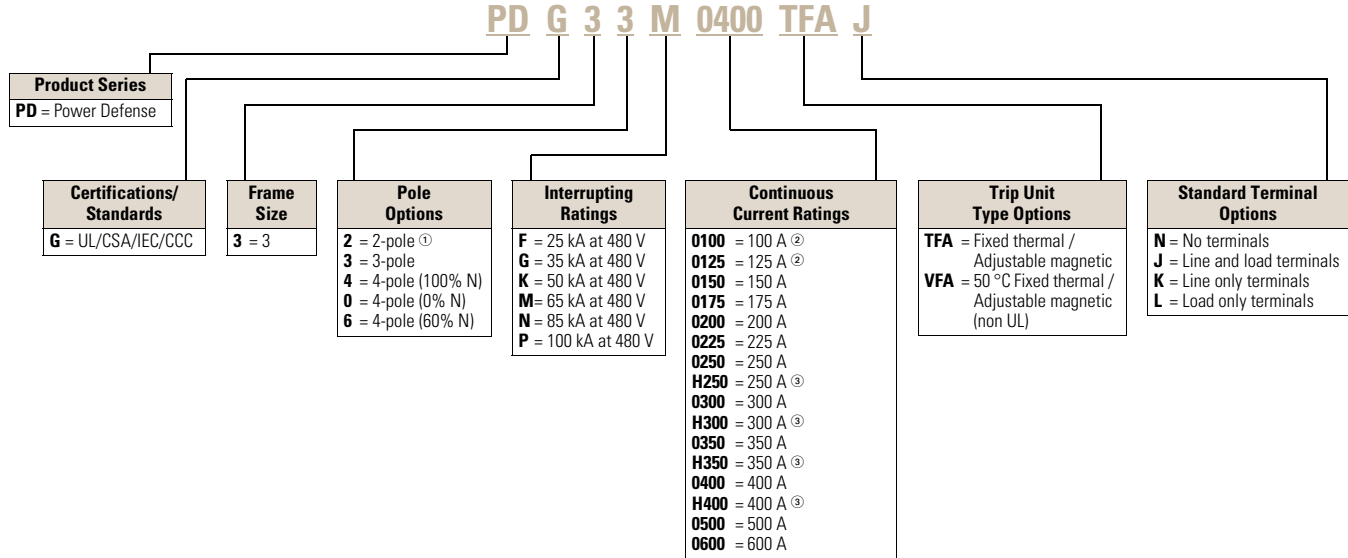
### Power Defense Molded Case Circuit Breakers

2

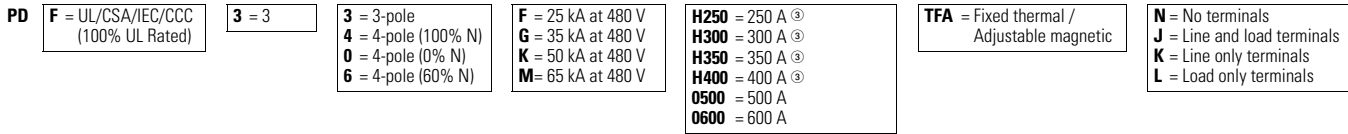
#### Molded Case Circuit Breaker

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

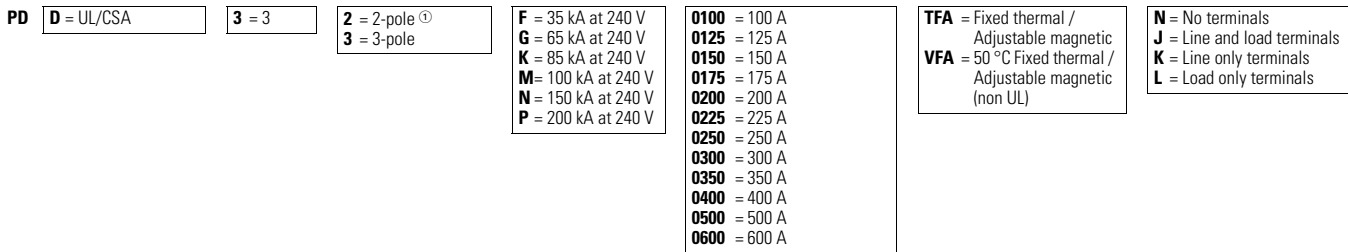
#### Molded Case Circuit Breaker with Thermal-Magnetic Trip Units (TMTU)—Globally Rated



#### Molded Case Circuit Breakers with TMTU—Globally Rated (100% UL Rated)



#### Molded Case Circuit Breakers with TMTU—UL/CSA Rated to 240 Vac



#### Molded Case Switches ④—Globally Rated



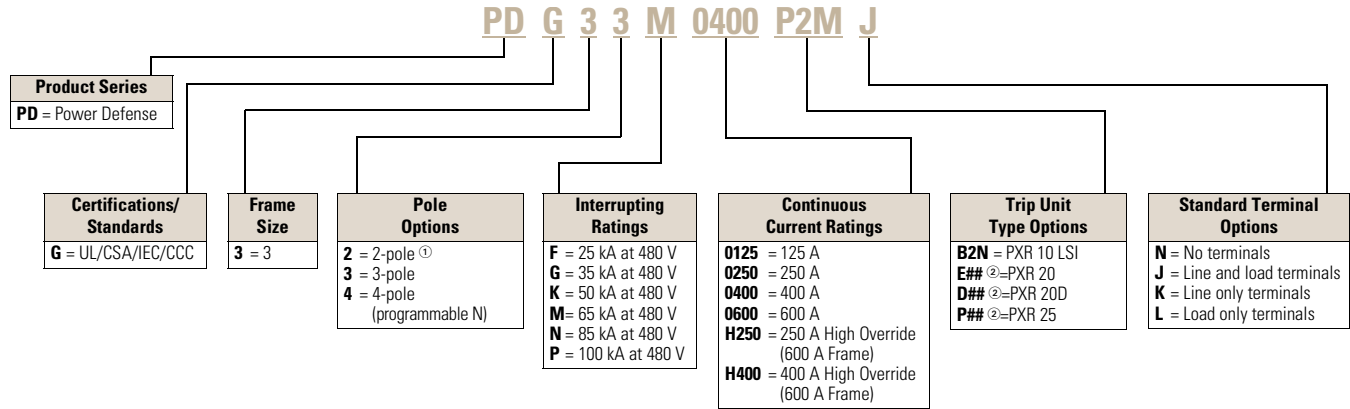
#### Notes

- ① All PD-3 2-pole breakers are physically the same size as a 3-pole frame with the outer poles used for electrical connections.
- ② Not available in 4-pole 60% neutral protection.
- ③ High override (600 A frame).
- ④ Molded case switches may open above 4000 A for the 400 A frame, and above 6300 A for the 600 A frame.

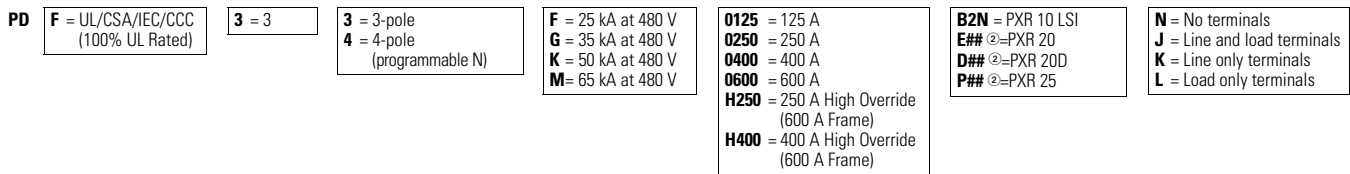
### Molded Case Circuit Breakers with Power Xpert Release (PXR) Electronic Trip Units (ETU)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Molded Case Circuit Breakers with PXR ETU—Globally Rated



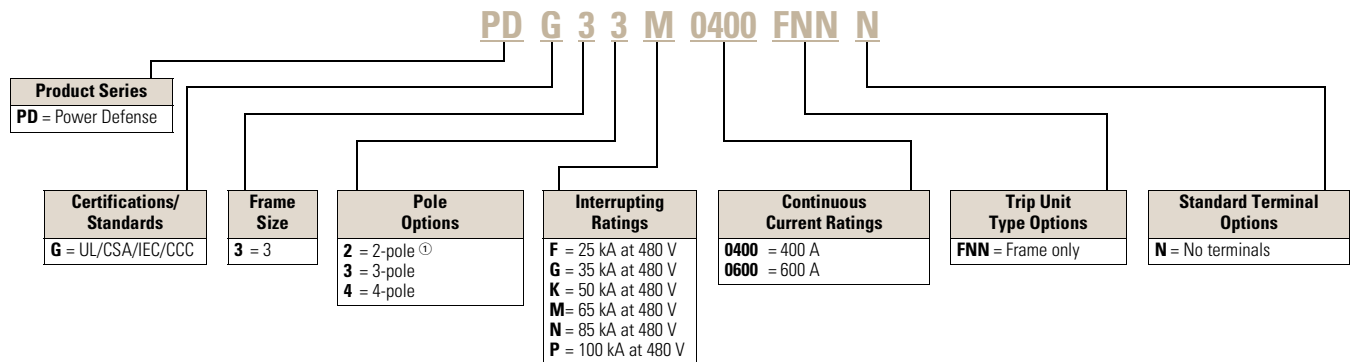
#### Molded Case Circuit Breakers with PXR ETU—Globally Rated (100% UL Rated)



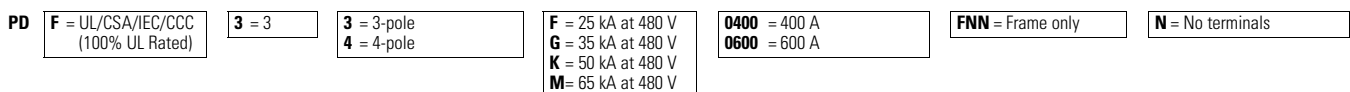
### Globally Rated Frame Only

PD-3 thermal-magnetic and electronic breakers may also be purchased as separate frames, trip units, terminals and accessories for field configuration of a final breaker. Each Frame Only device is marked with interrupting ratings and a maximum continuous current rating; each trip unit is also marked with a maximum continuous current rating, which must not exceed that of the frame. Additionally, 100% UL Rated frames are marked as such on the Frame Only device.

#### Frame Only—Globally Rated



#### Frame Only—Globally Rated (100% UL Rated)



### Notes

- ① All PD-3 2-pole breakers are physically the same size as a 3-pole frame with the outer poles used for electrical connections.
- ② See PXR Trip Unit Options table on **Page V4-T2-47** for protection type (#<sub>(1)</sub>) and available configured options (#<sub>(2)</sub>).

# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

2

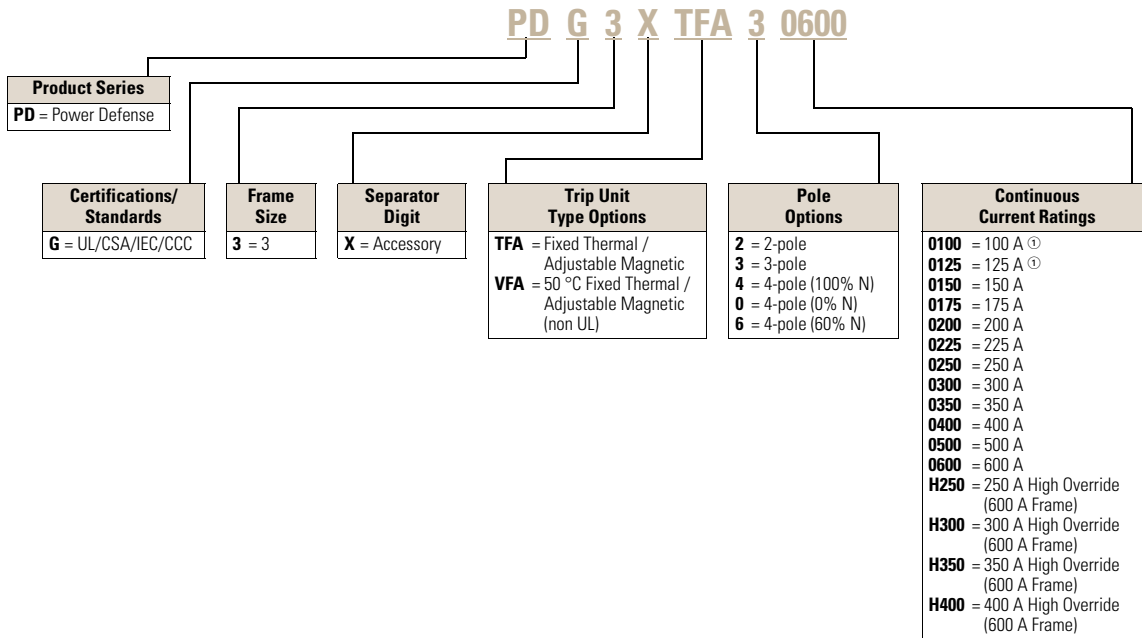
#### Trip Units

PD-3 thermal-magnetic and electronic breakers may also be purchased as separate frames, trip units, terminals and accessories for field configuration of a final breaker. The 400 A frame must use trip units of ratings 0100–0400, while the 600 A frame must use trip units of ratings 0500, 0600 or designated by **H**, such as *H250*. Additionally, for 2-pole breakers using electronic trip units, 3-pole trip units are used. PDG designated trip units are for use with PDG and PDF breaker frames. The 100% rating for PDF (100% UL Rated) is marked on the frame, not the trip unit.

#### Trip Units Only

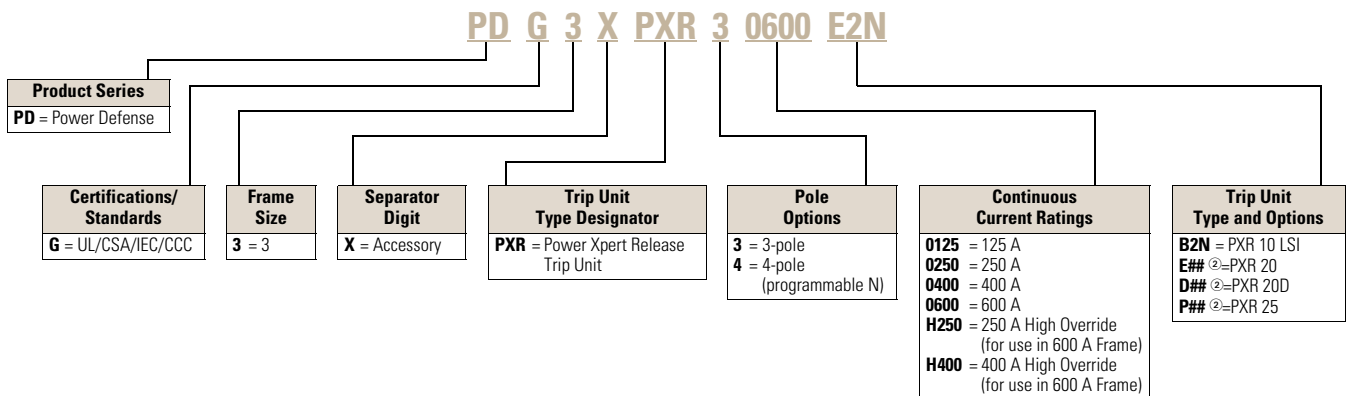
This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Thermal-Magnetic Trip Units



#### Power Xpert Release (PXR) Electronic Trip Units

#### Power Xpert Release (PXR) Electronic Trip Units



#### Notes

- ① Not available in 4-pole 60% neutral protection.
- ② See tables and descriptions on **Page V4-T2-47** for protection type (#1) and available configured options (#2).

**Power Xpert Release (PXR) Trip Unit Options—Frame Size 3**

**Power Xpert Release (PXR) Trip Unit Options**

PXR	ETU	#(1)—Protection Type				#(2)—Available Configured Options							
		LSI	LSIG	LSI with ARMS	LSIG with ARMS	Relays	Relays Modbus	Relays ZSI	Relays CAM	Relays Modbus ZSI	Relays Modbus CAM	Relays Modbus ZSI CAM	
PXR 10	B	2	—	—	—	N	—	—	—	—	—	—	—
PXR 20	E	2	—	—	—	N	R	M	Z	C	W	X	—
		—	3	4	5	—	R	M	Z	C	W	X	—
PXR 20D	D	2	3	4	5	—	—	M	—	—	W	—	D
PXR 25	P	2	3	4	5	—	—	M	—	—	W	—	D

**Descriptions of PXR Configured Options**

**Relays**—2 Form A contacts (rated for 240 Vac, 1 A)

- Interface: 3 wires (ALM1, ALM2, ALM Common)
- Programmable to indicate breaker conditions

**Modbus**—Modbus RTU directly from breaker

- Interface: 3 wires (MODBA, MODBB, MODBG)
- No additional modules required

**ZSI**—Zone Selective Interlocking

- Interface: 3 wires (Zin, Zout, Zcomm)
- Includes ability to turn ON and OFF, and indicate signals

**CAM**—CAM Link connection (requires a CAM module per breaker)

- Interface: 5 wires (refer to CAM IL for details)
- Communications Adapter Modules available for Modbus TCP and PROFIBUS

**ARMS**—Arcflash Reduction Maintenance System, or Maintenance Mode

- Available as trip unit Protection Type 4 or 5
- Interface: Switch and LED on face of trip unit (self-powered) and two wires for remote switch enable option (24 Vdc required)
- A programmable relay will be factory defaulted to remote indication of ARMS

**Auxiliary Power**

- Connection included with all PXR 20, 20D, and 25 trip units
- Required for communications, relays, and metering accuracy
- 24 Vdc, 0.5 A
- Interface: 2 wires Aux +24 V, Aux 0 V)

**Available Continuous Current (I<sub>r</sub>) Settings on PXR Electronic Trip Units**

Option	Setting	Catalog Number Selection and Maximum Setting (I <sub>n</sub> )			
		0125 125 A	0250/H250 250 A	0400/H400 400 A	0600 600 A
PXR 10, PXR 20	1	45 A	90 A	160 A	250 A
	2	50 A	100 A	175 A	275 A
	3	60 A	110 A	200 A	300 A
	4	63 A	125 A	225 A	320 A
	5	70 A	150 A	250 A	350 A
	6	80 A	160 A	275 A	400 A
	7	90 A	175 A	300 A	450 A
	8	100 A	200 A	320 A	500 A
	9	110 A	225 A	350 A	550 A
	10 = I <sub>n</sub>	125 A	250 A	400 A	600 A

PXR 20D, PXR 25 Programmable from minimum to maximum values in 1 A increments.

# 2.2

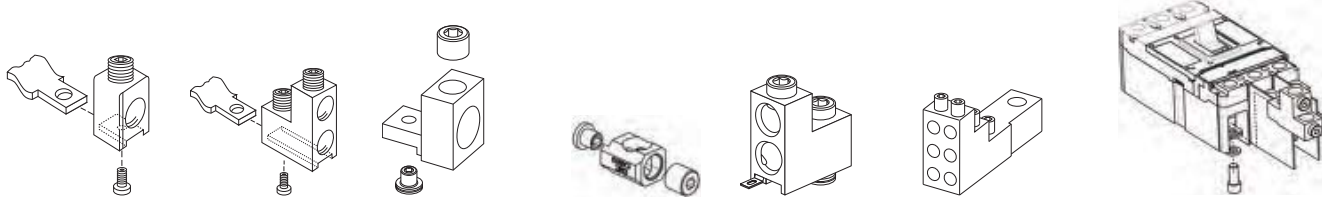
## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

#### Terminals—Frame Size 3

Catalog numbers shown are for a single side of a 3-pole breaker.  
For 2- and 4-pole options, replace the **X3** with **X2** or **X4**, respectively.  
Example: PDG3**X3**TA300 becomes PDG3**X2**TA300 for two-pole.

#### Terminal Types



PDG3X3TA300 PDG3X3TA350 PDG3X3T300 PDG3X3T350 PDG3X3TA350SW	PDG3X3TA400 PDG3X3TA400SW PDG3X3T400 PDG3X3TA400CW PDG3X3T400CW PDG3X3TA401CW PDG3X3TA401	PDG3X3TA402 PDG3X3T402 PDG3X3TA401H PDG3X3T401H PDG3X3TA401HCW PDG3X3T401HCW	PDG3X3TA400H PDG3X3T400H	PDG3X3TA630 PDG3X3T630 PDG3X3TA630SW PDG3X3TA630CW PDG3X3T630CW	PDG3X3TA4003W PDG3X3TA4006W PDG3X3TA6006W PDG3X3TA6006WSW	PDG3X3TA400RF PDG3X3TA400HRF PDG3X3TA630RF
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Note: Pictures are for reference only.

#### Terminals

Maximum Breaker Amperes	Breaker Frame	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG / kcmil Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number	Included Accessories	Digit 14 Designation			Factory Config. Ampere Range
										Line and Load	Line Only	Load Only	
<b>Standard Terminals</b>													
300	400	Aluminum	Cu/Al	B, C	1	3–350	26.7–177	<b>PDG3X3TA300</b>	—	J	K	L	100–225
350	400	Aluminum	Cu/Al	B, C	1	250–500	127–253	<b>PDG3X3TA350</b>	—	J	K	L	250–350
400	400	Aluminum	Cu/Al	B, C	2	3/0–250	85–127	<b>PDG3X3TA400</b>	Terminal shield	J	K	L	400
400	600	Aluminum	Cu/Al	B, C	1	500–750	253–380	<b>PDG3X3TA401H</b>	Terminal shield	J	K	L	H250–H400
630	600	Aluminum	Cu/Al	B, C	2	2–500	33.6–253	<b>PDG3X3TA630</b>	Terminal shield	J	K	L	450–600
<b>Optional Aluminum Terminals</b>													
400	400	Aluminum	Cu/Al	B, C	1	500–750	253–380	<b>PDG3X3TA402</b>	Terminal shield	T	U	V	100–400
400	400	Aluminum	Cu/Al	B, C	2	2/0–250 (2) and 2/0–500 (1)	67.4–127 (2) and 67.4–253 (1)	<b>PDG3X3TA401</b>	Terminal shield	—	—	—	—
400	600	Aluminum	Cu/Al	B, C	1	3–500	26.7–253	<b>PDG3X3TA400H</b>	—	T	U	V	H250–H400
<b>Optional Copper Terminals</b>													
300	400	Copper	Cu	B, C	1	3–350	26.7–177	<b>PDG3X3T300</b>	—	W	Y	Z	100–225
350	400	Copper	Cu	B, C	1	250–500	127–253	<b>PDG3X3T350</b>	—	W	Y	Z	250–350
400	400	Copper	Cu	B, C	2	3/0–250	85–127	<b>PDG3X3T400</b>	Terminal shield	W	Y	Z	400
400	400	Copper	Cu/Al	B, C	1	Al: 500–750 Cu: 500 Only	—	<b>PDG3X3T402</b>	Terminal shield	—	—	—	—
400	600	Copper	Cu	B, C	1	3–500	26.7–253	<b>PDG3X3T400H</b>	—	—	—	—	—
400	600	Copper	Cu	B, C	1	500–750	253–380	<b>PDG3X3T401H</b>	Terminal shield	W	Y	Z	H250–H400
630	600	Copper	Cu	B, C	2	2–500	33.6–253	<b>PDG3X3T630</b>	Terminal shield	W	Y	Z	450–600
<b>StrandAble Terminals</b>													
400	400	Aluminum	Cu/Al	B, C	2	3/0–250	85–127	<b>PDG3X3TA400SW</b>	—	A	B	C	100–400
				D, G, H, I, K, M		3/0–4/0	85–107						
350	400	Aluminum	Cu/Al	B, C	6	250–500	127–253	<b>PDG3X3TA350SW</b>	—	—	—	—	—
				D, G, H, I, K, M		250–350	127–177						
630	600	Aluminum	Cu/Al	B, C	2	2–500	33.6–253	<b>PDG3X3TA630SW</b>	—	A	B	C	H250–600
				D, G, H, I, K, M		2–350	33.6–177						

**Terminals—Frame Size 3****Terminals, continued**

Maximum Breaker Amperes	Breaker Frame	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG / kcmil Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number	Included Accessories	Digit 14 Designation			Factory Config. Ampere Range
										Line and Load	Line Only	Load Only	
<b>Control Wire Aluminum Terminals</b>													
400	400	Aluminum	Cu/Al	B, C	2	3/0–250	85–127	PDG3X3TA400CW	Terminal shield	1	2	3	100–400
400	400	Aluminum	Cu/Al	B, C	2	2/0–250 (2) or 2/0–500 (1)	67.4–127 (2) or 67.4–253 (1)	PDG3X3TA401CW	Terminal shield	4	5	6	100–400
400	600	Aluminum	Cu/Al	B, C	1	500–750	253–380	PDG3X3TA401HCW	Terminal shield	1	2	3	H250–H400
630	600	Aluminum	Cu/Al	B, C	2	2–500	33.6–253	PDG3X3TA630CW	Terminal shield	1	2	3	450–600
<b>Control Wire Copper Terminals</b>													
400	400	Copper	Cu	B, C	2	3/0–250	85–127	PDG3X3T400CW	Terminal shield	7	8	9	100–400
400	600	Copper	Cu	B, C	1	500–750	253–380	PDG3X3T401HCW	Terminal shield	7	8	9	H250–H400
630	600	Copper	Cu	B, C	2	2–500	33.6–253	PDG3X3T630CW	Terminal shield	7	8	9	450–600
<b>Multi-wire Terminals</b>													
400	400	Aluminum	Cu/Al	B, C	4	12–2/0	3.31–67.4	PDG3X3TA4003W	Terminal shield	—	—	H	100–400
400	400	Aluminum	Cu/Al	B, C	6	14–3	2.08–26.7	PDG3X3TA4006W	Terminal shield	—	—	G	100–400
600	600	Aluminum	Cu/Al	B, C	6	14–1/0	2.08–53.5	PDG3X3TA6006W	Terminal shield	—	—	G	H250–600
<b>StrandAble Multi-wire Terminals</b>													
600	400	Aluminum	Cu/Al	B, C D, G, H, I, K, M	6	12–2/0 8–1/0	—	PDG3X3TA6006WSW	Terminal shield	—	—	—	—
<b>Rear-fed Terminals</b>													
400	400	Aluminum	Cu/Al	B, C	1	250–500	127–253	PDG3X3TA400RF <sup>①</sup>	Interphase barriers	—	—	—	—
400	600	Aluminum	Cu/Al	B, C	1	2–500	33.6–253	PDG3X3TA400HRF <sup>①</sup>	Interphase barriers	—	—	—	—
630	600	Aluminum	Cu/Al	B, C	2	2–500	33.6–253	PDG3X3TA630RF <sup>①</sup>	Interphase barriers	—	—	—	—
<b>Rear Connectors</b>													
400	—	—	—	—	—	—	—	PDG3X3TA400RC	—	R	—	—	100–400
630	—	—	—	—	—	—	—	PDG3X3TA630RC	—	R	—	—	250–600
<b>End Cap Kits/Screw Terminals</b>													
400	—	—	—	—	—	—	—	PDG3X3TS400	—	S	D	E	100–400
600	—	—	—	—	—	—	—	PDG3X3TS600	—	S	D	E	250–600

**Note:** Wire capacity is based on standard imperial wire sizes; metric sizes provided in table are a direct conversion to demonstrate maximum capacity, not to denote metric wire sizes.

**Control Wire Tabs**

Use	Package Qty.	Catalog Number
100–400 A	12	KCWTK

**Note**

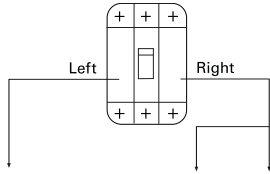
① Terminals not UL Listed.



#### Accessories

2

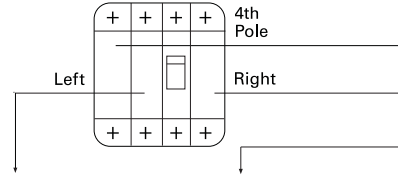
#### Internal Accessory Configurations—Frame Size 3



##### 3-Pole Circuit Breakers



Tripping Accessory Options	Alarm Options (2 Spaces) <sup>①</sup>	Aux Options (2 Spaces)
Shunt Trip 	None	None
	1NO (1 space)	1NO (1 space)
	1NC (1 space)	1NC (1 space)
	1NO/1NC (2 spaces)	1NO/1NC (2 spaces)
UVR 	2NO (2 spaces)	2NO (2 spaces)
	2NC (2 spaces)	2NC (2 spaces)

##### 4-Pole Circuit Breakers



Tripping Accessory Options	Alarm Options (2 Spaces) <sup>①</sup>	Aux Options (4 Spaces) <sup>②</sup>
Shunt Trip 	None	None
	1NO (1 space)	1NO (1 space)
	1NC (1 space)	1NC (1 space)
	1NO/1NC (2 spaces)	1NO/1NC (2 spaces)
UVR 	2NO (2 spaces)	2NO (2 spaces)
	2NC (2 spaces)	2NC (2 spaces)
		2NO/2NC (4 spaces)
		4NO (4 spaces)
		4NC (4 spaces)

#### Notes

- ① Frame 3 Power Defense breakers with electronic trip units AND communication only have access to one alarm space. Breakers with thermal-magnetic trip units or electronic trip units without communication have access to two alarm spaces.
- ② Neutral pole includes two additional auxiliary spaces.

**Alarm and Auxiliary Contact Blocks—Frame Size 3**

Power Defense breakers have designated positions for alarm and auxiliary switches in the right pole accessory cavity. For Frame 3, the two left-most positions are used for alarm switches, and the two right-most locations are used for auxiliary switches.

Power Defense breakers have secondary covers for ease of field installation of accessories, including alarm and auxiliary switches.

Power Defense alarm and auxiliary switches are available in contact blocks, in Form A (NO), Form B (NC), and Form C (NO-NC) types. Form A and Form B contacts take one position in the breaker accessory cavity, and Form C contacts take two positions in the cavity. Identical contact blocks are used for the alarm and auxiliary switch functions.

Electronic breakers with communications options (Modbus RTU or CAM Link) lose one alarm switch position, but are also able to provide trip position via communications and the PXR programmable relays.

**Contact Blocks****Pigtail (29 in / 0.75 m) Contact Blocks for Alarm and Auxiliary Switch Functionality**

Catalog Number	PDGXAA	PDGXAB	PDGXAC
Type	Form A / NO	Form B / NC	Form C / NO-NC

**Screw Terminal Contact Blocks for Alarm and Auxiliary Switch Functionality**

Catalog Number	PDGXXA	PDGXXB	PDGXXA + PDGXXB
Type	Form A / NO	Form B / NC	For NO-NC, use two separate contact blocks

**Push-In Clamp Contact Blocks for Alarm and Auxiliary Switch Functionality**

Catalog Number	PDGXUA	PDGXUB	PDGXUC
Type	Form A / NO	Form B / NC	Form C / NO-NC

**Pigtail (118 in / 3.0 m) Contact Blocks for Alarm and Auxiliary Switch Functionality**

Catalog Number	PDGXDA	PDGXDB	PDGXDC
Type	Form A / NO	Form B / NC	Form C / NO-NC



# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

2

#### Factory Installation of Alarm and Auxiliary Switches—Frame Size 3

Alarm and auxiliary switches are plug-and-play accessories designed to be field installable. However, Eaton also offers installation service in our factories.

Breaker catalog numbers with alarm and auxiliary switch combinations require a complete 20-digit catalog number, adding the alarm and

auxiliary switch functionality in digits 15–16 and adhering to the following conditions and tables:

- Digit 15 denotes the type of accessory(-ies) installed and the terminal types
- Switches may be requested for alarm only, auxiliary only or a combination of the two

- For Eaton factory installation, the same type of terminals (i.e., all pigtail 0.75 m, all screw, etc.) must be used. If a combination of alarm and auxiliary switches is selected, they must be the same type (i.e., all 1NC, all 1NO/1NC, etc.)
- Digit 16 denotes number and type (NO, NC) of switches installed

- If no other accessories are selected, use NNNN for the final 4 digits of the catalog number
- Electronic breakers with communications lose one alarm switch position in order to provide trip status via communications. They do not lose an auxiliary position for this purpose.

#### Pigtails—29 in / 0.75 m (A, B, C)

Alarm Switch		Auxiliary Switch Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
Alarm Switch	None	NN	AA	AB	AC	AD	AE	A1	A2	A3
	1NO	BA	CA	—	—	—	—	—	—	—
	1NC	BB	—	CB	—	—	—	—	—	—
	1NO/1NC	BC	—	—	CC	—	—	C1	—	—
	2NO	BD	—	—	—	CD	—	—	C2	—
	2NC	BE	—	—	—	—	CE	—	—	C3

#### Screw Terminals (X, Y, Z)

Alarm Switch		Auxiliary Switch Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
Alarm Switch	None	NN	XA	XB	XC	XD	XE	X1	X2	X3
	1NO	YA	ZA	—	—	—	—	—	—	—
	1NC	YB	—	ZB	—	—	—	—	—	—
	1NO/1NC	YC	—	—	ZC	—	—	Z1	—	—
	2NO	YD	—	—	—	ZD	—	—	Z2	—
	2NC	YE	—	—	—	—	ZE	—	—	Z3

#### Push-In Clamps (U, V, W)

Alarm Switch		Auxiliary Switch Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
Alarm Switch	None	NN	UA	UB	UC	UD	UE	U1	U2	U3
	1NO	VA	WA	—	—	—	—	—	—	—
	1NC	VB	—	WB	—	—	—	—	—	—
	1NO/1NC	VC	—	—	WC	—	—	W1	—	—
	2NO	VD	—	—	—	WD	—	—	W2	—
	2NC	VE	—	—	—	—	WE	—	—	W3

**Factory Installation of Alarm and Auxiliary Switches—Frame Size 3****Pigtails—118 in / 3.0 m (D, E, F)**

Alarm Switch		Auxiliary Switch Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
Alarm Switch	None	NN	DA	DB	DC	DD	DE	D1	D2	D3
	1NO	EA	FA	—	—	—	—	—	—	—
	1NC	EB	—	FB	—	—	—	—	—	—
	1NO/1NC	EC	—	—	FC	—	—	F1	—	—
	2NO	ED	—	—	—	FD	—	—	F2	—
	2NC	EE	—	—	—	—	FE	—	—	F3

**For PXR Trip Units with Communication<sup>Ⓢ</sup>**

Alarm Switch		Auxiliary Switch Three-Pole						Four-Pole		
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC
Alarm Switch	None	NN	AA	AB	AC	AD	AE	A1	A2	A3
	1NO	BA	CA	—	CF	CG	—	CP	CQ	—
	1NC	BB	—	CB	CH	—	CI	CR	—	CS

**Tripping Accessories—Frame Size 3**

Power Defense breakers have designated positions for shunt trips and undervoltage releases (UVRs) in the left pole accessory cavity. Each breaker has space for one tripping accessory only.

Power Defense breakers have secondary covers for ease of field installation of tripping accessories.

**Shunt Trips**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	PDG3XST12DCT	PDG3XST12DCS	PDG3XST12DCR
48 Vdc	PDG3XST48DCT	PDG3XST48DCS	PDG3XST48DCR
60 Vdc	PDG3XST60DCT	PDG3XST60DCS	PDG3XST60DCR
24 Vac/Vdc	PDG3XST24ACDCT	PDG3XST24ACDCS	PDG3XST24ACDCR
110–130 Vac/125 Vdc	PDG3XST130ACDCT	PDG3XST130ACDCS	PDG3XST130ACDCR
200–240 Vac/250 Vdc	PDG3XST250ACDCT	PDG3XST250ACDCS	PDG3XST250ACDCR
380–440 Vac	PDG3XST440ACT	PDG3XST440ACS	PDG3XST440ACR
480–525 Vac	PDG3XST525ACT	PDG3XST525ACS	PDG3XST525ACR
600 Vac	PDG3XST600ACT	PDG3XST600ACS	PDG3XST600ACR

**Undervoltage Releases (UVRs)**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	PDG3XUV12DCV	PDG3XUV12DCU	PDG3XUV12DCW
24 Vdc	PDG3XUV24DCV	PDG3XUV24DCU	PDG3XUV24DCW
48 Vdc	PDG3XUV48DCV	PDG3XUV48DCU	PDG3XUV48DCW
60 Vdc	PDG3XUV60DCV	PDG3XUV60DCU	PDG3XUV60DCW
125 Vdc	PDG3XUV125DCV	PDG3XUV125DCU	PDG3XUV125DCW
250 Vdc	PDG3XUV250DCV	PDG3XUV250DCU	PDG3XUV250DCW
24 Vac	PDG3XUV24ACV	PDG3XUV24ACU	PDG3XUV24ACW
130 Vac	PDG3XUV130ACV	PDG3XUV130ACU	PDG3XUV130ACW
240 Vac	PDG3XUV240ACV	PDG3XUV240ACU	PDG3XUV240ACW
440 Vac	PDG3XUV440ACV	PDG3XUV440ACU	PDG3XUV440ACW
525 Vac	PDG3XUV525ACV	PDG3XUV525ACU	PDG3XUV525ACW
600 Vac	PDG3XUV600ACV	PDG3XUV600ACU	PDG3XUV600ACW

**Note:** Use PDG3XUV18DCW when using Time Delay UVR.

**Note**

<sup>Ⓢ</sup> All options shown have 29 in/0.75 m pigtail termination. For alternate termination options, contact the product line.

**Factory Installed Tripping Accessories—Frame Size 3**

Shunt trips and undervoltage releases (UVRs) are plug-and-play accessories designed to be field installable. However, Eaton also offers the service of installation in our factories.

Breaker catalog numbers with shunt trips or UVRs require a complete 20-digit catalog number, adding the tripping accessory functionality in digits 17 and 18 and adhering to the following conditions and tables.

- Digit 17 denotes the type of accessory installed and the terminal type
- Digit 18 denotes the voltage of the accessory

- If no additional accessories are selected, use NN for digits 15-16 and 19-20 of the catalog number
- Each breaker has space for one shunt trip or UVR tripping accessory only

**Shunt Trips**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	TH	SH	RH
48 Vdc	TJ	SJ	RJ
60 Vdc	TK	SK	RK
24 Vac/Vdc	TN	SN	RN
110–130 Vac/125 Vdc	TP	SP	RP
200–240 Vac/250 Vdc	TR	SR	RR
380–440 Vac	TC	SC	RC
480–525 Vac	TD	SD	RD
600 Vac	TE	SE	RE

**Undervoltage Releases (UVRs)**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	VH	UH	WH
24 Vdc	VG	UG	WG
48 Vdc	VJ	UJ	WJ
60 Vdc	VK	UK	WK
125 Vdc	VL	UL	WL
250 Vdc	VM	UM	WM
24 Vac	VF	UF	WF
130 Vac	VA	UA	WA
240 Vac	VB	UB	WB
440 Vac	VC	UC	WC
525 Vac	VD	UD	WD
600 Vac	VE	UE	WE

**Note:** Use suffix **US** for 18 Vdc when using Time Delay UVR.

**Handle Mechanisms—Frame Size 3****Direct Rotary Handle Mechanism** <sup>①</sup>

Description	NEMA 1/12 Catalog Number	Factory Installed Digits 19–20
Standard lockable handle	PDG3XHMCS	HA
Standard handle with door interlock	PDG3XHMCSN	HB
Standard handle with mechanical padlock	PDG3XHMCSNP	HC
Standard handle with door interlock and mechanical padlock	PDG3XHMCSNP	HE
Emergency lockable handle	PDG3XHMCE	H1
Emergency handle with door interlock	PDG3XHMCE	H2
Emergency handle with mechanical padlock	PDG3XHMCEP	H3
Emergency handle with door interlock and mechanical padlock	PDG3XHMCEP	H5

**Variable Depth Rotary Handle Mechanism** <sup>①</sup>

Description	NEMA 1/3R/12/4/4X Catalog Number	Factory Installed Digits 19–20
Standard lockable handle	PDG3XHMDS	DA
Standard handle with mechanical padlock	PDG3XHMDSNP	DC
Emergency lockable handle	PDG3XHMDE	D1
Emergency handle with mechanical padlock	PDG3XHMDEP	D3
9 in (245 mm) handle mechanism shaft	PDG34XHMS245	—
17 in (445 mm) handle mechanism shaft	PDG34XHMS445	—
Standard NFPA79-compliant shaft handle	PDG34XHM79S	—
Emergency NFPA79-compliant shaft handle	PDG34XHM79E	—

**Flex Shaft Handle Mechanism**

Cable Length (ft)	Metal Handle, NEMA 1/3R/12 Catalog Number	High Performance Handle, NEMA 1/3R/12 Catalog Number	Metal Handle, NEMA 4/4X Catalog Number	High Performance Handle, NEMA 4/4X Catalog Number
2	PDG3XFS02	PDG3XFS02HP	PDG3XFS02X	PDG3XFS02HPX
3	PDG3XFS03	PDG3XFS03HP	PDG3XFS03X	PDG3XFS03HPX
4	PDG3XFS04	PDG3XFS04HP	PDG3XFS04X	PDG3XFS04HPX
5	PDG3XFS05	PDG3XFS05HP	PDG3XFS05X	PDG3XFS05HPX
6	PDG3XFS06	PDG3XFS06HP	PDG3XFS06X	PDG3XFS06HPX
7	PDG3XFS07	PDG3XFS07HP	PDG3XFS07X	PDG3XFS07HPX
8	PDG3XFS08	PDG3XFS08HP	PDG3XFS08X	PDG3XFS08HPX
9	PDG3XFS09	PDG3XFS09HP	PDG3XFS09X	PDG3XFS09HPX
10	PDG3XFS10	PDG3XFS10HP	PDG3XFS10X	PDG3XFS10HPX

**Note**

<sup>①</sup> Standard handles are black and gray; Emergency handles are red and yellow.

**Accessories—Frame Size 3****External Accessories**

Description	Fit Type	Catalog Number	Factory Installed Digits 19–20
Padlockable hasp	Top	<b>PDG3XPLKT</b>	L4
Padlockable hasp, OFF only	Top	<b>PDG3XPLKTOFF</b>	L1
Padlockable handle block	On handle	<b>PDG3XPHB</b>	—
Kirk lock provision—left side, Type F <sup>①</sup>	Left side	<b>PDG3XKLKPSF</b>	L8
Kirk lock provision—right side, Type F <sup>①</sup>	Right side		L9
Kirk lock provision—left/right side, Type FF <sup>①</sup>	Left/right side	<b>PDG3XKLKPSFF</b>	—
Walking beam interlock <sup>②③</sup>	400 A frame, two-, three- and four-pole	<b>PDG3XWBI234P</b>	—
	600 A frame, two- and three-pole	<b>PDG3XWBI23P</b>	—
	600 A frame, four-pole	<b>PDG3XWBI4P</b>	—
Electrical operator	24 Vdc	<b>PDG3XROP24DC</b>	RG
	48–60 Vdc	<b>PDG3XROP60DC</b>	RJ or RK
	125 Vdc	<b>PDG3XROP125DC</b>	RL
	250 Vdc	<b>PDG3XROP250DC</b>	RM
	110–130 Vac	<b>PDG3XROP130AC</b>	RA
	200–240 Vac	<b>PDG3XROP240AC</b>	RB
	380–440 Vac	<b>PDG3XROP440AC</b>	RC
Plug-in breaker base only	Three-pole, 400 A	<b>PDG3XPBB3P400A</b>	—
	Three-pole, 600 A	<b>PDG3XPBB3P600A</b>	—
	Four-pole, 400 A	<b>PDG3XPBB4P400A</b>	—
	Four-pole, 600 A	<b>PDG3XPBB4P600A</b>	—
Plug-in breaker parts kit	Three-pole, 400 A	<b>PDG3XPBK3P400A</b>	—
	Three-pole, 600 A	<b>PDG3XPBK3P600A</b>	—
	Four-pole, 400 A	<b>PDG3XPBK4P400A</b>	—
	Four-pole, 600 A	<b>PDG3XPBK4P600A</b>	—
Terminal covers <sup>④</sup>	Three-pole (400 A frame)	<b>PDG3XTC3P0400</b>	—
	Three-pole	<b>PDG3XTC3P</b>	—
	Four-pole	<b>PDG3XTC4P</b>	—
Interphase barriers	Single-pole	<b>PDG3XIB</b>	—
	Three-pole	<b>PDG3XIB3P</b>	—
	Four-pole	<b>PDG3XIB4P</b>	—
Finger protection	Three-pole	<b>PDG3XFP3P</b>	—
	Four-pole	<b>PDG3XFP4P</b>	—
Neutral CTs for ground fault (PXR)	Bus bar type	<b>PDG3XNCTB0600</b>	—
Service entrance barrier kit	Three-pole	<b>PRLSEBPD3</b>	—

**Base Mounting Hardware**

Description	Catalog Number
Two-, three-, four-pole metric (400 A)	<b>BMH3M</b>
Two-, three-, four-pole English (400 A)	<b>BMH3</b>
Two-, three-, four-pole metric (600 A)	<b>66A4560G03</b>

**Note:** Base mounting hardware is included with a circuit breaker or molded case switch.

**Dimensions and Weights—Frame Size 3****Approximate Dimensions in Inches (mm)**

Number of Poles	Width	Height	Depth
2	5.47 (138.9)	10.13 (257.1)	4.30 (109.1)
3	5.47 (138.9)	10.13 (257.1)	4.30 (109.1)
4	7.22 (182.9)	10.13 (257.1)	4.30 (109.1)

**Approximate Shipping Weight in lb (kg)**

Breaker Type	2-Pole	3-Pole	4-Pole
PDG3 400 A	8.05 (3.65)	11.02 (5.0)	13.77 (6.25)
PDG3 600 A	10.43 (4.73)	12.36 (5.61)	16.27 (7.39)

**Notes**

- ① Provision only. Kirk keylock sold separately.
- ② Breaker must be ordered with walking beam interlock ready modification from plant (factory suffix **WB** in digits 19-20).
- ③ Requires two breakers.
- ④ PDG3 with 0400 or below rating ship from the factory with the 400 A frame terminal cover, but can be fitted with either in the field. 600 A frames, including H250, H400, etc ship with the standard terminal cover.

## Power Defense Molded Case Circuit Breakers—Frame Size 4



## Contents

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Frame Size 2 (15–225 A) . . . . .	<b>V4-T2-29</b>
Frame Size 3 (45–600 A) . . . . .	<b>V4-T2-42</b>
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Dimensions and Weights . . . . .	<b>V4-T2-69</b>
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Frame Size 6 (700–2500 A) . . . . .	<b>V4-T2-79</b>
Motor Circuit Protectors (3–600 A) . . . . .	<b>V4-T2-87</b>
Motor Protection Circuit Breakers (15–600 A) . . . . .	<b>V4-T2-98</b>
Communications and Software . . . . .	<b>V4-T2-104</b>
Special Applications . . . . .	<b>V4-T2-106</b>

## Power Defense Molded Case Circuit Breakers—Frame Size 4

**Product Description**

Frame Size 4 covers a range of 300 A through 800 A with a complete offering of trip units, including PXR electronic trip units and fixed-adjustable thermal-magnetic trip units. PD-4 is available in a single 800 A frame.

**Application Description**

Frame Size 4 can be used to meet a wide range of circuit protection and power distribution needs, including ground fault protection and 100% UL ratings. PXR trip units in PD-4 provide all levels of protection, including energy metering with multiple communication schemes, breaker health indication and arc flash reduction options.

**Features and Benefits**

Frame Size 4 breakers are modular and available as complete breakers from the factory or as modular components, including frames, trip units, accessories and terminals to provide flexibility for customers. PXR trip units are available with advanced features to provide customers unparalleled situational awareness of their electrical system.

**Standards and Certifications**

Power Defense breakers are designed and tested to meet stringent requirements for:

- UL
- CSA
- IEC (CE)
- CB (CCC)



#### Catalog Number / Product Selection

2

#### Power Defense—Frame Size 4 (300–800 A)

Frame Size 4 covers a range of 320 A through 800 A using electronic trip units, and 300 A through 800 A using thermal-magnetic trip units. It is available in configurations of 2-pole, 3-pole and 4-pole, with the 2-pole being in the same physical size of a 3-pole variant.

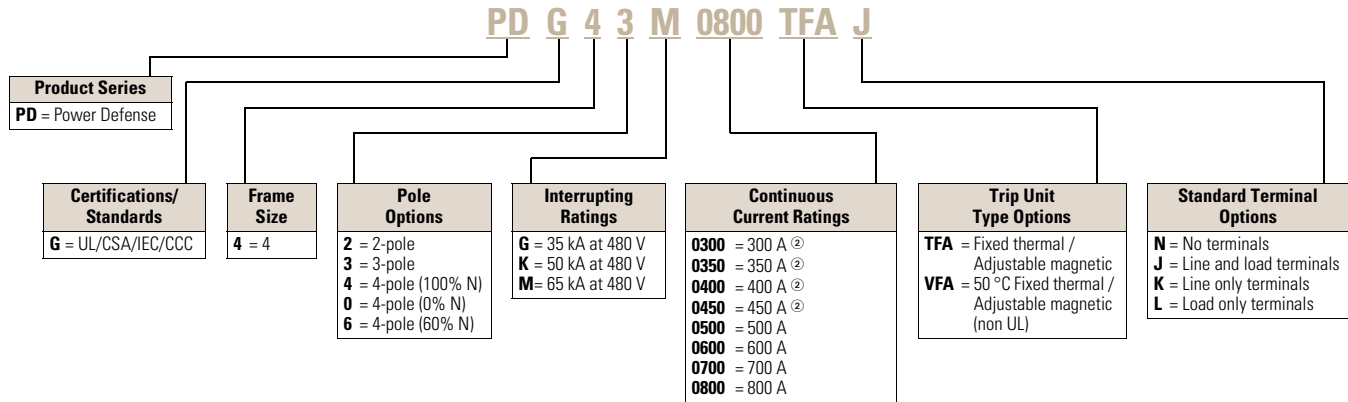
#### Interrupting Ratings

	G		K		M	
ANSI (UL/CSA)	kA rms		kA rms		kA rms	
240 Vac	65		85		100	
480 Vac	35		50		65	
600 Vac	18		25		35	
125/250 Vdc ①	22		22		25	
IEC	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	55	55	85	85	100	100
380–415 Vac	36	36	50	50	70	53
440 Vac	30	22.5	35	35	50	40
480 Vac	25	20	35	22.5	50	30
525 Vac	20	16.5	25	20	30	25
660–690 Vac	8	4	10	5	15	7.5
125/250 Vdc ①	22	22	22	22	25	25

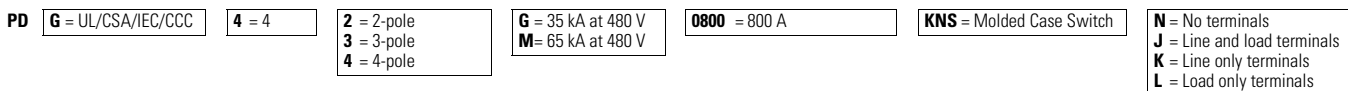
#### Power Defense—Frame Size 4 (300–800 A)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Molded Case Circuit Breakers with Thermal-Magnetic Trip Units (TMTU)—Globally Rated



#### Molded Case Switches—Globally Rated ③



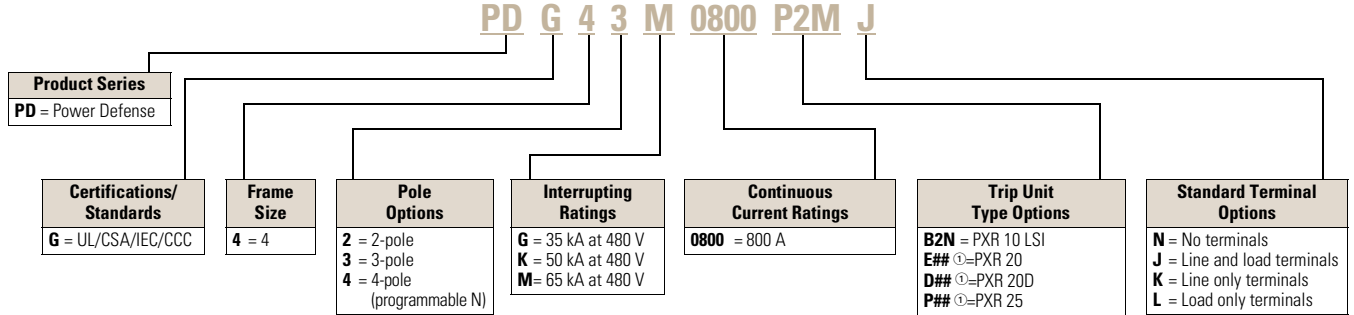
#### Notes

- ① DC ratings available in thermal-magnetic breakers only. 250 Vdc is achieved using 2 poles in series.
- ② Not available in 4-pole 60% neutral protection.
- ③ Molded case switch may open above 6000 A.

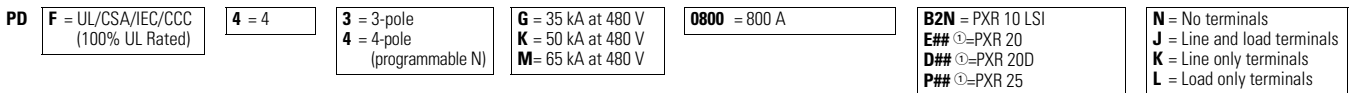
### Molded Case Circuit Breakers with Power Xpert Release (PXR) Electronic Trip Units (ETU)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Molded Case Circuit Breakers with PXR ETU—Globally Rated



#### Molded Case Circuit Breakers with PXR ETU—Globally Rated (100% UL Rated)

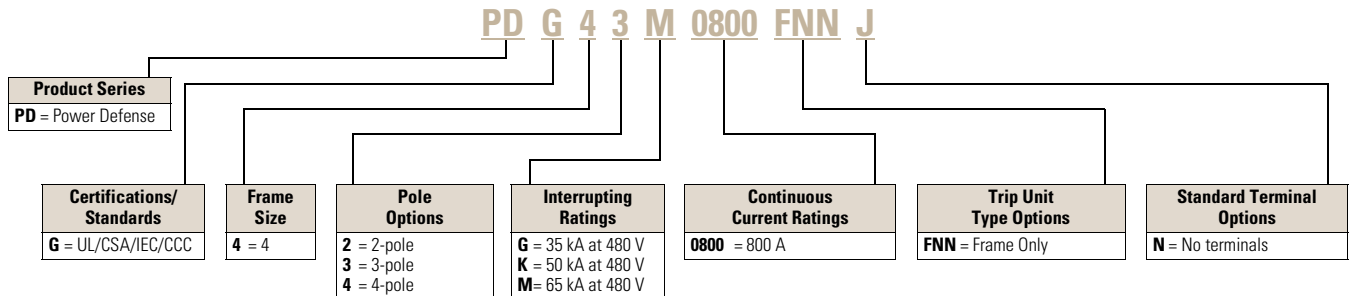


#### Globally Rated Frame Only

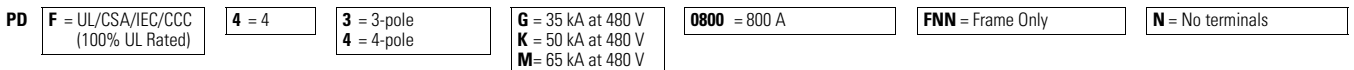
PD-4 thermal-magnetic and electronic breakers may also be purchased as separate frames, trip units, terminals and accessories for field configuration of a final breaker. Each Frame Only device is marked with interrupting ratings and a maximum continuous current rating; each trip unit is also marked with a maximum continuous current rating, which must not exceed that of the frame. Additionally, 100% UL Rated frames are marked as such on the Frame Only device.

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Frame Only—Globally Rated



#### Frame Only—Globally Rated (100% UL Rated)



#### Note

① See tables and descriptions on Page V4-T2-61 for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).



# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

2

#### Trip Units

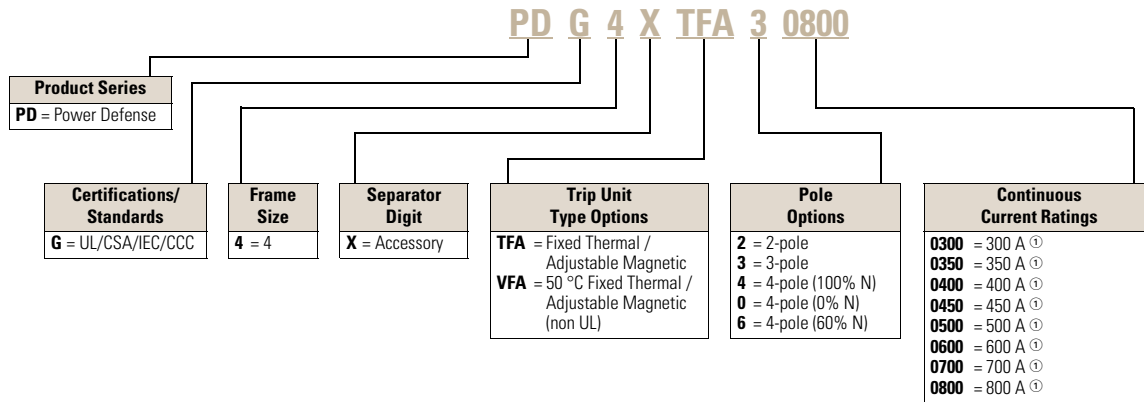
PD-4 thermal-magnetic and electronic breakers may also be purchased as separate frames, trip units, terminals and accessories for field configuration of a final breaker. For two-pole breakers using electronic trip units, three-pole trip units are used.

PDG designated trip units are for use with PDG and PDF breaker frames. The 100% rating for PDF (100% UL Rated) is marked on the frame, not the trip unit.

#### Trip Units Only

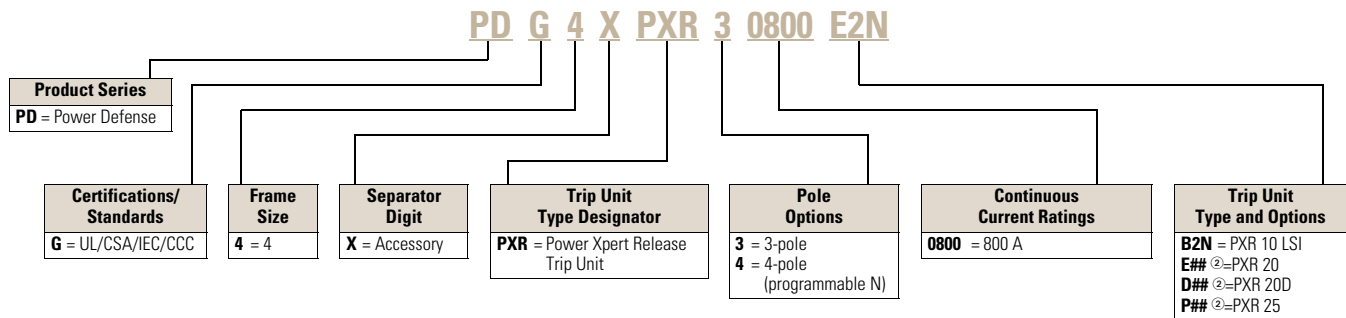
This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Thermal-Magnetic Trip Units



#### Power Xpert Release (PXR) Electronic Trip Units

#### Power Xpert Release (PXR) Electronic Trip Units



#### Notes

- ① Not available in 4-pole 60% neutral protection.
- ② See tables and descriptions on **Page V4-T2-61** for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).

**Power Xpert Release (PXR) Trip Unit Options—Frame Size 4**

**Power Xpert Release (PXR) Trip Unit Options**

PXR	ETU	# <sub>(1)</sub> —Protection Type				# <sub>(2)</sub> —Available Configured Options							
		LSI	LSIG	LSI with ARMS	LSIG with ARMS	—	Relays	Relays Modbus	Relays ZSI	Relays CAM	Relays Modbus ZSI	Relays Modbus CAM	Relays Modbus ZSI CAM
PXR 10	B	2	—	—	—	N	—	—	—	—	—	—	—
PXR 20	E	2	—	—	—	N	R	M	Z	C	W	X	—
		—	3	4	5	—	R	M	Z	C	W	X	—
PXR 20D	D	2	3	4	5	—	—	M	—	—	W	—	D
PXR 25	P	2	3	4	5	—	—	M	—	—	W	—	D

**Descriptions of PXR Configured Options**

**Relays**—2 Form A contacts (rated for 240 Vac, 1 A)

- Interface: 3 wires (ALM1, ALM2, ALM Common)
- Programmable to indicate breaker conditions

**Modbus**—Modbus RTU directly from breaker

- Interface: 3 wires (MODBA, MODBB, MODBG)
- No additional modules required

**ZSI**—Zone Selective Interlocking

- Interface: 3 wires (Zin, Zout, Zcomm)
- Includes ability to turn ON and OFF, and indicate signals

**CAM**—CAM Link connection (requires a CAM module per breaker)

- Interface: 5 wires (refer to CAM IL for details)
- Communications Adapter Modules available for Modbus TCP and PROFIBUS

**ARMS**—Arcflash Reduction Maintenance System, or Maintenance Mode

- Available as trip unit Protection Type 4 or 5
- Interface: Switch and LED on face of trip unit and two wires for remote switch enable option (24 Vdc required)
- A programmable relay will be factory defaulted to remote indication of ARMS

**Auxiliary Power**

- Connection included with all PXR 20, 20D, and 25 trip units
- Required for communications, relays, and metering accuracy
- 24 Vdc, 0.5 A
- Interface: 2 wires (Aux +24 V, Aux 0 V)

**Available Continuous Current (I<sub>r</sub>) Settings on PXR Electronic Trip Units**

Option	Setting	Catalog Number Selection and Maximum Setting (I <sub>n</sub> )	
		800 A	
PXR 10, PXR 20	1	320 A	
	2	350 A	
	3	400 A	
	4	450 A	
	5	500 A	
	6	550 A	
	7	600 A	
	8	630 A	
	9	700 A	
	10 = I <sub>n</sub>	800 A	
PXR 20D, PXR 25		Programmable from minimum to maximum values in 10 A increments.	

# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

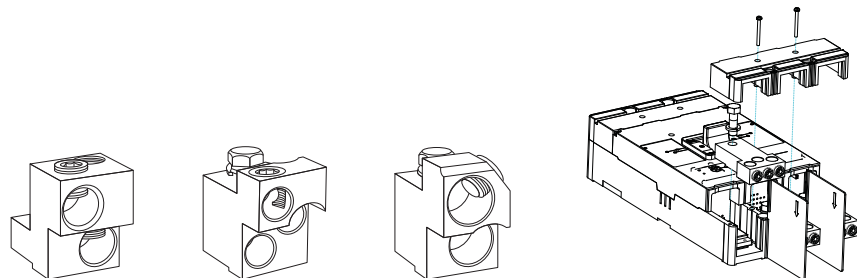
2

#### Terminals—Frame Size 4

Catalog numbers shown are for a single side of a 3-pole breaker. For Frame Size 4, terminals are also available in single-pole kits; these are not available in 2-pole or 4-pole configurations, unless otherwise noted. For single terminals, replace **X3** with **X1** on the catalog number.

Example: PDG4**X3**TA800 becomes PDG4**X1**TA800 for a single unit.

#### Terminal Types



PDG4X3TA700 PDG4X3T600 PDG4X3TA700CW	PDG4X3TA800 PDG4X3TA800SW PDG4X3TA800CW	PDG4X3TA801 PDG4X3T800 PDG4X3TA801CW	PDG4X3TA800RF
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Note: Pictures are for reference only.

#### Terminals

Maximum Breaker Amperes	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG / kcmil Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number	Included Accessories	Digit 14 Designation			Factory Config. Ampere Range
									Line and Load	Line Only	Load Only	
<b>Standard Terminals</b>												
700	Aluminum	Cu/Al	B, C	2	1–500	42.4–253	PDG4X3TA700	—	J	K	L	300–700
800	Aluminum	Cu/Al	B, C	3	3/0–400	85–203	PDG4X3TA800	—	J	K	L	800
<b>Alternate Terminals</b>												
800	Aluminum	Cu/Al	B, C	2	500–750	253–380	PDG4X3TA801	—	T	U	V	300–800
<b>Non-Aluminum Terminals</b>												
600	Aluminum	Cu	B, C	2	2/0–500	67.4–238	PDG4X3T600	—	W	Y	Z	300–600
800	Aluminum	Cu	B, C	3	3/0–300	85–152	PDG4X3T800	—	W	Y	Z	700–800
<b>Strandable Terminals</b>												
800	Aluminum	Cu/Al	B, C	3	3/0–400	85–203	PDG4X3TA800SW	—	A	B	C	300–800
			D, G, H, I, K, M		3/0–300	85–152						
<b>Control Wire Terminals</b>												
700	Aluminum	Cu/Al	B, C	2	1–500	42.4–253	PDG4X3TA700CW	—	1	2	3	300–700
800	Aluminum	Cu/Al	B, C	3	3/0–400	85–203	PDG4X3TA800CW	—	1	2	3	800
800	Aluminum	Cu/Al	B, C	2	500–750	253–380	PDG4X3TA801CW	—	4	5	6	300–800
<b>Rear Fed Terminals</b>												
800	Aluminum	Cu/Al	B, C	3	3/0–300	85–152	PDG4X3TA800RF	Interphase barriers	—	—	—	300–800
<b>Rear Connectors</b>												
800	—	—	—	—	—	—	PDG4X3TA800RC	—	R	—	—	300–800
<b>End Cap Kits/Screw Terminals</b>												
800	—	—	—	—	—	—	PDG4X3TS800 <sup>①</sup>	—	S	D	E	300–800

#### Notes

Wire capacity is based on standard imperial wire sizes; metric sizes provided in table are a direct conversion to demonstrate maximum capacity, not to denote metric wire sizes.

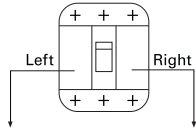
① End cap kits are available in 3-pole and 4-pole configurations only.



For 4-pole, use catalog number **PDG4X4TS800**.

**Accessories**

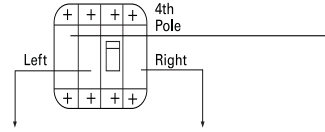
**Internal Accessory Configurations—Frame Size 4**



**3-Pole Circuit Breakers**



Tripping Accessory Options	Alarm Options (1–2 spaces) <sup>①</sup>	Aux Options (4 spaces)
None	None	None
Shunt Trip	1NO (1 space)	1NO (1 space)
	1NC (1 space)	1NC (1 space)
	1NO/1NC (2 spaces)	1NO/1NC (2 spaces)
	2NO (2 spaces)	2NO (2 spaces)
UVR	2NC (2 spaces)	2NC (2 spaces)
		2CO (4 spaces)
		4NO (4 spaces)
		4NC (4 spaces)

**4-Pole Circuit Breakers**



Tripping Accessory Options	Alarm Options (1–2 spaces) <sup>①</sup>	Aux Options (6 spaces)
None	None	None
Shunt Trip	1NO (1 space)	1NO (1 space)
	1NC (1 space)	1NC (1 space)
	1NO/1NC (2 spaces)	1NO/1NC (2 spaces)
	2NO (2 spaces)	2NO (2 spaces)
UVR	2NC (2 spaces)	2NC (2 spaces)
		2CO (4 spaces)
		4NO (4 spaces)
		4NC (4 spaces)
		3CO (6 spaces)
		6NO (6 spaces)
		6NC (6 spaces)

**Note**

<sup>①</sup> Frame 4 Power Defense breakers with electronic trip units and communication only have access to one alarm space. Breakers with thermal-magnetic trip units or electronic trip units without communication, have access to two alarm spaces.

#### Alarm and Auxiliary Contact Blocks—Frame Size 4

Power Defense breakers have designated positions for alarm and auxiliary switches in the right pole accessory cavity. For Frame 4, the two left-most positions are used for alarm switches, and the two right-most locations are used for auxiliary switches.

Power Defense breakers have secondary covers for ease of field installation of accessories, including alarm and auxiliary switches.

Power Defense alarm and auxiliary switches are available in contact blocks, in Form A (NO), Form B (NC), and Form C (NO-NC) types. Form A and Form B contacts take one position in the breaker accessory cavity, and Form C contacts take two positions in the cavity. Identical contact blocks are used for the alarm and auxiliary switch functions.

Electronic breakers with communications options (Modbus RTU or CAM Link) lose one alarm switch position, but are also able to provide trip position via communications and the PXR programmable relays.

#### Contact Blocks

##### Pigtail (29 in / 0.75 m) Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXAA	PDGXAB	PDGXAC
Type	Form A / NO	Form B / NC	Form C / NO-NC

##### Screw Terminal Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXXA	PDGXXB	PDGXXA + PDGXXB
Type	Form A / NO	Form B / NC	For NO-NC, use two separate contact blocks

##### Push-In Clamp Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXUA	PDGXUB	PDGXUC
Type	Form A / NO	Form B / NC	Form C / NO-NC

##### Pigtail (118 in / 3.0 m) Contact Blocks for Alarm and Auxiliary Switch Functionality

Catalog Number	PDGXDA	PDGXDB	PDGXDC
Type	Form A / NO	Form B / NC	Form C / NO-NC

**Factory Installation of Alarm and Auxiliary Switches—Frame Size 4**

Alarm and auxiliary switches are plug-and-play accessories designed to be field installable. However, Eaton also offers installation service in our factories.

Breaker catalog numbers with alarm and auxiliary switch combinations require a complete 20-digit catalog number, adding the alarm and

auxiliary switch functionality in digits 15–16 and adhering to the following conditions and tables:

- Digit 15 denotes the type of accessory(-ies) installed and the terminal types
- Switches may be requested for alarm only, auxiliary only or a combination of the two

- For Eaton factory installation, the same type of terminals (i.e., all pigtail 0.75 m, all screw, etc.) must be used. If a combination of alarm and auxiliary switches is selected, they must be the same type (i.e., all 1NC, all 1NO/1NC, etc.)
- Digit 16 denotes number and type (NO, NC) of switches installed

- If no other accessories are selected, use NNNN for the final 4 digits of the catalog number
- Electronic breakers with communications lose one alarm switch position in order to provide trip status via communications. They do not lose an auxiliary position for this purpose.

**Pigtails—29 in / 0.75 m (A, B, C)**

Alarm Switch	None	Auxiliary Switch Three-Pole								Four-Pole			
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC	3NO/3NC	6NO	6NC
None	NN	AA	AB	AC	AD	AE	A1	A2	A3	A4	A5	A6	
1NO	BA	CA	—	—	—	—	—	—	—	—	—	—	
1NC	BB	—	CB	—	—	—	—	—	—	—	—	—	
1NO/1NC	BC	—	—	CC	—	—	C1	—	—	C4	—	—	
2NO	BD	—	—	—	CD	—	—	C2	—	—	C5	—	
2NC	BE	—	—	—	—	CE	—	—	C3	—	—	C6	

**Screw Terminals (X, Y, Z)**

Alarm Switch	None	Auxiliary Switch Three-Pole								Four-Pole			
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC	3NO/3NC	6NO	6NC
None	NN	XA	XB	XC	XD	XE	X1	X2	X3	X4	X5	X6	
1NO	YA	ZA	—	—	—	—	—	—	—	—	—	—	
1NC	YB	—	ZB	—	—	—	—	—	—	—	—	—	
1NO/1NC	YC	—	—	ZC	—	—	Z1	—	—	Z4	—	—	
2NO	YD	—	—	—	ZD	—	—	Z2	—	—	Z5	—	
2NC	YE	—	—	—	—	ZE	—	—	Z3	—	—	Z6	

**Push-In Clamps (U, V, W)**

Alarm Switch	None	Auxiliary Switch Three-Pole								Four-Pole			
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC	3NO/3NC	6NO	6NC
None	NN	DA	DB	DC	DD	DE	D1	D2	D3	D4	D5	D6	
1NO	EA	FA	—	—	—	—	—	—	—	—	—	—	
1NC	EB	—	FB	—	—	—	—	—	—	—	—	—	
1NO/1NC	EC	—	—	FC	—	—	F1	—	—	F4	—	—	
2NO	ED	—	—	—	FD	—	—	F2	—	—	F5	—	
2NC	EE	—	—	—	—	FE	—	—	F3	—	—	F6	

#### Factory Installation of Alarm and Auxiliary Switches—Frame Size 4

##### Pigtails—118 in / 3.0 m (D, E, F)

Alarm Switch	None	Auxiliary Switch Three-Pole								Four-Pole			
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC	3NO/3NC	6NO	6NC
	None	NN	UA	UB	UC	UD	UE	U1	U2	U3	U4	U5	U6
	1NO	VA	WA	—	—	—	—	—	—	—	—	—	—
	1NC	VB	—	WB	—	—	—	—	—	—	—	—	—
	1NO/1NC	VC	—	—	WC	—	—	W1	—	—	W4	—	—
	2NO	VD	—	—	—	WD	—	—	W2	—	—	W5	—
	2NC	VE	—	—	—	—	WE	—	—	W3	—	—	W6

##### Pigtails—29 in / 0.75 m (A, B, C)

Alarm Switch	None	Auxiliary Switch Three-Pole								Four-Pole			
		None	1NO	1NC	1NO/1NC	2NO	2NC	2NO/2NC	4NO	4NC	3NO/3NC	6NO	6NC
	None	NN	AA	AB	AC	AD	AE	A1	A2	A3	A4	A5	A6
	1NO	BA	CA	—	CF	CG	—	CP	CQ	—	CT	CU	—
	1NC	BB	—	CB	CH	—	CJ	CR	—	CS	CV	—	CW

#### Tripping Accessories—Frame Size 4

Power Defense breakers have designated positions for shunt trips and undervoltage releases (UVRs) in the left pole accessory cavity. Each breaker has space for one tripping accessory only.

Power Defense breakers have secondary covers for ease of field installation of tripping accessories.

##### Shunt Trips

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	PDG4XST12DCT	PDG4XST12DCS	PDG4XST12DCR
48 Vdc	PDG4XST48DCT	PDG4XST48DCS	PDG4XST48DCR
60 Vdc	PDG4XST60DCT	PDG4XST60DCS	PDG4XST60DCR
24 Vac/Vdc	PDG4XST24ACDCT	PDG4XST24ACDCS	PDG4XST24ACDCR
110–130 Vac/125 Vdc	PDG4XST130ACDCT	PDG4XST130ACDCS	PDG4XST130ACDCR
200–240 Vac/250 Vdc	PDG4XST250ACDCT	PDG4XST250ACDCS	PDG4XST250ACDCR
380–440 Vac	PDG4XST440ACT	PDG4XST440ACS	PDG4XST440ACR
480–525 Vac	PDG4XST525ACT	PDG4XST525ACS	PDG4XST525ACR
600 Vac	PDG4XST600ACT	PDG4XST600ACS	PDG4XST600ACR

##### Undervoltage Releases (UVRs)

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	PDG4XUV12DCV	PDG4XUV12DCU	PDG4XUV12DCW
24 Vdc	PDG4XUV24DCV	PDG4XUV24DCU	PDG4XUV24DCW
48 Vdc	PDG4XUV48DCV	PDG4XUV48DCU	PDG4XUV48DCW
60 Vdc	PDG4XUV60DCV	PDG4XUV60DCU	PDG4XUV60DCW
125 Vdc	PDG4XUV125DCV	PDG4XUV125DCU	PDG4XUV125DCW
250 Vdc	PDG4XUV250DCV	PDG4XUV250DCU	PDG4XUV250DCW
24 Vac	PDG4XUV24ACV	PDG4XUV24ACU	PDG4XUV24ACW
130 Vac	PDG4XUV130ACV	PDG4XUV130ACU	PDG4XUV130ACW
240 Vac	PDG4XUV240ACV	PDG4XUV240ACU	PDG4XUV240ACW
440 Vac	PDG4XUV440ACV	PDG4XUV440ACU	PDG4XUV440ACW
525 Vac	PDG4XUV525ACV	PDG4XUV525ACU	PDG4XUV525ACW
600 Vac	PDG4XUV600ACV	PDG4XUV600ACU	PDG4XUV600ACW

**Note:** Use PDG4XUV18DCW when using Time Delay UVR.

**Factory Installed Tripping Accessories—Frame Size 4**

Shunt trips and undervoltage releases (UVRs) are plug-and-play accessories designed to be field installable. However, Eaton also offers the service of installation in our factories.

Breaker catalog numbers with shunt trips or UVRs require a complete 20-digit catalog number, adding the tripping accessory functionality in digits 17 and 18 and adhering to the following conditions and tables.

- Digit 17 denotes the type of accessory installed and the terminal type
- Digit 18 denotes the voltage of the accessory
- If no additional accessories are selected, use NN for digits 15-16 and 19-20 of the catalog number
- Each breaker has space for one shunt trip or UVR tripping accessory only

**Shunt Trips**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	TH	SH	RH
48 Vdc	TJ	SJ	RJ
60 Vdc	TK	SK	RK
24 Vac/Vdc	TN	SN	RN
110–130 Vac/125 Vdc	TP	SP	RP
200–240 Vac/250 Vdc	TR	SR	RR
380–440 Vac	TC	SC	RC
480–525 Vac	TD	SD	RD
600 Vac	TE	SE	RE

**Undervoltage Releases (UVRs)**

Voltage	Screw Terminals	Pigtail (29 in / 0.75 m)	Pigtail (118 in / 3.0 m)
12 Vdc	VH	UH	WH
24 Vdc	VG	UG	WG
48 Vdc	VJ	UJ	WJ
60 Vdc	VK	UK	WK
125 Vdc	VL	UL	WL
250 Vdc	VM	UM	WM
24 Vac	VF	UF	WF
130 Vac	VA	UA	WA
240 Vac	VB	UB	WB
440 Vac	VC	UC	WC
525 Vac	VD	UD	WD
600 Vac	VE	UE	WE

**Note:** Use suffix **US** for 18 Vdc when using Time Delay UVR.



**Handle Mechanisms—Frame Size 4**

2

**Direct Rotary Handle Mechanism** ①

Description	NEMA 1/12 Catalog Number	Factory Installed Digits 19–20
Standard lockable handle	PDG4XHMCS	HA
Standard handle with door interlock	PDG4XHMCSN	HB
Standard handle with mechanical padlock	PDG4XHMCSP	HC
Standard handle with door interlock and mechanical padlock	PDG4XHMCSNP	HE
Emergency lockable handle	PDG4XHMCE	H1
Emergency handle with door interlock	PDG4XHMCEH	H2
Emergency handle with mechanical padlock	PDG4XHMCEP	H3
Emergency handle with door interlock and mechanical padlock	PDG4XHMCEHP	H5

**Variable Depth Rotary Handle Mechanism** ①

Description	NEMA 1/3R/12/4/4X Catalog Number	Factory Installed Digits 19–20
Standard lockable handle	PDG4XHMDS	DA
Standard handle with mechanical padlock	PDG4XHMDS P	DC
Emergency lockable handle	PDG4XHMDE	D1
Emergency handle with mechanical padlock	PDG4XHMDEP	D3
9 in (245 mm) handle mechanism shaft	PDG34XHMS245	—
17 in (445 mm) handle mechanism shaft	PDG34XHMS445	—
Standard NFPA79-compliant shaft handle	PDG34XHM79S	—
Emergency NFPA79-compliant shaft handle	PDG34XHM79E	—

**Flex Shaft Handle Mechanism**

Cable Length (ft)	Metal Handle, NEMA 1/3R/12 Catalog Number	High Performance Handle, NEMA 1/3R/12 Catalog Number	Metal Handle, NEMA 4/4X Catalog Number	High Performance Handle, NEMA 4/4X Catalog Number
4	PDG4XFS04	PDG4XFS04HP	PDG4XFS04X	PDG4XFS04HPX
5	PDG4XFS05	PDG4XFS05HP	PDG4XFS05X	PDG4XFS05HPX
6	PDG4XFS06	PDG4XFS06HP	PDG4XFS06X	PDG4XFS06HPX
10	PDG4XFS10	PDG4XFS10HP	PDG4XFS10X	PDG4XFS10HPX

**Note**

① Standard handles are black and gray; Emergency handles are red and yellow.

**Accessories—Frame Size 4****External Accessories**

Description	Fit Type	Catalog Number	Factory Installed Digits 19–20
Padlockable hasp	Top	<b>PDG4XPLKT</b>	L4
Padlockable hasp, OFF only	Top	<b>PDG4XPLKTOFF</b>	L1
Padlockable handle block	On handle	<b>PDG4XPHB</b>	—
Kirk lock provision—left side <sup>1</sup>	Left side	<b>PDG4XKLKPSF</b>	L8
Kirk lock provision—right side <sup>1</sup>	Right side		L9
Walking beam interlock <sup>2</sup> <sup>3</sup>	Two-, three-, and four-pole	<b>PDG4XWBI234P</b>	—
Electrical operator	24 Vdc	<b>PDG4XROP24DC</b>	RG
	48–60 Vdc	<b>PDG4XROP60DC</b>	RJ or RK
	125 Vdc	<b>PDG4XROP125DC</b>	RL
	250 Vdc	<b>PDG4XROP250DC</b>	RM
	110–130 Vac	<b>PDG4XROP130AC</b>	RA
	200–240 Vac	<b>PDG4XROP240AC</b>	RB
	380–440 Vac	<b>PDG4XROP440AC</b>	RC
Interphase barriers	Single-pole	<b>PDG4XIB</b>	—
	Three-pole	<b>PDG4XIB3P</b>	—
	Four-pole	<b>PDG4XIB4P</b>	—
Neutral CTs for ground fault (PXR)	Bus bar Type	<b>PDG4XNCTB0800</b>	—
Service entrance barrier kit	Three-pole	<b>PRLSEBPD4</b>	—

**Base Mounting Hardware**

Description	Catalog Number
Two-, three-, four-pole metric	<b>BMH4M</b>
Two-, three-, four-pole English	<b>BMH4</b>

**Note:** Base mounting hardware is included with a circuit breaker or molded case switch.

**Dimensions and Weights—Frame Size 4****Approximate Dimensions in Inches (mm)**

Number of Poles	Width	Height	Depth
2	8.25 (209.6)	16 (406.4)	4.38 (111.2)
3	8.25 (209.6)	16 (406.4)	4.38 (111.2)
4	11.0 (279.4)	16 (406.4)	4.38 (111.2)

**Approximate Shipping Weight in lb (kg)**

Breaker Type	2-Pole	3-Pole	4-Pole
PDG4 800 A	30 (13.6)	30 (13.6)	39.9 (18.08)

**Notes**

- <sup>1</sup> Provision only. For use with Type F Kirk keylock (sold separately).
- <sup>2</sup> Breaker must be ordered with walking beam interlock ready modification from plant (factory suffix **WB**).
- <sup>3</sup> Requires two breakers.

Power Defense Molded Case Circuit Breakers—Frame Size 5



### Contents

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Frame Size 1 (15–125 A) . . . . .	<b>V4-T2-22</b>
Frame Size 2 (15–225 A) . . . . .	<b>V4-T2-29</b>
Frame Size 3 (45–600 A) . . . . .	<b>V4-T2-42</b>
Frame Size 4 (300–800 A) . . . . .	<b>V4-T2-57</b>
Frame Size 5 (320–1200 A)	
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### Power Defense Molded Case Circuit Breakers—Frame Size 5

#### Product Description

Frame Size 5 covers a global range of 320 A through 1200 A with a complete offering of advanced PXR electronic trip units. It includes two frame sizes of 800 A and 1200 A. Additionally, PD-5 has a 1600 A IEC (CE) and GB (CCC) frame that covers 800 A through 1600 A.

#### Application Description

Frame Size 5 can be used to meet a wide range of circuit protection and power distribution needs, including ground fault protection, 100% UL ratings, high interrupting capacity and high instantaneous settings for selective coordination. PXR trip units in PD-5 provide all levels of protection, including energy metering with multiple communication schemes, breaker health indication and arc flash reduction options.

#### Features and Benefits

Frame Size 5 breakers are modular and available as complete breakers from the factory or as modular components, including frames, trip units, accessories and terminals to provide flexibility for customers. PXR trip units are available with advanced features to provide customers unparalleled situational awareness of their electrical system.

#### Standards and Certifications

Power Defense breakers are designed and tested to meet stringent requirements for:

- UL
- CSA
- IEC (CE)
- CB (CCC)



**Catalog Number / Product Selection**

**Power Defense—Frame Size 5 (320–1200 A) for UL/CSA and 320–1600 A for IEC/CCC)**

Frame Size 5 covers a range of 320 A through 1200 A using electronic trip units. It is available in configurations of 2-pole, 3-pole and 4-pole, with the 2-pole being in the same physical size of a 3-pole variant. Additionally, an IEC / CCC option is available for 1600 A, with selectable ratings from 800 A through 1600 A.

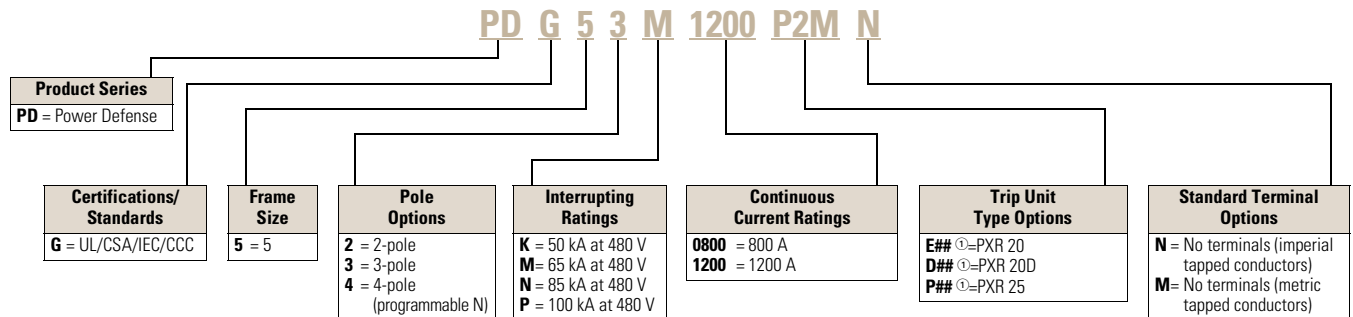
**Interrupting Ratings**

	K		M		N		P		T	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms	
240 Vac	85		100		150		200		200	
480 Vac	50		65		85		100		150	
600 Vac	25		35		50		65		65	
IEC	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	85	85	100	100	150	100	200	150	—	—
380–415 Vac	50	50	70	53	70	50	100	50	—	—
440 Vac	35	35	50	40	70	50	100	50	—	—
480 Vac	35	22.5	50	30	65	40	85	40	—	—
525 Vac	25	20	30	25	35	25	40	25	—	—
660–690 Vac	10	5	15	7.5	20	10	35	18	—	—

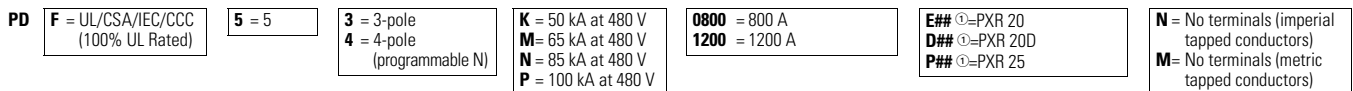
**Molded Case Circuit Breakers with Power Xpert Release (PXR) Electronic Trip Units (ETU)**

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

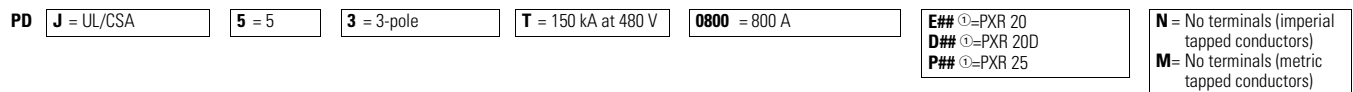
**Molded Case Circuit Breakers with PXR ETU—Globally Rated**



**Molded Case Circuit Breakers with PXR ETU—Globally Rated (100% UL Rated)**



**Molded Case Circuit Breakers with PXR ETU (150 kA at 480 V)—UL/CSA Rated**



**Note**

① See tables and descriptions on **Page V4-T2-74** for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).

# 2.2

## Molded Case Circuit Breakers

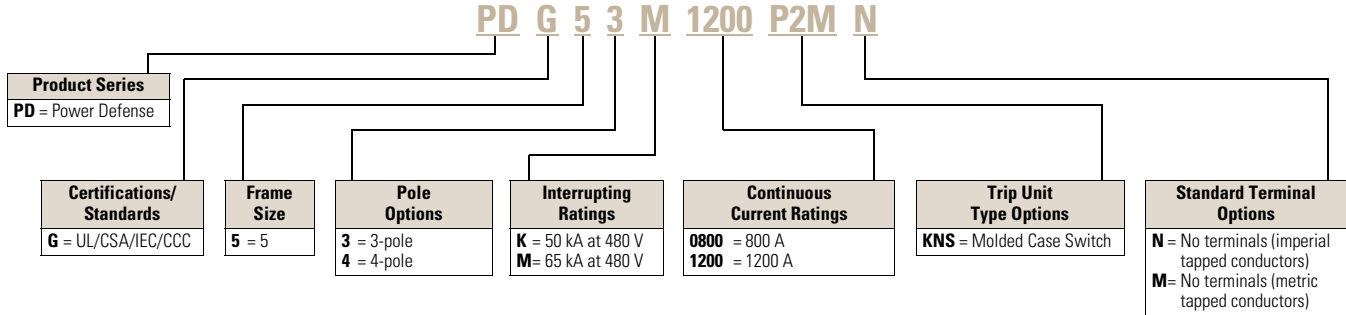
### Power Defense Molded Case Circuit Breakers

2

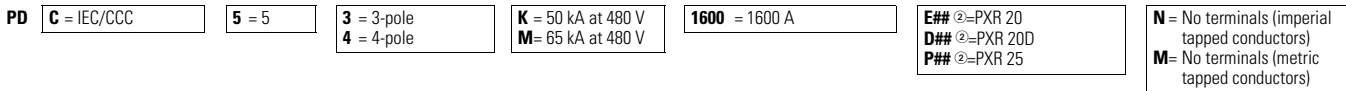
#### Molded Case Circuit Breakers with Power Xpert Release (PXR) Electronic Trip Units (ETU)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Molded Case Switches—Globally Rated ①



#### Molded Case Circuit Breakers—IEC/CCC Rated (only available as a complete breaker)

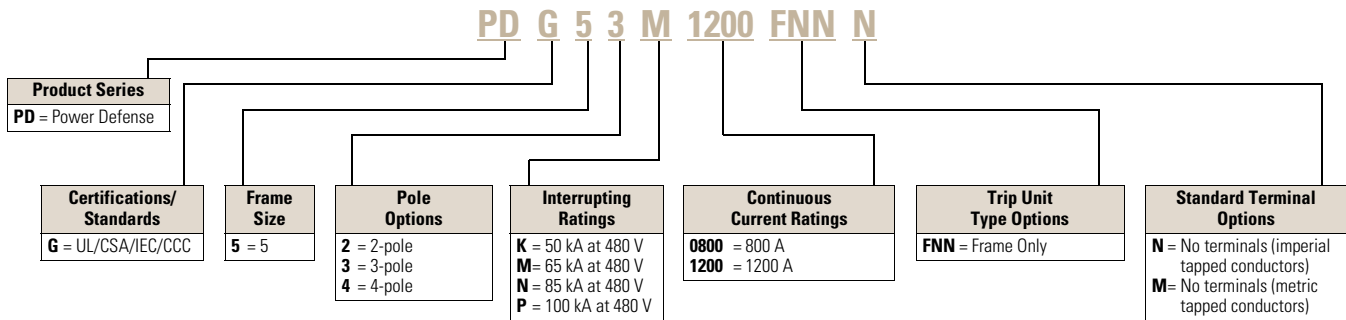


#### Globally Rated Frame Only

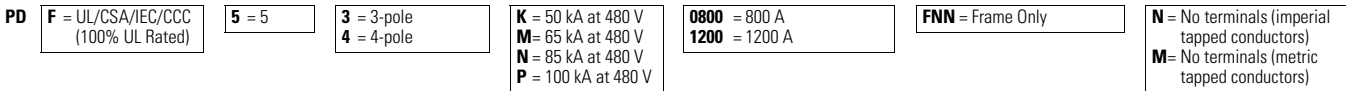
PD-5 electronic breakers may also be purchased as separate frames, trip units, terminals, and accessories for field configuration of a final breaker. Each Frame Only device is marked with interrupting ratings and a maximum continuous current rating; each trip unit is also marked with a maximum continuous current rating, which must not exceed that of the frame. Additionally, 100% UL Rated frames are marked as such on the Frame Only device.

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

#### Frame Only—Globally Rated



#### Frame Only—Globally Rated (100% UL Rated)



#### Notes

- ① Molded case switch may open above 14,000 A.
- ② See tables and descriptions on **Page V4-T2-74** for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).

### Trip Units

PD-5 electronic breakers may also be purchased as separate frames, trip units, terminals, and accessories for field configuration of a final breaker. Each frame rating (800 A, 1200 A, and 1600 A—IEC only) must use trip units of the same rating. Additionally, for two-pole breakers, three-pole trip units are used.

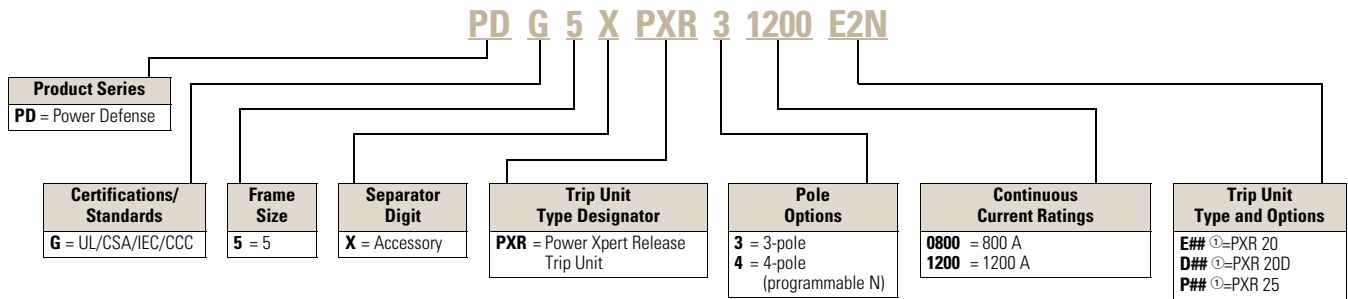
PDG designated trip units are for use with PDG and PDF breaker frames. The 100% rating for PDF (100% UL Rated) is marked on the frame, not the trip unit.

### Trip Units Only

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

### Power Xpert Release (PXR) Electronic Trip Units

#### Power Xpert Release (PXR) Electronic Trip Units



### Note

① See tables and descriptions on **Page V4-T2-74** for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).

#### Power Xpert Release (PXR) Trip Unit Options—Frame Size 5

#### Power Xpert Release (PXR) Trip Unit Options

2

PXR	ETU	#(1)—Protection Type				#(2)—Available Configured Options								
		LSI	LSIG	LSI with ARMS	LSIG with ARMS	Relays	Relays Modbus	Relays	Relays	Relays Modbus	Relays	Relays Modbus	Relays Modbus	
						ZSI		CAM		ZSI	CAM		ZSI	CAM
PXR 20	E	2	—	—	—	N	R	M	Z	C	W	X	—	—
		—	3	4	5	—	R	M	Z	C	W	X	—	—
PXR 20D	D	2	3	4	5	—	—	M	—	—	W	—	D	Y
PXR 25	P	2	3	4	5	—	—	M	—	—	W	—	D	Y

#### Descriptions of PXR Configured Options

**Relays**—3 Form A contacts (rated for 240 Vac, 1 A)

- Interface: 3 wires (ALM1, ALM2, ALM Common)
- Programmable to indicate breaker conditions
- Available as field-installable option if not pre-configured (catalog number **PDG56XRELAYS**)

**Modbus**—Modbus RTU directly from breaker

- Interface: 3 wires (MODBA, MODBB, MODBG)
- No additional modules required
- Available as field-installable option if not pre-configured (catalog number **PDG56XMODRTU**)

**ZSI**—Zone Selective Interlocking

- Interface: 3 wires (Zin, Zout, Zcomm)
- Includes ability to turn ON and OFF, and indicate signals

**CAM**—CAM Link connection (requires a CAM module per breaker)

- Interface: 5 wires (refer to CAM IL for details)
- Communications Adapter Modules available for Modbus TCP and PROFIBUS

**ARMS**—Arcflash Reduction Maintenance System, or Maintenance Mode

- Available as trip unit Protection Type 4 or 5
- Interface: Switch and LED on face of trip unit and two wires for remote switch enable option (24 Vdc required)
- A programmable relay will be factory defaulted to remote indication of ARMS

#### Auxiliary Power

- Connection included with all PXR 20, 20D, and 25 trip units
- Required for communications, relays, and metering accuracy
- 24 Vdc, 0.5 A
- Interface: 2 wires (Aux + 24 V, Aux 0 V)

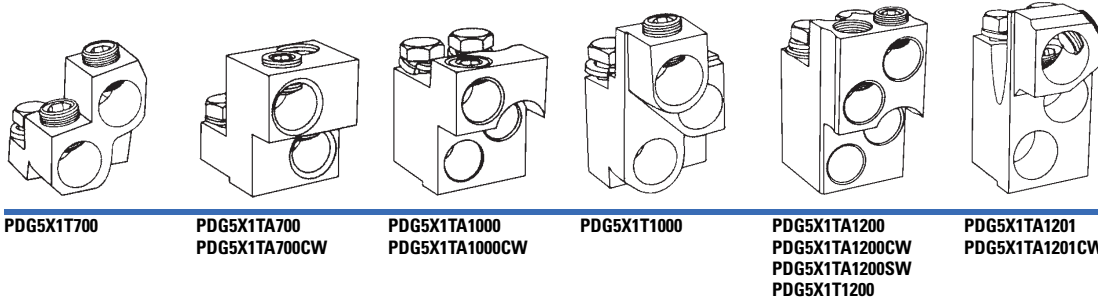
#### Available Continuous Current (I<sub>r</sub>) Settings on PXR Electronic Trip Units

Option	Setting	Catalog Number Selection and Maximum Setting (I <sub>n</sub> )		
		0800 800 A	1200 1200 A	1600 1600 A (IEC only)
PXR 20	1	320 A	500 A	800 A
	2	350 A	550 A	900 A
	3	400 A	600 A	1000 A
	4	450 A	630 A	1100 A
	5	500 A	700 A	1200 A
	6	550 A	800 A	1250 A
	7	600 A	900 A	1300 A
	8	630 A	1000 A	1400 A
	9	700 A	1100 A	1500 A
	10 = I <sub>n</sub>	800 A	1200 A	1600 A
PXR 20D, PXR 25		Programmable from minimum to maximum values in 10 A increments.		

### Terminals—Frame Size 5

Terminals for Frame 5 are available as single terminals only, unless otherwise specified. To configure both line and load of a 3-pole breaker, order quantity 6 terminals.

### Terminal Types



**Note:** Pictures are for reference only.

### Terminals

Maximum Breaker Amperes	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG / kcmil Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number <sup>①</sup>	Hardware Included
<b>Aluminum Terminal Options</b>								
700	Aluminum	Cu/Al	B, C	2	1–500	42.4–253	<b>PDG5X1TA700</b>	Imperial
1000	Aluminum	Cu/Al	B, C	3	3/0–400	85–203	<b>PDG5X1TA1000</b>	Imperial
1200	Aluminum	Cu/Al	B, C	4	4/0–500	107–253	<b>PDG5X1TA1200</b>	Imperial
1200	Aluminum	Cu/Al	B, C	3	500–750	253–380	<b>PDG5X1TA1201</b>	Imperial
<b>Copper Terminal Options</b>								
700	Copper	Cu	B, C	2	2/0–500	67.4–253	<b>PDG5X1T700</b>	Imperial
1000	Copper	Cu	B, C	3	3/0–500	85–253	<b>PDG5X1T1000</b>	Imperial
1200	Copper	Cu	B, C	4	3/0–400	85–203	<b>PDG5X1T1200</b>	Imperial
<b>StrandAble Terminal Options</b>								
1200	Aluminum	Cu/Al	B, C D, G, H, I, K, M	4	4/0–500 4/0–350	107–253 107–177	<b>PDG5X1TA1200SW</b>	Imperial
<b>Control Wire Terminal Options</b>								
700	Aluminum	Cu/Al	B, C	2	1–500	42.4–253	<b>PDG5X1TA700CW</b>	Imperial
1000	Aluminum	Cu/Al	B, C	3	3/0–400	85–203	<b>PDG5X1TA1000CW</b>	Imperial
1200	Aluminum	Cu/Al	B, C	4	4/0–500	107–253	<b>PDG5X1TA1200CW</b>	Imperial
1200	Aluminum	Cu/Al	B, C	3	500–750	253–380	<b>PDG5X1TA1201CW</b>	Imperial
<b>Conductor Extensions <sup>②③</sup></b>								
1200	—	—	—	—	—	—	<b>5104A24G01</b>	Imperial 2-pole
1200	—	—	—	—	—	—	<b>5104A24G02</b>	Imperial 3-pole
1200	—	—	—	—	—	—	<b>5104A24G05</b>	Imperial 4-pole
1200	—	—	—	—	—	—	<b>5104A24G03</b>	Metric 2-pole
1200	—	—	—	—	—	—	<b>5104A24G04</b>	Metric 3-pole
1200	—	—	—	—	—	—	<b>5104A24G06</b>	Metric 4-pole

**Note:** Wire capacity is based on standard imperial wire sizes; metric sizes provided in table are a direct conversion to demonstrate maximum capacity, not to denote metric wire sizes.

### Notes

- ① Add M at end for metric hardware.
- ② Included with 100% rated breaker.
- ③ Kits include conductors for both sides of the breaker (e.g., 6 conductors for a 3-pole breaker). Order quantity 1 per breaker.





#### Accessories

2

#### Internal Accessory Configurations—Frame Size 5

#### 3- and 4-Pole Circuit Breakers

##### Tripping Accessory Options

	Left Pole	Right Pole
None	None	Bell Alarm Options ①
Shunt Trip	Bell Alarm Options ① Auxiliary Switch Options ① Alarm and Auxiliary Combination Options ①	Auxiliary Switch Options ① Bell and Auxiliary Combination Options ①
		
UVR		
		

#### Indicating Accessories—Frame Size 5

#### Alarms and Auxiliary Switches

Alarm Switch		Auxiliary Switch				
		None	None	1 Form C	2 Form C	3 Form C
None	Left	—	—	PDG5X1AC	PDG5X2AC	PDG5XL3AC
		Right	—	PDG5X1AC	PDG5X2AC	PDG5XR3AC
	1 Form C	Left	PDG5XL1BC	PDG5XL1AC1BC	PDG5XL2AC1BC	—
		Right	PDG5XR1BC	PDG5XR1AC1BC	PDG5XR2AC1BC	—
	2 Form C	Left	PDG5XL2BC	PDG5XL1AC2BC	—	—
		Right	PDG5XR2BC	PDG5XR1AC2BC	—	—

#### Alarm and Auxiliary Switches for Breakers with Communicating Trip Units ②

Alarm Switch		Auxiliary Switch			
		None	None	1 Form C	2 Form C
None	Left	—	—	—	—
		Right	PDG5XRCBSM	PDG5XRC1AC	PDG5XRC2AC
	1 Form C	Left	—	—	—
		Right	PDG5XRC1BC	PDG5XRC1AC1BC	—
2 Form C	Left	—	—	—	
	Right	PDG5XRC2BC	—	—	

#### Notes

- ① See Indicating Accessories tables for options.
- ② All electronic trip units configured with communication will automatically include a communication indicator in the right pole. Up to two additional Form C contacts are available for external indication in the right pole.

**Factory Installed Indicating Accessories—Frame Size 5** ①**Alarms and Auxiliary Switches**

		Auxiliary Switch				
		None	None	1 Form C	2 Form C	3 Form C
<b>Alarm Switch</b>	<b>None</b>	Left	—	—	—	A4
		Right	NN	AC	A1	—
	<b>1 Form C</b>	Left	—	—	—	—
		Right	BC	CC	C1	—
	<b>2 Form C</b>	Left	—	—	—	—
		Right	B1	CX	—	—

**Alarm and Auxiliary Switches for Breakers with Communicating Trip Units** ②

		Auxiliary Switch			
		None	None	1 Form C	2 Form C
<b>Alarm Switch</b>	<b>None</b>	Left	—	—	—
		Right	NN	AC	A1
	<b>1 Form C</b>	Left	—	—	—
		Right	BC	CC	—
	<b>2 Form C</b>	Left	—	—	—
		Right	B1	—	—

**Tripping Accessories—Frame Size 5****Shunt Trips**

Voltage	Pigtail (29 in / 0.75 m)	Factory Installed Catalog Number (Digit 17–18)
48–60 Vdc	<b>PDG5XST60DCS</b>	<b>SK</b>
110–125 Vdc	<b>PDG5XST125DCS</b>	<b>SL</b>
220–250 Vdc	<b>PDG5XST250DCS</b>	<b>SM</b>
24 Vac/Vdc	<b>PDG5XST24ACDCS</b>	<b>SN</b>
48–60 Vac	<b>PDG5XST60ACS</b>	<b>ST</b>
110–240 Vac	<b>PDG5XST240ACS</b>	<b>SA or SB</b>
380–440 Vac	<b>PDG5XST440ACS</b>	<b>SC</b>
480–600 Vac	<b>PDG5XST600ACS</b>	<b>SD or SE</b>

**Undervoltage Releases (UVRs)**

Voltage	Pigtail (29 in / 0.75 m)	Factory Installed Catalog Number (Digit 17–18)
12 Vdc	<b>PDG5XUV12DCU</b>	<b>UH</b>
24 Vdc	<b>PDG5XUV24DCU</b>	<b>UG</b>
48–60 Vdc	<b>PDG5XUV60DCU</b>	<b>UJ or UK</b>
125 Vdc	<b>PDG5XUV125DCU</b>	<b>UL</b>
250 Vdc	<b>PDG5XUV250DCU</b>	<b>UM</b>
12 Vac	<b>PDG5XUV12ACU</b>	<b>UU</b>
24 Vac	<b>PDG5XUV24ACU</b>	<b>UF</b>
48–60 Vac	<b>PDG5XUV60ACU</b>	<b>UT</b>
110–127 Vac	<b>PDG5XUV120ACU</b>	<b>UA</b>
208–240 Vac	<b>PDG5XUV240ACU</b>	<b>UB</b>
380–500 Vac	<b>PDG5XUV480ACU</b>	<b>UC or UV</b>

**Note:** Use PDG5XUV18DCU (Suffix US) when using Time Delay UVR.

**Notes**

- ① Factory installation of indicating accessories available for the right pole only. Left pole accessories may be field installed.
- ② All electronic trip units configured with communication will automatically include a Communication Indicator in the right pole. Up to two additional Form C contacts are available for external indication in the right pole.

**Handle Mechanisms—Size 5****Variable Depth Rotary Handle Mechanism**

Description	NEMA 1/3R/12/4/4X Catalog Number	Factory Installed Digits 19–20
Standard lockable handle (black and gray)	PDG5XHMDS	DA
Emergency lockable handle (red and yellow)	PDG5XHMDE	D1
12 in (305 mm) handle mechanism shaft	PDG56XHMS305	—

**Flex Shaft Handle Mechanism**

Cable Length (ft)	Metal Handle, NEMA 1/3R/12 Catalog Number	High Performance Handle, NEMA 1/3R/12 Catalog Number	Metal Handle, NEMA 4/4X Catalog Number	High Performance Handle, NEMA 4/4X Catalog Number
4 ft	PDG5XFS04	PDG5XFS04HP	PDG5XFS04X	PDG5XFS04HPX
5 ft	PDG5XFS05	PDG5XFS05HP	PDG5XFS05X	PDG5XFS05HPX
6 ft	PDG5XFS06	PDG5XFS06HP	PDG5XFS06X	PDG5XFS06HPX
10 ft	PDG5XFS10	PDG5XFS10HP	PDG5XFS10X	PDG5XFS10HPX

**External Accessories—Frame Size 5****External Accessories**

Description	Fit Type	Catalog Number	Factory Installed Digits 19–20
Padlockable hasp	Left-side	PDG5XPLKS	L5
	Right-side		L6
Padlockable hasp	Top	PDG5XPLKT	L4
Padlockable hasp, OFF only	Top	PDG5XPLKTOFF	L1
Non-padlockable handle block	Field	PDG5XHB	—
Kirk key interlock kit <sup>①</sup>	Left-side	PDG5XKLKPSF	L8
	Right-side		L9
Walking beam interlock <sup>②③</sup>	Three- or four-pole	PDG5XWBI34P	WB <sup>④</sup>
Electrical operator	24 Vdc	EOP5T21	MG
	48 Vdc	EOP5T22	MJ
	125 Vdc	EOP5T26	ML
	120 Vac	EOP5T07	MA
	208 Vac	EOP5T09	MY
	240 Vac	EOP5T11	MB
Neutral CTs for ground fault (PXR)	Bus bar type	EOP5T15	MD
		PDG5XNCTB1200	—
Interphase barriers	Three-pole	PDG5XIB3P	—
	Four-pole	PDG5XIB4P	—
Terminal covers	Three-pole	PDG5XTC3P	—
Service entrance barrier kit	Three-pole	PRLSEBPD5	—

**Base Mounting Hardware**

Description	Catalog Number
Two-, three-, four-pole metric	BMH5M
Two-, three-, four-pole English	BMH5

**Note:** Base mounting hardware is included with a circuit breaker or molded case switch.

**Dimensions and Weights—Frame Size 5****Approximate Dimensions in Inches (mm)**

Number of Poles	Width	Height	Depth
2	8.25 (209.5)	16 (406.4)	5.50 (139.7)
3	8.25 (209.5)	16 (406.4)	5.50 (139.7)
4	11.13 (282.7)	16 (406.4)	5.50 (139.7)

**Approximate Shipping Weight in lb (kg)**

Breaker Type	2-Pole	3-Pole	4-Pole
PDG5 800, 1200 and 1600 A	46.8 (21.30)	46.8 (21.30)	58 (26.31)

**Notes**

- ① Provision only. For use with Type F Kirk keylock (sold separately).
- ② Breaker must be ordered with walking beam interlock ready modification from plant (factory suffix "WB").
- ③ Requires two breakers.
- ④ Modification code for walking beam denotes modification to the breaker; accessory must be ordered separate.

## Power Defense Molded Case Circuit Breakers—Frame Size 6



## Contents

**Description****Page**

Power Defense Molded Case Circuit Breakers	
Frame Size 1 (15–125 A) . . . . .	<b>V4-T2-22</b>
Frame Size 2 (15–225 A) . . . . .	<b>V4-T2-29</b>
Frame Size 3 (45–600 A) . . . . .	<b>V4-T2-42</b>
Frame Size 4 (300–800 A) . . . . .	<b>V4-T2-57</b>
Frame Size 5 (320–1200 A) . . . . .	<b>V4-T2-70</b>
Frame Size 6 (700–2500 A)	
Catalog Number / Product Selection . . . . .	<b>V4-T2-80</b>
Accessories . . . . .	<b>V4-T2-84</b>
Dimensions and Weights . . . . .	<b>V4-T2-86</b>
Motor Circuit Protectors (3–600 A) . . . . .	<b>V4-T2-87</b>
Motor Protection Circuit Breakers (15–600 A) . . . . .	<b>V4-T2-98</b>
Communications and Software . . . . .	<b>V4-T2-104</b>
Special Applications . . . . .	<b>V4-T2-106</b>

## Power Defense Molded Case Circuit Breakers—Frame Size 6

**Product Description**

Frame Size 6 covers a range of 700 A through 2500 A with a complete offering of advanced PXR electronic trip units. It includes three frame sizes of 1600 A, 2000 A and 2500 A.

**Application Description**

Frame Size 6 can be used to meet a wide range of circuit protection and power distribution needs, including ground fault protection and 100% UL ratings. PXR trip units in PD-6 provide all levels of protection, including energy metering with multiple communication schemes, breaker health indication and arc flash reduction options.

**Features and Benefits**

Frame Size 6 breakers are modular and available as complete breakers from the factory or as modular components, including frames, trip units, accessories and terminals to provide flexibility for customers. PXR trip units are available with advanced features to provide customers unparalleled situational awareness of their electrical system.

**Standards and Certifications**

Power Defense breakers are designed and tested to meet stringent requirements for:

- UL
- CSA
- IEC (CE)
- CB (CCC)



#### Catalog Number / Product Selection

2

#### Power Defense—Frame Size 6 (700–2500 A)

Frame Size 6 covers a range of 700 A through 2500 A using electronic trip units. It is available in configurations of 2-pole, 3-pole and 4-pole, with the 2-pole being in the same physical size of a 3-pole variant.

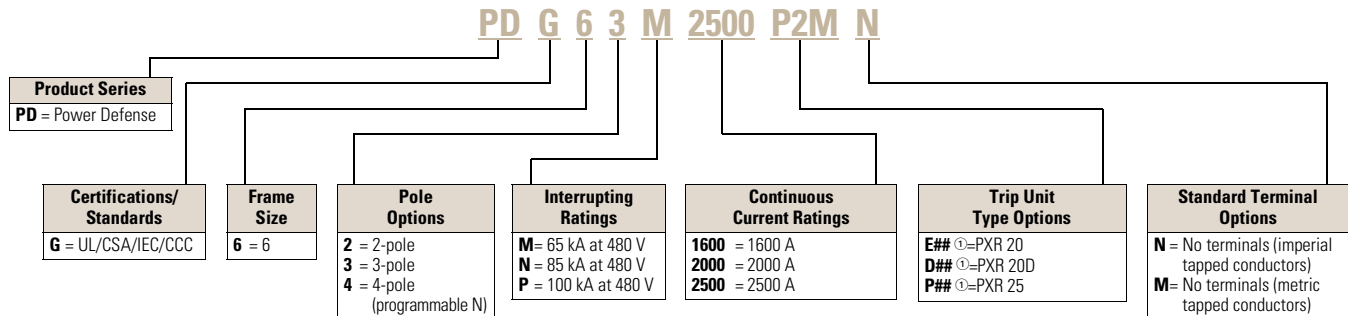
#### Interrupting Ratings

	M		N		P	
ANSI (UL/CSA)	kA rms		kA rms		kA rms	
240 Vac	125		150		200	
480 Vac	65		85		100	
600 Vac	35		50		65	
IEC	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	135	100	150	100	200	100
380–415 Vac	70	53	70	53	100	53
440 Vac	50	40	70	50	100	50
480 Vac	50	30	65	40	85	40
525 Vac	30	25	35	25	40	25
660–690 Vac	15	7.5	20	13	35	18

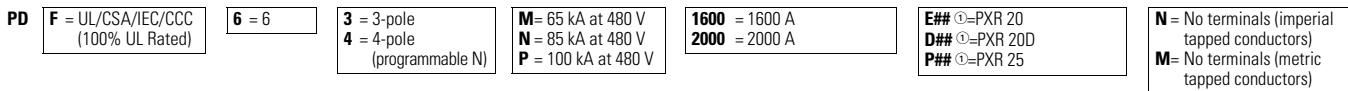
#### Molded Case Circuit Breakers with Power Xpert Release (PXR) Electronic Trip Units (ETU)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

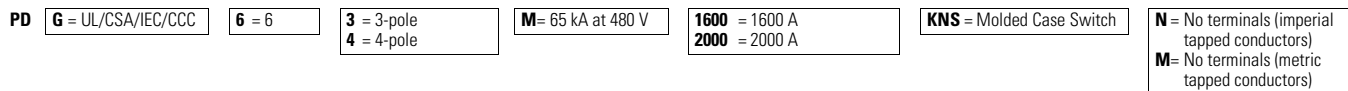
#### Molded Case Circuit Breakers with PXR ETU—Globally Rated



#### Molded Case Circuit Breakers with PXR ETU—Globally Rated (100% UL Rated)



#### Molded Case Switches—Globally Rated ②



#### Notes

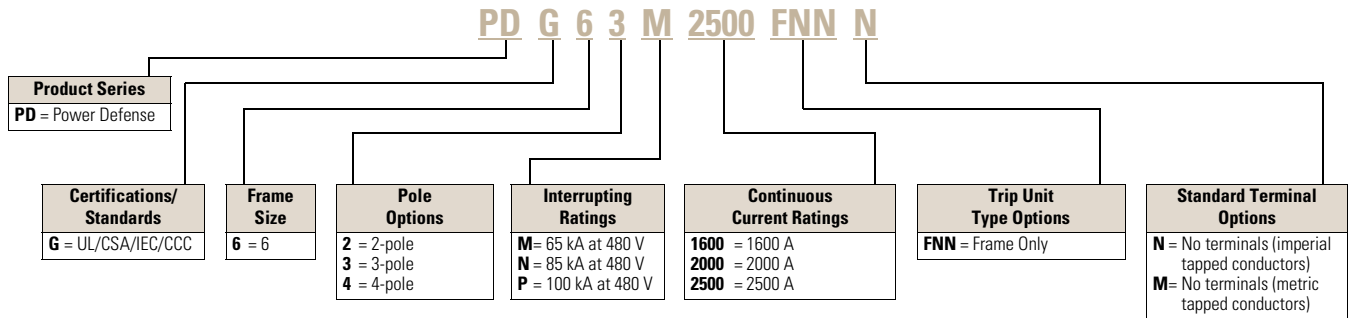
- ① See tables and descriptions on **Page V4-T2-82** for protection type (#<sub>1</sub>) and available configured options (#<sub>2</sub>).
- ② Molded case switch may open above 17,500 A.

### Globally Rated Frame Only

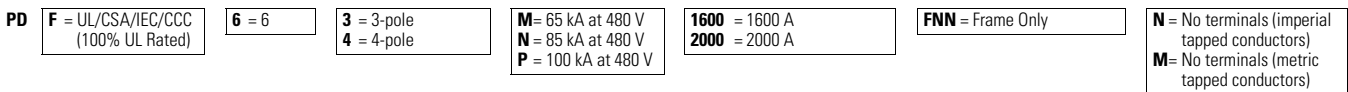
PD-6 electronic breakers may also be purchased as separate frames, trip units, terminals, and accessories for field configuration of a final breaker. Each Frame Only device is marked with interrupting ratings and a maximum continuous current rating; each trip unit is also marked with a maximum continuous current rating, which must not exceed that of the frame. Additionally, 100% UL Rated frames are marked as such on the Frame Only device.

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

### Frame Only—Globally Rated



### Frame Only—Globally Rated (100% UL Rated)



### Trip Units

PD-6 electronic breakers may also be purchased as separate frames, trip units, terminals, and accessories for field configuration of a final breaker. Each frame rating (1600 A, 2000 A, and 2500 A) must use trip units of the same rating. Additionally, for two-pole breakers, three-pole trip units are used.

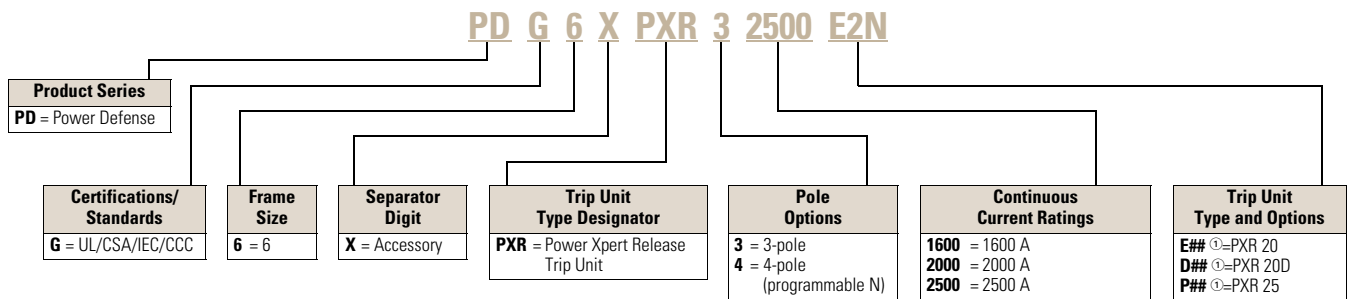
PDG designated trip units are for use with PDG and PDF breaker frames. The 100% rating for PDF (100% UL Rated) is marked on the frame, not the trip unit.

### Trip Units Only

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

### Power Xpert Release (PXR) Electronic Trip Units

### Power Xpert Release (PXR) Electronic Trip Units



### Note

Ⓞ See PXR Trip Unit Options table on Page V4-T2-82 for protection type (#11) and available configured options (#12).

#### Globally Rated Frame Only

#### Power Xpert Release (PXR) Trip Unit Options

2

PXR	ETU	#(1)—Protection Type				#(2)—Available Configured Options							
		LSI	LSIG	LSI with ARMS	LSIG with ARMS	Relays	Relays Modbus	Relays	Relays	Relays Modbus	Relays	Relays Modbus	Relays Modbus
								ZSI	CAM	ZSI	ZSI CAM	CAM	ZSI CAM
PXR 20	E	2	—	—	—	N	R	M	Z	C	W	X	—
		—	3	4	5	—	R	M	Z	C	W	X	—
PXR 20D	D	2	3	4	5	—	—	M	—	—	W	—	D Y
PXR 25	P	2	3	4	5	—	—	M	—	—	W	—	D Y

#### Descriptions of PXR Configured Options

**Relays**—3 Form A contacts (rated for 240 Vac, 1 A)

- Interface: 3 wires (ALM1, ALM2, ALM Common)
- Programmable to indicate breaker conditions
- Available as field-installable option if not pre-configured (catalog number **PDG56XRELAYS**)

**Modbus**—Modbus RTU directly from breaker

- Interface: 3 wires (MODBA, MODBB, MODBG)
- No additional modules required
- Available as field-installable option if not pre-configured (catalog number **PDG56XMODRTU**)

**ZSI**—Zone Selective Interlocking

- Interface: 3 wires (Zin, Zout, Zcomm)
- Includes ability to turn ON and OFF, and indicate signals

**CAM**—CAM Link connection (requires a CAM module per breaker)

- Interface: 5 wires (refer to CAM IL for details)
- Communications Adapter Modules available for Modbus TCP and PROFIBUS

**ARMS**—Arcflash Reduction Maintenance System, or Maintenance Mode

- Available as trip unit Protection Type 4 or 5
- Interface: Switch and LED on face of trip unit and two wires for remote switch enable option (24 Vdc required)
- A programmable relay will be factory defaulted to remote indication of ARMS

#### Auxiliary Power

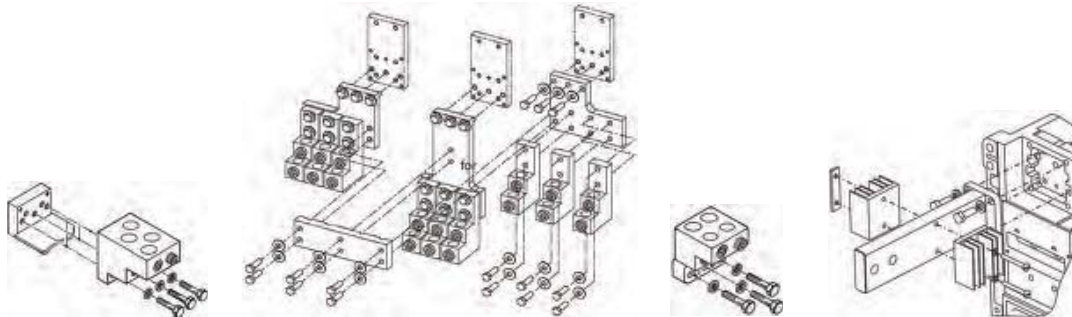
- Connection included with all PXR 20, 20D, and 25 trip units
- Required for communications, relays, and metering accuracy
- 24 Vdc, 0.5 A
- Interface: 2 wires (Aux + 24 V, Aux 0 V)

#### Available Continuous Current (I<sub>r</sub>) Settings on PXR Electronic Trip Units

Option	Setting	Catalog Number Selection and Maximum Setting (I <sub>n</sub> )		
		1600 1600 A	2000 2000 A	2500 2500 A
PXR 20	1	700 A	1000 A	1600 A
	2	800 A	1100 A	1700 A
	3	900 A	1200 A	1800 A
	4	1000 A	1250 A	1900 A
	5	1100 A	1400 A	2000 A
	6	1200 A	1600 A	2100 A
	7	1250 A	1700 A	2200 A
	8	1400 A	1800 A	2300 A
	9	1500 A	1900 A	2400 A
	10 = I <sub>n</sub>	1600 A	2000 A	2500 A
PXR 20D, PXR 25		Programmable from minimum to maximum values in 10 A increments.		

**Terminals—Frame Size 6**

Terminals for Frame 6 are available as single terminals only, unless otherwise specified. To configure both line and load of a 3-pole breaker, order quantity 6 terminals.

**Terminal Types****PDG6X1TA1600****PDG6X3TA2000****PDG6X1T1600****PDG6X1T2000RC  
PDG6X1T2500RC  
PDF6X1T2000RC**

**Note:** Pictures are for reference only.

**Terminals**

Maximum Breaker Amperes	Terminal Body Type	Wire Type	Wire Class	Number of Conductors per Phase	AWG / kcmil Range per Conductor	Metric (mm <sup>2</sup> ) Range per Conductor	3-Pole Catalog Number <sup>①</sup>	Hardware Included
<b>Aluminum Terminal Options</b>								
1600	Aluminum	Cu/Al	B, C	4	500–1000	253–507	<b>PDG6X1TA1600</b>	Imperial
2000	Aluminum	Cu/Al	B, C	6	2–600	33.6–304	<b>PDG6X3TA2000</b> <sup>②</sup>	Imperial bus connection
<b>Copper Terminal Options</b>								
1600	Copper	Cu	B, C	4	1–600	42.4–304	<b>PDG6X1T1600</b>	Imperial
<b>Rear Connectors</b> <sup>③</sup>								
2000	Copper						<b>PDG6X1T2000RC</b>	Imperial
2000	Copper						<b>PDF6X1T2000RC</b> <sup>④</sup>	Imperial
2500	Copper						<b>PDG6X1T2500RC</b>	Imperial

**Note:** Wire capacity is based on standard imperial wire sizes; metric sizes provided in table are a direct conversion to demonstrate maximum capacity, not to denote metric wire sizes.

**Notes**

- ① Add **M** at end for metric hardware.
- ② Only available for 3-pole breaker; order quantity 1 per breaker side, or quantity 2 per breaker.
- ③ Kit includes one conductor and hardware; order quantity 6 for both sides of a 3-pole breaker.
- ④ Included with 100% rated breaker.



#### Accessories

##### Internal Accessory Configurations—Frame Size 6

All Frame 6 accessories are installed in an internal pocket to the right of the breaker handle.

##### Internal Accessory

Accessory Slot 1 Options	Accessory Slot 2 Options
None	None
2 Form C	2 Form C

Lower Accessory Slot 1 Options	Lower Accessory Slot 2 Options	Lower Accessory Slot 3 Options
None	None	None
Shunt trip	Shunt trip	UVR
Alarm switch	UVR	Alarm switch
—	Alarm switch	—

##### Indicating Accessories—Frame Size 6

##### Indicating Accessories <sup>①②</sup>

	Alarm Switch	Auxiliary Switch
<b>1 Form C</b>	<b>PDG6X1BC</b>	—
<b>2 Form C</b>	<b>PDG6X2BC</b>	<b>PDG6X2AC</b>
<b>4 Form C</b>	—	<b>PDG6X4AC</b>

##### Factory Installed Indicating Accessories

		Auxiliary	2 Form C	4 Form C
		None		
<b>Alarm switch</b>	<b>None</b>	NN	A1	A7
	<b>1 Form C</b>	BC	C1	C9
	<b>2 Form C</b>	B1	CY	CZ

##### Notes

- ① All PDG6 indicating accessories come with 29 in/0.75 m pigtailed.
- ② All PDG6 indicating accessories are installed in the accessory pocket to the right of the breaker handle.

**Tripping Accessories—Frame Size 6****Shunt Trips**

<b>Voltage</b>	<b>Pigtail (29 in / 0.75 m)</b>	<b>Factory Installed Catalog Number (Digit 17–18)</b>
48–60 Vdc	<b>PDG6XST60DCS</b>	<b>SK</b>
110–125 Vdc	<b>PDG6XST125DCS</b>	<b>SL</b>
220–250 Vdc	<b>PDG6XST250DCS</b>	<b>SM</b>
24 Vac/Vdc	<b>PDG6XST24ACDCS</b>	<b>SN</b>
48–60 Vac	<b>PDG6XST60ACS</b>	<b>ST</b>
110–240 Vac	<b>PDG6XST240ACS</b>	<b>SA or SB</b>
380–440 Vac	<b>PDG6XST440ACS</b>	<b>SC</b>
480–600 Vac	<b>PDG6XST600ACS</b>	<b>SD or SE</b>

**Undervoltage Releases (UVRs)**

<b>Voltage</b>	<b>Pigtail (29 in / 0.75 m)</b>	<b>Factory Installed Catalog Number (Digit 17–18)</b>
12 Vdc	<b>PDG6XUV12DCU</b>	<b>UH</b>
24 Vdc	<b>PDG6XUV24DCU</b>	<b>UG</b>
48–60 Vdc	<b>PDG6XUV60DCU</b>	<b>UJ or UK</b>
125 Vdc	<b>PDG6XUV125DCU</b>	<b>UL</b>
250 Vdc	<b>PDG6XUV250DCU</b>	<b>UM</b>
12 Vac	<b>PDG6XUV12ACU</b>	<b>UU</b>
24 Vac	<b>PDG6XUV24ACU</b>	<b>UF</b>
48–60 Vac	<b>PDG6XUV60ACU</b>	<b>UT</b>
110–127 Vac	<b>PDG6XUV120ACU</b>	<b>UA</b>
208–240 Vac	<b>PDG6XUV240ACU</b>	<b>UB</b>
380–500 Vac	<b>PDG6XUV480ACU</b>	<b>UC or UV</b>

**Handle Mechanisms—Size 6****Variable Depth Rotary Handle Mechanism**

Description	NEMA 1/3R/12/4/4X Catalog Number	Factory Installed Digits 19–20
Standard lockable handle (black and gray)	PDG6XHMDS	DA
Emergency lockable handle (red and yellow)	PDG6XHMDE	D1
12 in (305 mm) handle mechanism shaft	PDG56XHMS305	—

**Flex Shaft Handle Mechanism**

Cable Length (ft)	Metal Handle, NEMA 1/3R/12 Catalog Number	High Performance Handle, NEMA 1/3R/12 Catalog Number	Metal Handle, NEMA 4/4X Catalog Number	High Performance Handle, NEMA 4/4X Catalog Number
4 ft	PDG6XFS04	PDG6XFS04HP	PDG6XFS04X	PDG6XFS04HPX
5 ft	PDG6XFS05	PDG6XFS05HP	PDG6XFS05X	PDG6XFS05HPX
6 ft	PDG6XFS06	PDG6XFS06HP	PDG6XFS06X	PDG6XFS06HPX

**External Accessories—Frame Size 6****External Accessories**

Description	Fit Type	Catalog Number	Factory Installed Digits 19–20
Padlockable hasp	Right	PDG6XPLKR	L6
Padlockable hasp, OFF only	Right	PDG6XPLKROFF	L3
Kirk key interlock kit <sup>①</sup>	Right	PDG6XKLKPRF	L9
Walking beam interlock <sup>②③</sup>	Three-pole	PDG6XWBI3P	WB <sup>④</sup>
Electrical operator	48 Vdc	EOP6T21K	MJ
	120 Vac	EOP6T08K	MA
	240 Vac	EOP6T11K	MB
Neutral CTs for ground fault (PXR)	Bus bar type	PDG6XNCTB2500	—

**Dimensions and Weights—Frame Size 6****Approximate Dimensions in Inches (mm)**

Number of Poles	Width	Height	Depth
2	15.5 (393.7)	16 (406.4)	9.75 (247.7)
3	15.5 (393.7)	16 (406.4)	9.75 (247.7)
4	20 (508.0)	16 (406.4)	9.75 (247.7)

**Approximate Shipping Weight in lb (kg)**

Breaker Type	2-Pole	3-Pole	4-Pole
PDG6 1600 and 2000 A	102 (46.3)	102 (46.3)	135 (61.2)
PDG6 2500 A	135 (61.2)	135 (61.2)	182 (82.6)

**Notes**

- <sup>①</sup> Provision only. For use with Type F Kirk keylock (sold separately).
- <sup>②</sup> Breaker must be ordered with walking beam interlock ready modification from plant (factory suffix "WB").
- <sup>③</sup> Requires two breakers.
- <sup>④</sup> Modification code for Walking Beam denotes modification to the breaker; accessory must be ordered separate.

## Motor Circuit Protectors (3–600 A)

### Power Defense Molded Case Circuit Breakers—Motor Circuit Protectors

#### Product Description

Motor circuit protectors (MCPs) are instantaneous-only devices available in ratings from 3 A to 600 A. Power Defense MCPs are available in Frame Sizes 1, 2 and 3, and are designated by the trip unit digits in the catalog number (Digits 11–13), always use M as Digit 11. Digit 12 designates the calibration (S = Standard, H = High, L = Low), and always use A as Digit 13 to indicate an adjustable instantaneous setting.

#### Application Description

MCPs are designed to be used in combination with motor starters. Power Defense MCPs are typically used in combination with motor starters, usually NEMA sizes 0 through 6. Each MCP device is calibrated at a minimum for six trip settings to provide flexibility in its application. Typical motor full load currents and NEMA starter sizes are provided for each device and setting, only as a guide for selecting MCPs; actual motor characteristics and design parameters must be used to determine the adequate device and setting to be used in the application.

#### Features and Benefits

Power Defense MCPs are of a modular design, with field-installable accessories and terminals. Accessories and terminals for MCPs are common with the accessories used for the equivalent frame size molded case circuit breaker. Accessories may be field or factory installed. For factory installation, follow the same catalog numbering guidelines provided for the respective equivalent circuit breaker frame.

#### Standards and Certifications

MCPs are UL Recognized Components (UL File E7819) and comply with the applicable requirements of the UL 489 standard. Eaton MCPs are also UL Listed in combination with Eaton motor starters under various UL file number; reference UL's website for additional information.

MCPs are also designed to comply with CSA Standard C22.2 No. 5, IEC 60947-2 (Annex O), and GB 14048.2. As such, they carry the following markings:

- UL
- CSA
- IEC (CE)
- CB (CCC)



#### Frame Size 1 Product Selection

PDG1 MCPs cover a continuous current range of 3 A through 100 A, with trip calibration settings from 9 A through 1100 A. All devices are a 3-pole configuration and have a single interrupting capacity as an IEC 60947-2 (Annex O) instantaneous trip circuit breaker.

PDG1 MCPs include six trip settings, corresponding to 3x through 11x of the continuous amperage rating of the device, and each corresponding to 13x the minimum FLA value shown in the table below.

Where a 13x setting is required for an intermediate FLA value, alternate CAM settings and/or MCP ratings should be used.

A High Calibration MCP for the 100 A device is also available for special applications where the ampere rating of the disconnecting means cannot be less than 115% of the motor full load ampere rating, and includes settings corresponding to 5x to 15x of the continuous ampere rating of the device.

All catalog numbers shown include standard line and load steel terminals (Digit 14 = J). For aluminum terminals, use T in Digit 14 of the catalog number.

Terminal catalog numbers listed in the table are for one side of the MCP; order 2 sets for line and load if ordering separate.

#### Ratings

Maximum Application Voltage (UL and CSA)

- 600Y/347 Vac
- 480 Vac
- 250 Vdc

**Note:** For DC applications, actual trip levels are approximately 40% higher than values shown.

#### IEC Instantaneous Circuit Breaker (ICB) Interrupting Capacity (kA)

	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	5	5
415 Vac	5	5
690 Vac	3	1.5

#### PDG1 Motor Circuit Protectors—Standard Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers	
							Included (Dig 14 = J)	Optional (Dig 14 = T)
PDG13M0003MSAJ	3	A	3x	9	0	0.69–0.91	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	15		1.1–1.3		
		C	7x	21		1.6–1.7		
		D	9x	27		2.0–2.2		
		E	10x	30		2.3–2.5		
		F	11x	33		2.6–2.8		
PDG13M0007MSAJ	7	A	3x	21	0	1.5–2.0	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	35		2.6–3.1		
		C	7x	49		3.7–3.9		
		D	9x	63		4.8–5.2		
		E	10x	70		5.3–5.7		
		F	11x	77		5.8–6.1		
PDG13M0015MSAJ	15	A	3x	45	0	3.4–4.5	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	75		5.7–6.8		
		C	7x	105		8.0–9.1		
		D	9x	135		10.4–11.4		
		E	10x	150		11.5–12.6		
		F	11x	165		12.7–13.0		
PDG13M0030MSAJ	30	A	3x	90	1	3.9–9.1	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	150		11.5–13.7		
		C	7x	210		16.1–18.3		
		D	9x	270		20.7–22.9		
		E	10x	300		23.0–25.2		
		F	11x	330		25.3–26.1		
PDG13M0050MSAJ	50	A	3x	150	2	11.5–15.2	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	250		19.2–22.9		
		C	7x	350		26.9–30.6		
		D	9x	450		34.6–38.3		
		E	10x	500		38.4–42.1		
		F	11x	550		42.2–43.5		

## PDG1 Motor Circuit Protectors—Standard Calibration, continued

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers	
							Included (Dig 14 = J)	Optional (Dig 14 = T)
PDG13M0070MSAJ	70	A	3x	210	2	16.1–30.6	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	350		26.9–32.2		
		C	7x	490		37.6–42.9		
		D	9x	630		48.4–53.7		
		E	10x	700		53.8–59.1		
		F	11x	770		59.2–60.9		
PDG13M0100MSAJ	100	A	3x	300	3	23–30.6	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	5x	500		38.4–46.0		
		C	7x	700		53.8–61.4		
		D	9x	900		69.2–76.8		
		E	10x	1000		76.9–84.5		
		F	11x	1100		84.6–87.0		

## PDG1 Motor Circuit Protectors—High Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers	
							Included (Dig 14 = J)	Optional (Dig 14 = T)
PDG13M0100MHAJ	100	A	5x	500	3	38.4–46.0	PDG1X3T125 (Steel)	PDG1X3TA125 (Aluminum)
		B	7.5x	750		57.6–65.2		
		C	10x	1000		76.9–84.5		
		D	12.5x	1250		①		
		E	13.75x	1375		①		
		F	15x	1500		①		

**Note**

① Settings above 85 A are for special applications. NEC Article 430.110(a) requires the ampere rating of the disconnecting means to be not less than 115% of the motor full load ampere rating

#### Frame Size 2 Product Selection

PDG2 MCPs cover a continuous current range of 3 A through 150 A, with trip calibration settings from 9 A through 2500 A. All devices are a 3-pole configuration and have a single interrupting capacity as an IEC 60947-2 (Annex O) instantaneous circuit breaker.

PDG2 MCPs include eight trip settings, corresponding to 3x through 10x of the continuous amperage rating of the device, and each corresponding to 13x the minimum FLA value shown in the table below.

Where a 13x setting is required for an intermediate FLA value, alternate dial settings and/or MCP ratings should be used.

A High Calibration MCP for the 150 A device is also available for special applications where the ampere rating of the disconnecting means cannot be less than 115% of the motor full load ampere rating.

Additionally, four Low Calibration devices are available for low magnetic protection special applications.

All catalog numbers shown include standard line and load terminals (Digit 14 = J). For optional terminals, use T, W or other options in Digit 14 as described in the Frame Size 2 circuit breaker section of the catalog.

Terminal catalog numbers listed in the table are for one side of the MCP; order 2 sets for line and load if ordering separate.

#### Ratings

Maximum Application Voltage (UL and CSA)

- 600 Vac
- 250 Vdc

**Note:** For DC applications, actual trip levels are approximately 40% higher than values shown.

#### IEC Instantaneous Circuit Breaker (ICB) Interrupting Capacity (kA)

	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	5	5
415 Vac	5	5
690 Vac	3	1.5

#### PDG2 Motor Circuit Protectors—Standard Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG23M0003MSAJ	3	A	3.0	9	0	0.69–0.91	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	12		0.92–1.0			
		C	5.0	15		1.1–1.2			
		D	6.0	18		1.3–1.5			
		E	7.0	21		1.6–1.7			
		F	8.0	24		1.8–1.9			
		G	9.0	27		2.0–2.2			
		H	10.0	30		2.3–2.5			
PDG23M0007MSAJ	7	A	3.0	21	0	1.50–2	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	28		2.10–2.5			
		C	5.0	35		2.6–3.1			
		D	6.0	42		3.2–3.6			
		E	7.0	49		3.7–3.9			
		F	8.0	56		4.3–4.7			
		G	9.0	63		4.8–5.2			
		H	10.0	70		5.3–5.7			
PDG23M0015MSAJ	15	A	3.0	45	0	3.40–4.5	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	60		4.60–5.6			
		C	5.0	75		5.7–6.8			
		D	6.0	90		6.9–7.9			
		E	7.0	105		8.0–9.1			
		F	8.0	120		9.2–10.3			
		G	9.0	135		10.4–11.4			
		H	10.0	150		11.5–12.6			
PDG23M0030MSAJ	30	A	3.0	90	1	6.90–9.1	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	120		9.20–11.4			
		C	5.0	150		11.5–13.7			
		D	6.0	180		13.8–16.0			
		E	7.0	210		16.1–18.3			
		F	8.0	240		18.4–20.6			
		G	9.0	270		20.7–22.9			
		H	10.0	300		23.0–25.2			

## PDG2 Motor Circuit Protectors—Standard Calibration, continued

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG23M0050MSAJ	50	A	3.0	150	2	11.50–15.2	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	200		15.30–19.1			
		C	5.0	250		19.2–22.9			
		D	6.0	300		23.0–26.8			
		E	7.0	350		26.9–30.6			
		F	8.0	400		30.7–34.5			
		G	9.0	450		34.6–38.3			
		H	10.0	500		38.4–42.1			
PDG23M0070MSAJ	70	A	3.0	210	2	16.10–21.4	PDG2X3T100 (Steel)	PDG2X3TA100 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	280		21.50–26.8			
		C	5.0	350		26.9–32.2			
		D	6.0	420		32.3–37.5			
		E	7.0	490		37.6–42.9			
		F	8.0	560		43.0–48.3			
		G	9.0	630		48.4–53.7			
		H	10.0	700		53.8–59.1			
PDG23M0100MSAJ	100	A	3.0	300	3	23.00–30.6	PDG2X3T100 (Steel)	PDG2X3TA100 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	4.0	400		30.70–38.3			
		C	5.0	500		38.4–46.0			
		D	6.0	600		46.1–53.7			
		E	7.0	700		53.8–61.4			
		F	8.0	800		61.5–69.1			
		G	9.0	900		69.2–76.8			
		H	10.0	1000		76.9–84.5			
PDG23M0150MSAJ	150	A	3.0	450	4	34.60–46	PDG2X3TA225 (Aluminum)	PDG2X3TA150 (Aluminum)	PDG2X3T150 (St. Steel)
		B	4.0	600		46.10–57.5			
		C	5.0	750		57.6–69.1			
		D	6.0	900		69.2–80.6			
		E	7.0	1050		80.7–92.2			
		F	8.0	1200		92.3–103.7			
		G	9.0	1350		103.8–115.2			
		H	10.0	1500		115.3–126.7			

## PDG2 Motor Circuit Protectors—High Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG23M0150MHAJ	150	A	5.0	750	4	57.0–75.0	PDG2X3TA225 (Aluminum)	PDG2X3TA150 (Aluminum)	PDG2X3T150 (St. Steel)
		B	6.7	1000		76.0–95.0			
		C	8.3	1250		96.0–114.0			
		D	10.0	1500		115.0–130.7			
		E	11.7	1750		①			
		F	13.3	2000		①			
		G	15.0	2250		①			
		H	16.7	2500		①			

**Note**

① Settings above 130 A are for special applications. NEC Article 430.110(a) requires the ampere rating of the disconnecting means to be not less than 115% of the motor full load ampere rating



## PDG2 Motor Circuit Protectors—Special Low Calibration

2

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Terminal Kit Catalog Numbers		
					Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG23M0025MLAJ	25	A	1.6	40	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	1.7	43			
		C	1.8	46			
		D	2.0	49			
		E	2.1	52			
		F	2.2	55			
		G	2.3	58			
		H	2.4	60			
PDG23M0050MLAJ	50	A	1.6	80	PDG2X3T100 (Steel)	PDG2X3TA50 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	1.7	87			
		C	1.9	93			
		D	2.0	98			
		E	2.1	103			
		F	2.2	109			
		G	2.3	115			
		H	2.4	120			
PDG23M0070MLAJ	70	A	1.6	115	PDG2X3T100 (Steel)	PDG2X3TA100 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	1.7	122			
		C	1.9	130			
		D	2.0	139			
		E	2.1	145			
		F	2.2	153			
		G	2.3	160			
		H	2.4	170			
PDG23M0100MLAJ	100	A	1.6	160	PDG2X3T100 (Steel)	PDG2X3TA100 (Aluminum)	PDG2X3T100 (Steel) (Same as J)
		B	1.7	174			
		C	1.9	185			
		D	2.0	196			
		E	2.1	207			
		F	2.2	218			
		G	2.3	229			
		H	2.4	240			

### 400 A Frame Size 3 Product Selection

PDG3 400 A Frame MCPs cover a continuous current range of 70 A through 400 A, with trip calibration settings from 350 A through 4500 A. All devices are a 3-pole configuration in a 400 A frame and have a single interrupting capacity as an IEC 60947-2 (Annex O) instantaneous circuit breaker.

PDG3 MCPs include nine trip settings, corresponding to 5x through 10x of the continuous amperage rating of the device and each corresponding to 13x the minimum FLA value shown in the table below.

Where a 13x setting is required for an intermediate FLA value, alternate dial settings and/or MCP ratings should be used.

A High Calibration MCP for the 400 A frame device is also available for special applications where the ampere rating of the disconnecting means cannot be less than 115% of the motor full load ampere rating.

All catalog numbers shown include standard aluminum line and load terminals (Digit 14 = J). For optional terminals, use T (aluminum), W (copper) or other options in Digit 14 as described in the Frame Size 3 circuit breaker section of the catalog.

Terminal catalog numbers listed in the table are for one side of the MCP; order 2 sets for line and load if ordering separate.

### Ratings

Maximum Application Voltage (UL and CSA)

- 600 Vac
- 250 Vdc

**Note:** For DC applications, actual trip levels are approximately 40% higher than values shown.

### IEC Instantaneous Circuit Breaker (ICB) Interrupting Capacity (kA)

	I <sub>cu</sub>	I <sub>cs</sub>
240 Vac	100	100
415 Vac	70	53
690 Vac	15	7.5
250 Vdc	22	22

### PDG3 400 A Frame Motor Circuit Protectors—Standard Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG33M0070MSAJ	70	A	5.0	350	4	27.0–30.7	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.7	400		30.8–33.8			
		C	6.3	440		33.9–36.9			
		D	6.9	480	5	37.0–40.3			
		E	7.5	525		40.4–43.8			
		F	8.1	570		43.9–46.9			
		G	8.7	610		47.0–50.7			
		H	9.4	660		50.8–53.8			
		I	10.0	700		53.9–57.2			
PDG33M0100MSAJ	100	A	5.0	500	5	38.5–43.4	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.7	565		43.5–48.0			
		C	6.3	626		48.1–53.0			
		D	6.9	690		53.1–57.6			
		E	7.5	750		57.7–62.3			
		F	8.1	810		62.4–67.3			
		G	8.8	875		67.4–71.9			
		H	9.4	935		72.0–76.9			
		I	10.0	1000		77.0–81.6			
PDG33M0125MSAJ	125	A	5.0	625	5	48.1–53.8	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.6	700		53.9–59.9			
		C	6.2	780		60.0–66.1			
		D	6.9	860		66.2–72.3			
		E	7.5	940		72.4–78.4			
		F	8.2	1020		78.5–83.8			
		G	8.7	1090		83.9–89.9			
		H	9.4	1170		90.0–96.1			
		I	10.0	1250		96.2–102.0			

# 2.2

## Molded Case Circuit Breakers

### Power Defense Molded Case Circuit Breakers

#### PDG3 400 A Frame Motor Circuit Protectors—Standard Calibration, continued

2

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG33M0150MSAJ	150	A	5.0	750	5	57.7–64.6	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.6	840		64.7–71.9			
		C	6.2	935		72.0–79.2			
		D	6.9	1030		79.3–86.5			
		E	7.5	1125		86.6–93.8			
		F	8.1	1220		93.9–101.1			
		G	8.8	1315		101.2–108.4			
		H	9.4	1410		108.5–115.3			
		I	10.0	1500		115.4–122.4			
PDG33M0175MSAJ	175	A	5.0	875	5	67.4–75.3	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.6	980		75.4–83.8			
		C	6.2	1090		83.9–92.3			
		D	6.9	1200		92.4–100.7			
		E	7.5	1310		100.8–109.2			
		F	8.1	1420		109.3–117.6			
		G	8.7	1530		117.7–126.1			
		H	9.4	1640		126.2–134.6			
		I	10.0	1750		134.7–142.8			
PDG33M0200MSAJ	200	A	5.0	1000	5	77.0–86.5	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.6	1125		86.6–96.1			
		C	6.3	1250		96.2–105.7			
		D	6.9	1375		105.8–115.3			
		E	7.5	1500		115.4–124.9			
		F	8.1	1625		125.0–134.6			
		G	8.8	1750		134.7–144.2			
		H	9.4	1875		144.3–153.8			
		I	10.0	2000		153.9–163.3			
PDG33M0225MSAJ	225	A	5.0	1125	5	86.6–97.3	PDG3X3TA300 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T300 (Copper)
		B	5.6	1265		97.4–108.4			
		C	6.3	1410		108.5–118.8			
		D	6.9	1545		118.9–129.9			
		E	7.5	1690		130.0–140.7			
		F	8.1	1830		140.8–151.5			
		G	8.8	1970		151.6–162.3			
		H	9.4	2110		162.4–173.0			
		I	10.0	2250		173.1–183.6			
PDG33M0250MSAJ	250	A	5.0	1250	5	96.2–108.0	PDG3X3TA350 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T350 (Copper)
		B	5.6	1405		108.1–119.9			
		C	6.2	1560		120.0–132.3			
		D	6.9	1720		132.4–144.2			
		E	7.5	1875		144.3–156.1			
		F	8.1	2030		156.2–168.0			
		G	8.7	2185		168.1–179.9			
		H	9.4	2340		180.0–192.3			
		I	10.0	2500		192.4–204.0			

## PDG3 400 A Frame Motor Circuit Protectors—Standard Calibration, continued

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG33M0300MSAJ	300	A	5.0	1500	5	115.4–129.9	PDG3X3TA350 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T350 (Copper)
		B	5.6	1690		130.0–144.2			
		C	6.3	1875		144.3–158.4			
		D	6.9	2060		158.5–173.0			
		E	7.5	2250		173.1–187.6			
		F	8.1	2440		187.7–201.9			
		G	8.8	2625		202.0–216.1			
		H	9.4	2810		216.2–230.7			
		I	10.0	3000		230.8–244.9			
PDG33M0350MSAJ	350	A	5.0	1750	5	134.7–151.5	PDG3X3TA350 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T350 (Copper)
		B	5.6	1970		151.6–168.4			
		C	6.3	2190		168.5–185.3			
		D	6.9	2410		185.4–201.9			
		E	7.5	2625		202.0–218.8			
		F	8.1	2845		218.9–235.7			
		G	8.8	3065		235.8–252.6			
		H	9.4	3285		252.7–269.2			
		I	10.0	3500		269.3–285.7			
PDG33M0400MSAJ	400	A	5.0	2000	5	153.9–173.0	PDG3X3T400 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T400 (Copper)
		B	5.6	2250		173.1–192.3			
		C	6.3	2500		192.4–211.5			
		D	6.9	2750		211.6–230.7			
		E	7.5	3000		230.8–249.9			
		F	8.1	3250		250.0–269.2			
		G	8.8	3500		269.3–288.4			
		H	9.4	3750		288.5–307.6			
		I	10.0	4000		307.7–326.9			

## PDG3 400 A Frame Motor Circuit Protectors—High Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG33M0400MHAJ	400	A	5.6	2250	5	173.1–194.5	PDG3X3T400 (Aluminum)	PDG3X3TA402 (Aluminum)	PDG3X3T400 (Copper)
		B	6.3	2530		194.6–216.1			
		C	7.0	2810		216.2–237.6			
		D	7.7	3090		237.7–259.5			
		E	8.4	3375		259.6–281.1			
		F	9.1	3655		281.2–302.6			
		G	9.8	3935		302.7–324.1			
		H	10.5	4215		324.2–346.1			
		I	11.3	4500		346.2–368.1			

#### 600 A Frame Size 3 Product Selection

PDG3 600 A MCPs cover a continuous current range of 250 A through 600 A, with trip calibration settings from 1250 A through 6000 A. All devices are a 3-pole configuration in a 600 A frame and have a single interrupting capacity as an IEC 60947-2 (Annex O) instantaneous circuit breaker.

PDG3 MCPs include nine trip settings, corresponding to 5x through 10x of the

continuous amperage rating of the device, and each corresponding to 13x the minimum FLA value shown in the table below. Where a 13x setting is required for an intermediate FLA value alternate dial settings and/or MCP ratings should be used.

All catalog numbers shown include standard line and load terminals (Digit 14 = J). For optional terminals, use T (aluminum) W (copper) or

other options in Digit 14 as described in the Frame Size 3 circuit breaker section of the catalog.

Terminal catalog numbers listed in the table are for one side of the MCP; order 2 sets for line and load if ordering separate.

#### Ratings

Maximum Application Voltage (UL and CSA)

- 600 Vac
- 250 Vdc

**Note:** For DC applications, actual trip levels are approximately 40% higher than values shown.

#### IEC Instantaneous Circuit Breaker (ICB) Interrupting Capacity (kA)

	I <sub>CU</sub>	I <sub>CS</sub>
240 Vac	100	100
415 Vac	70	53
690 Vac	25	13
250 Vdc	42	42

#### PDG3 600 A Frame Motor Circuit Protectors—Standard Calibration

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		
							Included (Dig 14 = J)	Optional (Dig 14 = T)	Optional (Dig 14 = W)
PDG33MH250MSAJ	250	A	5.0	1250	6	96.2–108.0	PDG3X3TA401H (Aluminum)	PDG3X3TA400H (Aluminum)	PDG3X3T401H (Copper)
		B	5.6	1405		108.1–119.9			
		C	6.2	1560		120.0–132.2			
		D	6.9	1720		132.3–144.1			
		E	7.5	1875		144.2–156.1			
		F	8.1	2030		156.2–168.0			
		G	8.7	2185		168.1–179.9			
		H	9.4	2340		180.0–192.2			
		I	10.0	2500		192.3–204.0			
PDG33MH300MSAJ	300	A	5.0	1500	6	115.4–129.9	PDG3X3TA401H (Aluminum)	PDG3X3TA400H (Aluminum)	PDG3X3T401H (Copper)
		B	5.6	1690		130.0–144.1			
		C	6.3	1875		144.2–158.4			
		D	6.9	2060		158.5–173.0			
		E	7.5	2250		173.1–187.6			
		F	8.1	2440		187.7–201.8			
		G	8.8	2625		201.9–216.1			
		H	9.4	2810		216.2–230.7			
		I	10.0	3000		230.8–244.9			
PDG33MH350MSAJ	350	A	5.0	1750	6	134.6–151.4	PDG3X3TA401H (Aluminum)	PDG3X3TA400H (Aluminum)	PDG3X3T401H (Copper)
		B	5.6	1970		151.5–168.4			
		C	6.3	2190		168.5–185.3			
		D	6.9	2410		185.4–201.8			
		E	7.5	2625		201.9–218.7			
		F	8.1	2845		218.8–235.7			
		G	8.8	3065		235.8–252.6			
		H	9.4	3285		252.7–269.1			
		I	10.0	3500		269.2–285.7			
PDG33MH400MSAJ	400	A	5.0	2000	6	153.8–173.0	PDG3X3TA401H (Aluminum)	PDG3X3TA400H (Aluminum)	PDG3X3T401H (Copper)
		B	5.6	2250		173.1–192.2			
		C	6.3	2500		192.3–211.4			
		D	6.9	2750		211.5–230.7			
		E	7.5	3000		230.8–249.9			
		F	8.1	3250		250.0–269.1			
		G	8.8	3500		269.2–288.4			
		H	9.4	3750		288.5–307.6			
		I	10.0	4000		307.7–326.9			

## PDG3 600 A Frame Motor Circuit Protectors—Standard Calibration, continued

MCP Catalog Number	Continuous Amperes	CAM Setting	MCP Trip Setting (Mult)	MCP Trip Setting (Amps)	Typical NEMA Starter Size	Typical Motor Full Load Current Amperes	Terminal Kit Catalog Numbers		Optional (Dig 14 = W)
							Included (Dig 14 = J)	Optional (Dig 14 = T)	
PDG33M0450MSAJ	450	A	5.0	2250	6	173.1–194.5	PDG3X3TA630 (Aluminum)	—	PDG3X3T630 (Copper)
		B	5.6	2530		194.6–216.1			
		C	6.2	2810		216.2–237.6			
		D	6.9	3090		237.7–259.5			
		E	7.5	3375		259.6–281.4			
		F	8.1	3660		281.5–303.0			
		G	8.8	3940		303.1–324.5			
		H	9.4	4220		324.6–346.1			
		I	10.0	4500		346.2–368.1			
PDG33M0500MSAJ	500	A	5.0	2500	6	192.3–216.1	PDG3X3TA630 (Aluminum)	—	PDG3X3T630 (Copper)
		B	5.6	2810		216.2–240.3			
		C	6.3	3125		240.4–264.5			
		D	6.9	3440		264.6–288.4			
		E	7.5	3750		288.5–313.7			
		F	8.2	4080		313.8–336.4			
		G	8.8	4375		336.5–359.1			
		H	9.3	4670		359.2–384.5			
		I	10.0	5000		384.6–408.2			
PDG33M0600MSAJ	600	A	5.0	3000	6	230.8–259.5	PDG3X3TA630 (Aluminum)	—	PDG3X3T630 (Copper)
		B	5.6	3375		259.6–289.1			
		C	6.3	3760		289.2–316.8			
		D	6.9	4120		316.9–346.1			
		E	7.5	4500		346.2–375.3			
		F	8.1	4880		375.4–403.7			
		G	8.8	5250		403.8–433.0			
		H	9.4	5630		433.1–461.4			
		I	10.0	6000		461.5–507.7			

**Note:** 800 and 1200 A, 600 Vac maximum motor circuit protectors are available as Series C HMCP product.

**Additional Information****Terminals**

Available terminal configuration for MCPs follow the same guidelines as presented for each circuit breaker frame. Additional terminals, including control wire, StrandAble and other options are presented in each Power Defense circuit breaker frame size section.

**Accessories**

MCPs and MCCBs for each frame use a common set of accessories. Available accessories are presented in each corresponding Power Defense circuit breaker frame section (i.e., PDG1 accessories are found in the Frame Size 1 section, PDG2 accessories in the Frame Size 2 section and PDG3 in the Frame Size 3 section).

**Weights and Dimensions**

MCPs have the same dimensions and weight as the 3-pole version of the respective circuit breaker, shown in each frame section.

## Motor Protection Circuit Breakers (15–600 A)

### Power Defense Molded Case Circuit Breakers—Motor Protection Circuit Breakers

#### Product Description

Power Defense motor protection circuit breakers (MPCBs) use Power Xpert Release (PXR) electronic trip units to provide branch protection and motor protection in a combined device, eliminating the need for a separate overload relay. Motor protection PXR units build upon the features available in standard PXR trip units and add motor protection application specific functionality and features. MPCBs are available in Power Defense Frame Sizes 2 and 3, and share accessories and catalog numbering convention with the respective molded case circuit breaker frames.

#### Application Description

MPCBs meet requirements for motor branch protection, including disconnecting means, branch circuit short-circuit protection and overload protection. MPCBs can be used with a contactor to eliminate the need for overload relay and still create manual motor control. Typical branch motor starter applications are protected by three components consisting of: breaker, contactor and overload relay, or fuse, contactor and overload relay. The MPCB application-specific protection eliminates the need for motor overload relay and reduces the traditional three-component starter assembly down to two elements—the MPCB and the contactor.

#### Features and Benefits

PXR motor protection electronic trip units provide motor protection basic and advanced functionality in PXR 10 and PXR 25, respectively. Features include phase unbalance protection, phase loss protection, over/under voltage protection, cold/hot start (thermal memory) protection, programmable high load alarms, programmable relays for multiple functions to include pre-detection trip relay, Class 5/10/15/20/30 protection, energy metering, communications, cause-of-trip indication, events logging, breaker health monitoring, harmonics, ground fault alarm and protection, and more.

ZSI allows the MPCB to interface with upstream feeder or branch circuit breakers for coordination and reduction of arc flash for some applications.

#### Standards and Certifications

MPCBs provide:

- UL 489 branch circuit protection
- UL 508 and CSA C22.2 No. 14 motor protection, and meet IEC 60947-2 and 50947-4 requirements

Power Defense MPCBs meet:

- UL 489
- CSA
- C22.2 No. 5-02
- IEC 60947-2
- GB 14048.2-2008



**Catalog Number / Product Selection****Power Defense MPCB—Frame Size 2 (15–200 A)**

Frame Size 2 covers a range of 15 A through 200 A using PXR 10 and PXR 25 electronic trip units. It is available in 3-pole configurations.

**Interrupting Ratings**

Catalog Designator	F		G		K		M		N		P	
ANSI	kA rms		kA rms		kA rms		kA rms		kA rms		kA rms	
240 Vac	35		65		85		100		150		200	
480 Vac	25		35		50		65		85		100	
600 Vac	14		18		22		25		25		25	
250 Vdc	—		—		—		—		—		—	
IEC	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
240 Vac	35	35	55	55	85	85	100	100	150	100	200	150
380–415 Vac	25	25	36	36	50	50	70	53	70	70	100	70
440 Vac	25	20	30	22.5	35	35	50	40	70	50	100	65
480 Vac	20	20	25	20	35	22.5	50	30	65	40	65	40
525 Vac	18	13	20	13	25	13	25	13	25	13	25	13
660–690 Vac	—	—	8	4	10	5	10	5	10	5	10	5
250 Vdc	—	—	—	—	—	—	—	—	—	—	—	—

**Power Defense MPCB—Frame Size 3 (45–600 A)**

Frame Size 3 covers a range of 45 A through 600 A using PXR 10 and PXR 25 electronic trip units. It is available in 3-pole configurations. Frame 3 has two specific constructions, one each for 400 A and 600 A. The 600 A construction provides a unique capability to be used at 400A and below in applications requiring higher fixed instantaneous levels. This is accomplished by using a letter H in the 7th digit of the catalog number.

**Interrupting Ratings**

Catalog Designator	F		G		K		M		N		P	
ANSI (UL/CSA)	kA rms		kA rms		kA rms		kA rms		kA rms		kA rms	
240 Vac	35		65		85		100		150		200	
480 Vac	25		35		50		65		85		100	
600 Vac	14		18		25		35		50		65	
125/250 Vdc	—		—		—		—		—		—	
IEC	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
240 Vac	35	35	55	55	85	85	100	100	150	100	200	150
380–415 Vac	25	25	36	36	50	50	70	53	70	70	100	70
440 Vac	25	20	30	22.5	35	35	50	40	70	50	100	50
480 Vac	20	20	25	20	35	22.5	50	30	65	40	85	40
525 Vac	18	5	20	7.5	25	10	30	15	35	25	40	25
660–690 Vac	—	—	8	4	10	5	15	7.5	20	10	20	10
125/250 Vdc	—	—	—	—	—	—	—	—	—	—	—	—



# 2.2

## Molded Case Circuit Breakers

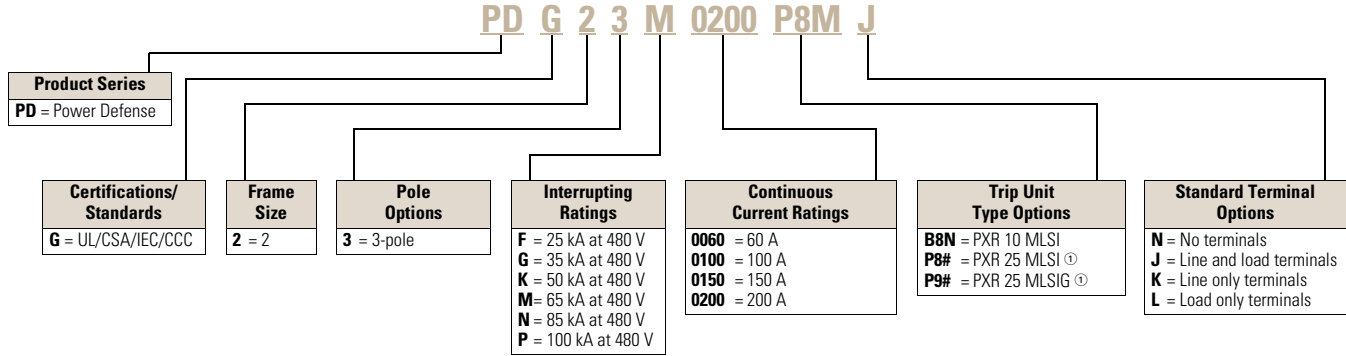
### Power Defense Molded Case Circuit Breakers

2

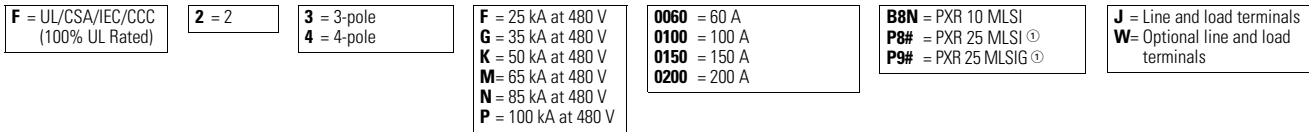
#### MPCB with Power Xpert (PXR) Electronic Trip Units (ETU)

This information is presented as a tool to develop catalog numbers for selecting Power Defense circuit breakers and trip units.

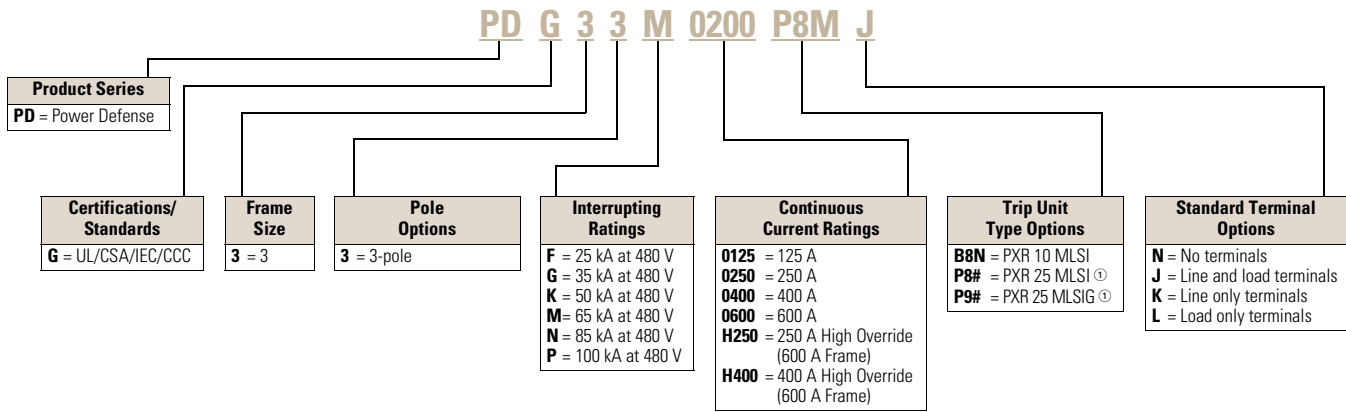
#### Frame Size 2 MPCB with PXR ETU—Globally Rated



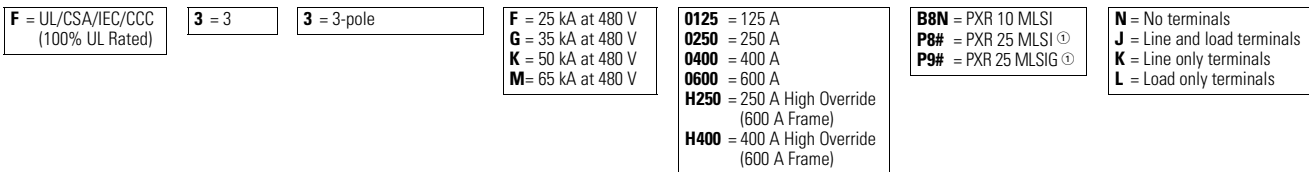
#### Frame Size 2 MPCB with PXR ETU—Globally Rated (100% UL Rated)



#### Frame Size 3 MPCB with PXR ETU—Globally Rated



#### Frame Size 3 MPCB with PXR ETU—Globally Rated (100% UL Rated)



**Note**

① See "Power Xpert Release (PXR) Trip Unit Options" table on the next page for # (Available Configured Options).

**Power Xpert Release (PXR) Trip Unit Options**

		#(1)—Protection Type		#(2)—Available Configured Options			
		LSI	LSIG	Relays Modbus	Relays Modbus ZSI	Relays Modbus CAM	Relays Modbus ZSI CAM
<b>PXR</b>	<b>ETU</b>						
PXR 10	<b>B</b>	<b>8</b>	—	<b>N</b>	—	—	—
PXR 25	<b>P</b>	<b>8</b>	<b>9</b>	—	<b>M</b>	<b>W</b>	<b>D</b> <b>Y</b>

**Descriptions of PXR Configured Options**

**Relays**—2 Form A contacts (rated for 240 Vac, 1 A)

- Interface: 3 wires (ALM1, ALM2, ALM Common)
- Programmable to indicate breaker conditions
- Field installable for PD-2

**Note:** PD-2 includes 1 relay when used in conjunction with Modbus RTU.

**Modbus**—Modbus RTU directly from the breaker

- Interface: 3 wires (MODBA, MODBB, MODBG)
- No additional modules required
- Field installable for PD-2

**ZSI**—Zone Selective Interlocking output

- Interface: 2 wires (Zout, Zcomm)
- Includes ability to turn ON and OFF, and indicate signals

**CAM**—CAM Link connection (requires a CAM module per breaker)

- Interface: 5 wires (refer to CAM IL for details)
- Communications Adapter Modules available for Modbus TCP and PROFIBUS

**Auxiliary Power**

- Connection included with all PXR 25 trip units
- Required for communications, relays, and metering accuracy
- 24 Vdc, 0.5 A
- Interface: 2 wires Aux +24 V, Aux 0 V)

**Available Settings and Features on PXR Motor Protection Electronic Trip Units**

Option	Setting	Full Load Amperes (I <sub>e</sub> ) Current Settings PD-2				Full Load Amperes (I <sub>e</sub> ) Current Settings PD-3			
		0060 60 A	0100 100 A	0150 150 A	0200 200 A	0125 125 A	0250/H250 250 A	0400/H400 400 A	0600 600 A
PXR 10	1	15 A	32 A	50 A	70 A	45 A	90 A	160 A	250 A
	2	16 A	35 A	60 A	80 A	50 A	100 A	175 A	275 A
	3	20 A	40 A	63 A	90 A	60 A	110 A	200 A	300 A
	4	25 A	50 A	70 A	100 A	63 A	125 A	225 A	320 A
	5	30 A	60 A	80 A	110 A	70 A	150 A	250 A	350 A
	6	35 A	63 A	90 A	125 A	80 A	160 A	275 A	400 A
	7	40 A	70 A	100 A	150 A	90 A	175 A	300 A	450 A
	8	45 A	80 A	110 A	160 A	100 A	200 A	320 A	500 A
	9	50 A	90 A	125 A	175 A	110 A	225 A	350 A	550 A
	10	60 A	100 A	150 A	200 A	125 A	250 A	400 A	600 A

PXR 25 Programmable from minimum to maximum values in 1 A increments.

#### Trip Profile (Trip Class and Phase Unbalance)

##### PXR 10—Dial 2

Setting	Dial Label	Trip Class	Phase Unbalance
1	A	5	OFF
2	B	10	OFF
3	C	15	OFF
4	D	20	OFF
5	E	30	OFF
6	F	5	ON
7	G	10	ON
8	H	15	ON
9	J	20	ON
10	K	30	ON

##### PXR 10—Phase Unbalance Settings Programmable by PXPM

- Pickup Level: 5 to 35% of load
- Trip Time: 1 to 300 seconds
- Action taken: MPCB will trip at selected protection settings

##### PXR 25—Programmable

###### Trip Class

- Trip Class: 5–30 in increments of 0.1

###### Phase Unbalance

- Pickup Level: 5 to 35% of load
- Trip Time: 1 to 300 seconds
- Action taken: MPCB will trip at selected protection settings

###### Phase Loss

- Pickup Level: Fixed at 75% of load
- Trip Time: 1 to 240 seconds
- Action taken: May be set to trip or alarm

#### Short Delay / Instantaneous Settings

MPCBs with PXR 10 include a combined Short Delay and Instantaneous trip dial. The short delay time may be programmed to trip instantaneously or with a delay for coordination or to avoid nuisance tripping. Breakers with PXR 25 trip units include independent adjustments for short delay and instantaneous settings.

##### PXR 10—Dial 3 Programmable

Setting	$I_{sd}$ ( $\times I_e$ )	$t_{sd}$ (sec)
1	3	Default to INST; programmable via USB and PXPM to INST, 0.150 or 0.300.
2	4	INST / 0.150 / 0.300
3	5	
4	6	
5	7	
6	8	
7	10	
8	11 <sup>Ⓢ</sup>	
9	12 <sup>Ⓢ</sup>	
10	13 <sup>Ⓢ</sup>	

##### Note

<sup>Ⓢ</sup> If setting value exceeds the fixed magnetic override of the device, the setting defaults to the magnetic override value (please verify these values in the time current curves or PXR user manual).

##### PXR 25—Programmable

###### Short delay pickup— $I_{sd}$ ( $\times I_e$ )

- 3x–13x: Programmable in increments of 0.1x

###### Short delay time— $t_{sd}$ (sec)

- 0.05–0.50: Programmable in increments of 0.01 sec
- Fixed (flat) response

###### Instantaneous pickup— $I_i$ ( $\times I_n$ )

- 3x–Maximum: Programmable in increments of 0.1x
- Maximum is determined by frame fixed magnetic override level

#### Ground Fault Protection Settings

MPCBs with PXR 25 include an option to add ground fault protection. Ground fault protection includes the ability to trip and/or alarm on a determined ground fault condition.

##### Phase Unbalance

- Pickup Level: 5 to 35% of load
- Trip Time: 1 to 300 seconds
- Action taken: May be set to trip or alarm

##### Phase Loss

- Pickup Level: Fixed at 75% of load
- Trip Time: 1 to 240 seconds
- Action taken: May be set to trip or alarm

#### Metering and Communications Capabilities

PXR 25 motor protection trip units include the same advanced metering functions as the MCCB PXR 25, including:

- Energy metering to 1% accuracy
- Current metering to 0.5% accuracy
- Multiple communications options, including standard Modbus RTU
- Load alarm at two programmable levels between 50% to 120%
- Programmable relays for remote indication

#### Advanced Motor Protection Settings

MPCBs with PXR 25 trip units also include additional application specific motor protection features. These features may be set to trip the breaker, alarm (indication via programmable relays), or disabled.

##### Over Voltage

- Pickup Level: 180 to 720 V
- Trip Time: 1 to 300 seconds

##### Under Voltage

- Pickup Level: 60 to 670 V
- Trip Time: 1 to 300 seconds

##### Voltage Unbalance (between phase-to-phase readings)

- Pickup Level: 5% to 25% difference
- Trip Time: 1 to 300 seconds

##### Phase Rotation

- Configuration: ABC or CBA sequence
- Time: Fixed at 200 ms

##### Reverse Power

- Pickup Level: 1–65,500 kW
- Trip Time: 1 to 300 seconds

##### Total Harmonic Distortion

- Line-to-line and line-to-neutral voltage
- Each phase and neutral current
- 1st through 29th at 60 Hz / 1st through 35th at 50 Hz

**Additional Information****Terminals**

Available terminal configuration for MPCBs follow the same guidelines as presented for each circuit breaker frame. Additional terminals, including control wire, StrandAble and other options are presented in each Power Defense circuit breaker frame size section.

**Accessories**

MPCBs and MCCBs for each frame use a common set of accessories. Available accessories are presented in each corresponding Power Defense circuit breaker frame section (i.e., PDG2 accessories are found in the Frame Size 2 section and PDG3 in the Frame Size 3 section). All Frame Size 2 MPCBs are automatically configured with 1 Form C auxiliary switch.

**Weights and Dimensions**

MPCBs have the same dimensions and weight as the 3-pole version of the respective circuit breaker, shown in each frame section.

#### Power Defense Molded Case Circuit Breakers—Communications and Software

2



### Contents

Description	Page
Power Defense Molded Case Circuit Breakers	
Frame Size 1 (15–125 A)	V4-T2-22
Frame Size 2 (15–225 A)	V4-T2-29
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### Communications and Software

#### Communication Adapter Modules

##### Product Description

Designed for Power Defense circuit breakers, the Power Xpert Release (PXR) communications adapter module (CAM) expands the communication capabilities of the PXR 20, PXR 20D and PXR 25 electronic trip units. When used in conjunction with an IoT-based system, the PXR-CAMs allow for greater visibility into the facility, process or machine, thus adhering to the design principles of Industry 4.0.

##### Application Description

- Improve safety with remote breaker control via programmable discrete I/O
- Perform at-a-glance troubleshooting with front-facing LEDs that communicate status and alarms
- Simplify configuration and monitoring with intuitive HTML5 web interface (ECAM only)

##### Features and Benefits

- Compact, DIN rail mounted design with removable terminal blocks offers space savings, fast installation and accessibility for maintenance
- Dimensions:  
4.30 in (110 mm) H  
1.20 in (30 mm) W  
4.30 in (110 mm) D

##### Supported Protocols

- Modbus TCP/IP CAM for PXR 20, 20D, 25  
Catalog number:  
**PXR-ECAM-MTCP**
- PROFIBUS DP CAM for PXR 20, 20D, 25  
Catalog number:  
**PXR-PCAM**

**Modbus RTU RS-485****Product Description**

Power Xpert Release (PXR) trip units have optional integral Modbus RTU communication on the PXR 20. Modbus RTU comes standard on the PXR 20D and 25.

**Application Description**

With this industry standard protocol, the PXR trip units can supply real-time data such as voltage, current, power, health and status to any Modbus RTU client without any additional external device.

**Field Installation**

Field-installable options are available on the PXR 20 for Power Defense frames 2, 5 and 6. See catalog numbers below:

- Field installable Modbus RTU with Relay for PD-2:  
**PDG2XMODRTUREL**
- Field installable Modbus RTU for PD-5 and 6:  
**PDG56XMODRTU**

**Power Xpert Protection Manager****Product Description**

Eaton's Power Xpert Protection Manager (PXPM) software provides a clean, intuitive user interface enabling unmatched control, testing and troubleshooting.

The software is free to download and can run all standard features on any PC. Licenses can be purchased to unlock premium features: secondary injection testing and trip/alarm waveform.

Communication between PXPM and PXR trip units is made via USB or through connected networks.

**Features and Benefits**

- *Set point configuration:* allows direct-to-trip unit or offline setup, including duplication of settings between units
- *Control mode:* capture waveforms, reset trip unit or set the date/time
- *Real-time data:* provides information regarding all status and metered data direction from the trip unit
- *Event summaries:* stores up to 200 events, detailed information on the most recent (10 trip and 10 alarm) events, and time adjustments to the real-time clock
- *Reports:* allows for the formatting and printing of real-time data of performed secondary injection tests

**Secondary Injection Testing**

The secondary injection test function utilizes a separate circuit that injects a signal in parallel with and representative of the output of the current sensor. All the built-in protection circuitry and routines respond per the settings in the breaker. The PXPM software can initiate testing of long delay trip, short delay trip, instantaneous trip, maintenance mode and ground (earth) fault trip via the USB communication.

The current sensor test utilizes a separate circuit to create a signal that is directed through the Rogowski coil. This signal will verify continuity and functionality of the Rogowski coil.

Feature license catalog number: **PXPM-SW-TEST**

**Trip/Alarm Waveform**

PXPM's trip/alarm waveform feature allows PXR trip units to capture and display the breaker state leading up to the last trip or alarm event, provided that auxiliary power is connected.

Available waveform data includes minimum and maximum phase current, voltage and frequency. Using this information increases uptime by identifying issues causing an event and minimized breaker wear by identifying potential tripping issues faster, without the need for expensive standalone testing equipment.

Feature license catalog number: **PXPM-SW-WAVE**

## Special Applications

### Extreme Temperature Applications

The Technical Data section of this catalog (**Pages V4-T2-12–V4-T2-20**) presents permissible loads for each breaker type at ambient temperatures ranging from 40 °C through 70 °C. The tables are presented as an aid in selecting breakers appropriate for the application.

Per industry standards, breakers are calibrated to perform at an ambient temperature of 40 °C. Thermal-magnetic breakers are temperature sensitive, and at temperatures above 40 °C will carry less current than their continuous current rating. This high temperature condition promotes nuisance tripping and can create unacceptable temperature conditions inside the breaker and at the terminals. To prevent these issues, the ambient temperature load derating values presented in the technical data section must be followed. Additionally, special 50 °C calibrated breakers are available—note that these do not carry a UL Listing.

Electronic breakers are insensitive to ambient temperature within a certain range and are not likely to nuisance trip. However, if the ambient temperature significantly exceeds 40 °C the electronic circuitry or other internal components could become damaged. Power Defense electronic breakers are designed with circuitry to initiate a tripping operation to provide self-protection to the electronic components in the event the internal temperature reaches to an unsafe level.

In addition to ambient temperature, other factors must be taken into account in the application of circuit breakers in system designs. These include altitude, power factor, cable size and type, load types, and others. Additional details on these can be found in Eaton's *Consulting Application Guide*.

### 100% Rated Breakers

Molded case circuit breakers are designed to carry rated current in open air at the calibrated temperature for an indefinite period of time without tripping. Molded case circuit breakers are typically applied in an enclosure, therefore the National Electrical Code (Article 220.10b) requires that all overcurrent protection devices be loaded to a maximum of 80% of their continuous current rating, unless specifically listed for 100% applications. Breakers listed for 100% applications specifically outline, on the nameplates, a minimum size enclosure, the minimum ventilation (if needed), and the minimum conductor size for application at 100% rating.

Power Defense circuit breakers are available in 100% rated configurations, as presented in each section of the catalog. Power Defense breakers rated for 100% use the designator PDF in Digits 1–3 of the catalog number.

It is important to understand that using 100% rated breakers is not always the best choice for every system design. Consideration should be given to any present or future factors that could affect the overall system design, and an understanding of NEC Article 210.20a in application of these products.

### 50 °C Calibrated Breakers

Special non-UL listed calibrations are available for 50 °C ambient temperatures for breakers equipped with thermal-magnetic trip units, and for separate thermal-magnetic trip units. Breakers equipped with electronic trip units can operate reliably in ambient temperatures of 50 °C, and do not require specific calibration.

For this application on thermal-magnetic breakers, the trip unit digits (11–13) of the Power Defense circuit breaker catalog number are changed, from TFF and TFA to VFF and VFA, respectively. Details for these are provided within each frame section.

### Freeze-Tested Circuit Breakers

Power Defense circuit breakers may be ordered with freeze testing for applications in extreme cold conditions. This option uses special lubrication and mechanical operation is verified at –40 °C.

For this application, add suffix **J2** to digits 19–20 on a Power Defense catalog number to order.

### Fungus/Moisture Treated Breakers

Molded case circuit breakers are suited for operation in 0% to 95% noncondensing humidity environments. As is the case with all electrical equipment, application in a condition or environment above this humidity level should be avoided. Breakers applied in these environments should be protected by the proper NEMA rated enclosure (or of appropriate IP rating), and maintained dry. If such operating conditions cannot be met, special treatment of the circuit breaker should be considered to minimize the possibility of operational problems.

All Eaton circuit breaker cases are molded from a glass-polyester material, which does not support the growth of fungus. Any parts that are susceptible to the growth of fungus will require special treatment for application in these types of conditions.

For this application, add suffix **J1** to digits 19–20 on a Power Defense catalog number to order.

### High Altitude Applications

Low-voltage circuit breakers must be progressively derated for voltage and current carrying capacity at altitudes above approximately 6000 ft. The thinner air at higher altitudes reduces cooling and dielectric characteristics compared to denser air found at lower altitudes.

Please consult the product line, Technical Resources Center, or Eaton's *Consulting Application Guide* for specific de-rating details.

### 400 Hz Applications

Some specialty equipment requires 400–415 Hz power systems. Due to the increased resistance in these systems, circuit breakers typically require de-rating. Additionally, cable and bus sizes used at 400–415 Hz are not based on standard National Electrical Code tables for 60 Hz applications, and larger cross sections are necessary.

Eaton's Power Defense molded case circuit breakers may be used for overcurrent protection on these systems. Please consult with the product line or Technical Resources Center for specific information to order breakers and terminals for use on 400–415 Hz systems.

Breakers labeled for use in 400 Hz systems are not recognized by UL, therefore do not carry a UL Listing.

### Reverse Fed Applications

All Power Defense molded case circuit breakers shipped complete from Eaton's factory are capable of being reverse fed, with the power source feeding the lower side (typically considered the load side) of the circuit breaker. UL specifies parameters for circuit breakers to be applied in reverse-feed applications, which are met by Power Defense circuit breakers. This typically includes a factory seal and no "Line" or "Load" markings. All Frame Sizes 1 and 2 (PDG1 and PDG2) circuit breakers are always shipped in this configuration.

Breakers that ship as frames only (available in Frame Sizes 3–6), for field installation of trip units, are marked for standard application, with the line side marked at the top and the load side at the bottom, and meet UL requirement for standard applications.

An Eaton facility authorized to modify MCCBs under UL File E7819 may convert a standard circuit breaker of this type to a reverse-feed capable device per UL parameters following specific procedures.

Frame Sizes 1 and 2 always ship complete from the factory and are always reverse-feed capable. Frame Sizes 3, 4, 5 and 6 may ship as complete circuit breakers, or as separate frames and trip units if ordered separately.

Motor Circuit Protector devices are not capable of being reverse fed.



Series G, 15–2500 Amperes for UL, CSA and IEC Applications

2



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### Description

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High Instantaneous Circuit Breaker for	
Selective Coordination . . . . .	<b>V4-T2-205</b>
Special Features and Accessories . . . . .	<b>V4-T2-208</b>
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Drawout Cassette . . . . .	<b>V4-T2-219</b>

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## Product Overview

### Series G, 15–2500 Amperes for UL, CSA and IEC Applications

Eaton Series G molded case circuit breakers provide increased performance in considerably less space than standard circuit breakers or comparable fusible devices.

The “G” signifies global applications: Series G circuit breakers are marked with UL, CSA, CE, IEC and KEMA KEUR listings. Other advantages include:

- Field-fit accessories
- Common accessories through 630 amperes
- Electronic trip units from 20 to 2500 amperes
- UL-listed and IEC-rated, 30 mA ground fault/earth leakage modules
- Built-in ground fault protection down to 20 amperes

The EG, JG and LG frames are designed around space-saving footprints. The NG and RG use the proven Eaton Series C ND and RD designs.

The Series G family includes five frame sizes in ratings from 15 to 2500 amperes. Series G offers a choice of several interrupting capacities up to 200 kA at 480 volts AC (200 kA at 240 volts AC).

Series G molded case circuit breakers are also available in direct current options. Please see Specialty Breakers **Section 2.6** for more details.

Standard calibration is 40 °C. For applications in high ambient temperature conditions, 50 °C factory calibration is available on thermal-magnetic breakers (not UL).

### The Most Logically Designed Contact Assembly

The flexibility and outstanding performance characteristics of Eaton circuit breakers are made possible by the best contact designs in circuit breaker history. Our technology creates a high-speed “blow-open” action using the electromechanical forces produced by high-level fault currents.

Eaton circuit breakers are operated by a toggle-type mechanism that is mechanically trip-free from the handle so that the contacts cannot be held closed against short circuit currents. Tripping due to overload or short circuits is clearly indicated by the position on the handle. This remarkably fast and dependable contact action is designed to enhance safety.

### Thorough In-Plant Testing

The quality, dependability and reliability of every Eaton Circuit Breaker is ensured by a thorough program of in-plant testing. Two calibration tests are conducted on every pole of every circuit breaker to verify the trip mechanism, operating mechanism, continuity and accuracy.

### Current Limiting Characteristics

Circuit breakers are current limiting because of their high repulsion contact arrangement and use of state-of-the-art arc extinguishing technology.

Eaton offers one of the most complete lines of current limiting breakers in the industry. The industrial breakers are available in current limiting versions with interrupting capacities up to 200 kA at 480 V without fuses in the same physical size as standard and high interrupting capacity breakers.

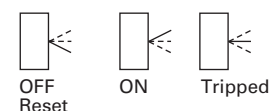
### Operating Mechanisms

Eaton circuit breakers have a toggle handle operating mechanism, which also serves as a switching position indicator. The indicator shows the positions of: ON, OFF and TRIPPED.

The toggle handle snaps into the TRIPPED position if the breaker is tripped by one of its overcurrent, short circuit, shunt or undervoltage releases. Before the circuit breaker can be reclosed following a trip-out, the toggle handle must be brought beyond the OFF position (RESET). The circuit breaker can then be reclosed.

As an additional switching position indicator for EG- to RG-Frame circuit breakers, there are two windows on the right and on the left of the toggle handle, in which the switching state is indicated by means of the colors red, green and white corresponding to the ON, OFF and TRIPPED positions respectively.

### Positions of the Toggle Handle Drive



### Standards and Certifications

Eaton Series G circuit breakers meet applicable UL 489 and IEC 60947-2 standards.

Molded case circuit breakers from Eaton are designed to conform with the following international standards:

- Australian Standard AS 2184 and AS 3947-2 molded case circuit breakers
- British Standards Institution Standard EN60947.2
- International Electromechanical Commission Recommendations IEC 60947.2 circuit breakers
- CE
- Japanese T-Mark standard molded case circuit breakers
- National Electrical Manufacturers Association Standards Publication No. AB1-1993 molded case circuit breakers
- South African Bureau of Standards, Standard SANS 156, Standard Specification for molded case circuit breakers
- Swiss Electro-Technical Association Standard SEV 947.2, Safety Regulations for circuit breakers
- Union Technique de l'Electricite Standard NF C 63-120, low voltage switchgear and control gear circuit breaker requirements
- Verband Deutscher Elektrotechnike (Association of German Electrical Engineers) Standard VDE 0660, low voltage switchgear and control gear, circuit breakers

### Global Third-Party Certification

Certification marks ensure product compliance with the total standard via the third party witnessing of tests by globally recognized independent certification organizations.

KEMA is a highly recognized, independent international organization that offers certification and inspection facilities for equipment in many industries. The KEMA-KEUR mark is the highest certification an electrical product can receive from KEMA. Our IEC 60947-2 molded case circuit breakers are KEMA tested and certified. These breakers are also listed in accordance with UL 489, as well as CSA C22.2 No. 5-02.

KEMA, UL and CSA provide ongoing follow-up testing and inspections to ensure that Eaton molded case circuit breakers continue to meet their exacting standards.

### ISO Certification

Eaton circuit breakers are manufactured in ISO® certified facilities.

## Product Selection Overview

### Electronic Trip Units (Digitrip RMS Trip Units)—Multi-Function Electronic Trip Units for All Applications

2

#### True rms Sensing

Digitrip RMS trip units use Eaton's microprocessor-based intelligence to provide true rms sensing, permitting increased accuracy and reliable system protection. True rms sensing is not susceptible to nuisance tripping when waveforms containing high harmonic currents are present.

#### Digitrip RMS 310+

Digitrip RMS 310+ electronic trip units are available with Eaton Series G circuit breakers JG, LG, NG and RG, as well as Series C FD, KD, LD and MDL circuit breakers.

Digitrip 310+ trip units are equipped with an integrated  $I_r$  switch that allows users to modify the continuous current rating of the breaker without having to replace a rating plug. This provides further flexibility for coordination in systems. The trip units may be used in 50 Hz or 60 Hz applications. The Digitrip 310+ offers true rms sensing, is front adjustable and has an optional local display of current and cause of trip.

#### Curve Shaping

When selectively coordinated systems are called for, Digitrip RMS 310+ will provide a cost-effective solution for a variety of applications.

The standard Digitrip RMS 310+ includes an adjustable short time pickup setting encompassing an  $I^2t$  ramp function that provides the basic LS curve shaping function.

Digitrip 310+ trip units also include selectable long time delay ( $t_{LD}$ ) and pickup settings ( $I_r$ ). A rating plug is not required.

The optional Digitrip RMS 310+ LSI and LSI $G$  provide additional flat response short time delay adjustments and an instantaneous setting to provide LSI curve shaping capability.

Digitrip RMS 310+ LSG and LSI $G$  units are available with ground fault pickup and flat response ground fault delay. Ground fault alarm options are available with trip and no trip functionality as a means to notify users of a ground fault condition with the option to maintain the breaker online.

Digitrip RMS 310+ trip units can effectively coordinate with both sophisticated upstream power breakers as well as downstream thermal-magnetic breakers, making Digitrip RMS 310+ trip units the cost-effective reliable choice for selectively coordinated systems.

#### Thermal Memory

All Digitrip RMS trip units incorporate a long delay. Thermal memory prevents the system from cumulative overheating due to repeated overcurrent events that may occur in quick succession.

#### Field Testing

A field test kit is available for Digitrip RMS 310+ trip units.

#### Arcflash Reduction Maintenance Mode (ARMS)

ARMS is an available feature on KD, LG, LD, MDL, NG and RG frames with 310+ electronic trip units. This feature increases worker safety by providing an accelerated instantaneous trip unit to reduce arc flash. Additionally, LG, NG and RG frames with the ARMS feature include a fully adjustable instantaneous setting.

#### Digitrip RMS 610 and 910

Digitrip RMS 610 and 910 trip units are available with Eaton R-Frame circuit breakers 800 through 2500 amperes. Digitrip 610 and 910 trip units provide unparalleled system protection with the added convenience of a local display.

#### Curve Shaping

Digitrip RMS 610 and 910 trip units are available with up to nine curve shaping choices achieved by adjusting up to seven switches on the front of the unit for optimum system coordination. Maximum curve shaping flexibility is provided by dependent long and short delay adjustments that are long delay pickup ( $I_r$ ) based, depicted on the front of the unit by the blue portion of the time-current curve.

Additional coordination capability can be provided by utilizing the short delay and ground fault zone selective interlocking features available on these trip units.

#### System Diagnostics

Digitrip RMS 610 and 910 models of trip units provide long delay, short delay, instantaneous, and ground fault cause of trip LEDs on the front of the unit. Their display shows a magnitude of trip information, as well as remote signal contacts, for improved system alarming.

#### System Monitoring

Digitrip 610 and 910 trip units have the capability to monitor phase currents, as well as neutral or ground currents. This information is displayed on a large digital display mounted on the unit.

Digitrip RMS 910 trip units can also provide the user with power and energy monitoring capability. Peak power demand, present power demand, and total energy, as well as forward and reverse energy can be monitored with this unit.

Digitrip RMS 910 trip units have the additional capability of monitoring line-to-line voltage, as well as system power factor. Both parameters are displayed in the digital display window and are supported by LEDs to indicate which parameter is being displayed.

#### Harmonics Monitoring

Digitrip RMS 910 trip units are capable of displaying values of current harmonics in the digital display window. Percentage of harmonic content can be monitored for each phase, up to the 27th harmonic. Additionally, a total harmonic distortion value can be calculated and displayed.

#### Communications

Digitrip RMS 910 units have built-in communications options to allow all protection, monitoring, and control information to be transmitted back to a central location via the Eaton PowerNet™ system.

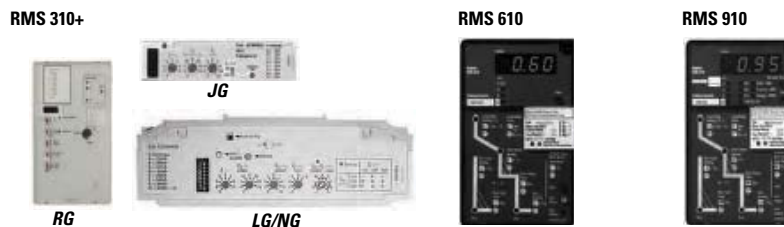
#### Field Testing

Integral field testing capability is provided on all 610 and 910 trip units. No additional test set is needed to perform both trip and no trip field testing.

## Product Selection Guide

## Electronic Trip Units

## Digitrip—RMS 310+, 610 and 910



Breaker Type					
Series G frame(s)		JG-, LG-, NG- and RG-Frames		RG-Frame	RG-Frame
Ampere rating		20–2500 A		800–2500 A	800–2500 A
Interrupting rating at 415 V		35, 70, 100 kA		70, 100 kA	70, 100 kA
Trip Unit Sensing					
rms sensing		Yes		Yes	Yes
Protection and Coordination <sup>①</sup>					
Protection	Ordering options	LS, LSG	LSI, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG
	Fixed rating plug ( $I_n$ ) <sup>②</sup>	Yes	Yes	Yes	Yes
	Overtemperature trip	Yes	Yes	Yes	Yes
Long delay	Adjustable $I_r$ switch	Yes	Yes	No	No
	Long delay setting	VAR/frame	VAR/frame	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )
	Long delay time $I^2t$ at 6x	10 seconds <sup>③</sup>	10 seconds <sup>③</sup>	2–24 seconds	2–24 seconds
	Long delay thermal memory	Yes	Yes	Yes	Yes
	High load alarm	1.05 $I_r$	1.05 $I_r$	0.85 x $I_r$	0.85 x $I_r$
Short delay	Short delay setting	VAR/frame <sup>④</sup>	VAR/frame <sup>④</sup>	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )
	Short delay time $I^2t$	100 ms	No	100, 300, 500 ms	100, 300, 500 ms
	Short delay time flat	No	1–300 ms	100–500 ms	100–500 ms
	Short delay time ZSI	No	Yes	Yes	Yes
Instantaneous	Independent adjustable Inst. setting	No	Yes <sup>⑤</sup>	Yes	Yes
	Instantaneous setting	No	VAR/frame	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )
	Discriminator	No	No	Yes <sup>⑥</sup>	Yes <sup>⑥</sup>
	Instantaneous override	Yes	Yes	Yes	Yes
Ground fault	Ground fault setting	VAR/frame <sup>⑦</sup>	VAR/frame <sup>⑦</sup>	25–100% x ( $I_n$ ) <sup>⑦</sup>	25–100% x ( $I_n$ ) <sup>⑦</sup>
	Ground fault delay $I^2t$ at 0.62x	No	No	100, 300, 500 ms	100, 300, 500 ms
	Ground fault delay flat	1–300 ms	1–300 ms	100–500 ms	100–500 ms
	Ground fault ZSI	No	Yes	Yes	Yes
	Ground fault thermal memory	No	No	Yes	Yes

## Notes

$I_n$  = Rating plug rating.  
 $I_r$  = Long delay setting.

<sup>①</sup> 310+ details are included by frame in **Pages V4-T2-148** (JG), **V4-T2-166** (LG), **V4-T2-176** (NG), and **V4-T2-187** (RG).

<sup>②</sup> 310+ trip units have selectable settings instead of a rating plug.

<sup>③</sup> 310+ trip units have adjustable long delay times of 2–24 seconds, except NG 310+ for 800 A frame, for which it is 2–14 seconds.

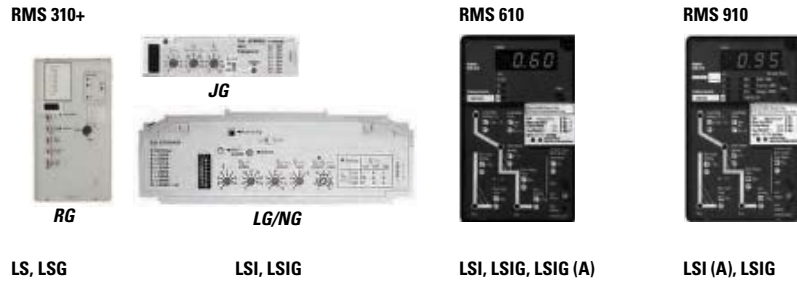
<sup>④</sup> JG/LG: 2X–14X ( $I_n$ ); NG: 2X–8X ( $I_n$ ); RG: 2X–9X ( $I_n$ ); 2500 ampere RG-Frame 2X–6X% x ( $I_n$ ).

<sup>⑤</sup> LG, NG and RG ALSI and ALSIG 310+ trip units include an independently adjustable Instantaneous ( $I_i$ ) setting.

<sup>⑥</sup> LS, LSG only.

<sup>⑦</sup> Not to exceed 1200 amperes.

#### Digitrip—RMS 310+, 610 and 910, continued



	LS, LSG	LSI, LSIG	LSI, LSIG, LSIG (A)	LSI (A), LSIG
<b>System Diagnostics</b>				
Cause of trip LEDs	Yes <sup>①②</sup>	Yes <sup>①②</sup>	Yes	Yes
Magnitude of trip information	No	No	Yes	Yes
Remote signal contacts	No	No	Yes	Yes
<b>System Monitoring</b>				
Digital display	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes	Yes
Current	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes	Yes
Voltage	No	No	No	Yes
Power and energy	No	No	No	Yes
Power quality—harmonics	No	No	No	Yes
Power factor	No	No	No	Yes
<b>System Communications</b>				
PowerNet	No	No	No	Yes
<b>Field Testing</b>				
Testing method	Test set <sup>④</sup>	Test set <sup>④</sup>	Integral	Integral

**Notes**

- ① Using cause of trip module (catalog number **TRIP-LED**).
- ② RG 310+ trip units include integrated cause of trip LEDs.
- ③ Using ammeter or remote ammeter/cause of trip display (catalog number **DIGIVIEW** and **DIGIVIEWR06**).
- ④ Test kit available for field testing 310+ trip units (catalog number **MTST230V**).

Technical Data and Specifications

Ratings

Frames EG, JG and LG

EG



JG



LG



Maximum rated current (amperes)		125, 160 <sup>①</sup>								250						400, 630 <sup>②</sup>						
Breaker type <sup>③</sup>		B	B	E	S	S	H	H	C	E	S	H	C	U	X	E	S	H	C	U	X	
Number of poles		1	2, 3, 4	2, 3, 4	1	2, 3, 4	1	2, 3, 4	3, 4	2, 3, 4	2, 3, 4	2, 3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	
<b>Breaker Capacity (kA rms) Vac 50–60 Hz</b>																						
NEMA <sup>®</sup> , UL, CSA	240 Vac	25	25	35	85	85	100	100	200	65	85	100	200	200	200	65	85	100	200	200	200	
	480 Vac	—	18	25	—	35	—	65	100	25	35	65	100	150	200	35	50	65	100	150	200	
	600 Vac <sup>④</sup>	—	—	18	—	22	—	25	35	18	18	25	35	50	50	18	25	35	50	65	65	
	125/250 Vdc <sup>⑤</sup>	10 <sup>⑥</sup>	10	10	35 <sup>⑥</sup>	35	42 <sup>⑥</sup>	42	42	42	10	22	22	42	50	50	22	22	42	42	50	50
IEC 60947-2	220–240 Vac	<i>I<sub>CU</sub></i>	25	25	35	85	85	100	100	200	65	85	100	200	200	200	65	85	100	200	200	200
		<i>I<sub>CS</sub></i>	25	25	35	43	43	50	50	200	65	85	100	200	200	200	65	85	100	200	200	200
	380–415 Vac	<i>I<sub>CU</sub></i>	—	18	25	—	40	—	70	100	25	40	70	100	150	200	35	50	70	100	150	200
		<i>I<sub>CS</sub></i>	—	18	25	—	30	—	35	100	25	40	70	100	150	200	35	50	53	100	150	200
	660–690 Vac	<i>I<sub>CU</sub></i>	—	—	—	—	—	—	—	—	12	12	14	16	18	18	12	20	25	30	35	35
		<i>I<sub>CS</sub></i>	—	—	—	—	—	—	—	—	6	6	7	12	14	14	6	10	13	15	18	18
	125/250 Vdc <sup>⑤</sup>	<i>I<sub>CU</sub></i>	10 <sup>⑥</sup>	10	10	35 <sup>⑥</sup>	35	42 <sup>⑥</sup>	42	42	10	22	22	42	50	50	22	22	42	42	50	50
		<i>I<sub>CS</sub></i>	10 <sup>⑥</sup>	10	10	35 <sup>⑥</sup>	35	42 <sup>⑥</sup>	42	42	10	22	22	42	50	50	22	22	42	42	50	50
Ampere range		15–160 A <sup>①</sup>								20–250 A						100–630 A <sup>②</sup>						
Trip Units		FT-FM								FT-AM						FT-AM						
F = Fixed		AT-FM								AT-AM						AT-AM						
A = Adjustable										Electronic (Digitrip RMS 310)						Electronic (Digitrip RMS 310)						
T = Thermal																						
M = Magnetic																						
Interchangeable		—	—	—	—	—	—	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
Built-in		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Thermal magnetic	Fixed thermal	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	Adjustable thermal	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	Magnetic	Fixed								Adjustable						Adjustable						
Electronic RMS <sup>⑦</sup>	LS	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
	LSI	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
	LSG	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
	LSIG	—	—	—	—	—	—	—	—	■	■	■	■	■	■	■	■	■	■	■	■	
	ALSI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	■	■	■	■	■	■	
	ALSIG	—	—	—	—	—	—	—	—	—	—	—	—	—	—	■	■	■	■	■	■	
Utilization category		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	

Notes

- ① 125 amperes is the maximum UL and CSA rating for the EG.
- ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.
- ③ Breaker type C, U and X are current limiting per UL 489.
- ④ EG breaker rated 600/347 Vac.
- ⑤ Two poles in series.
- ⑥ 125 Vdc only for single-pole breakers.
- ⑦ Not suitable for DC application. Four-pole ground fault not available.

# 2.3

## Molded Case Circuit Breakers

### Series G

#### Frames NG and RG

NG



RG



Maximum rated current (amperes)		800, 1200	800, 1200	800, 1200	1600 <sup>①</sup>	800	1600, 2000, 2500	1600, 2000, 2500	
Breaker type		S	H	C <sup>②</sup>	S	U	H	C <sup>②</sup>	
Number of poles		2, 3, 4	2, 3, 4	2, 3, 4	3	3	3, 4	3, 4	
<b>Breaker Capacity (kA rms) AC 50–60 Hz</b>									
NEMA, UL, CSA	240 Vac	85	100	200	—	200	125	200	
	480 Vac	50	65	100	—	150	65	100	
	600 Vac	25	35	65	—	65	50	65	
IEC 60947-2	220–240 Vac	$I_{cu}$	85	100	200	85	—	135	200
		$I_{cs}$	85	100	100	85	—	100	100
	380–415 Vac	$I_{cu}$	50	70	100	50	—	70	100
		$I_{cs}$	50	50	50	50	—	50	50
	660–690 Vac	$I_{cu}$	20 <sup>③</sup>	25 <sup>③</sup>	35	20 <sup>③</sup>	—	25 <sup>③</sup>	35 <sup>③</sup>
		$I_{cs}$	10	13	18	10	—	13	18
	250 Vdc	$I_{cu}$	—	—	—	—	—	—	—
		$I_{cs}$	—	—	—	—	—	—	—
Ampere range		400–1200 A	400–1200 A	400–1200 A	1600 A	800 A	800–2500 A	800–2500 A	
Trip units		Electronic (Digitrip RMS 310+)				Electronic (Digitrip RMS 310+ and 910)			
	Interchangeable	—	—	—	—	—	■ <sup>⑤</sup>	■ <sup>⑤</sup>	
	Built-in	■	■	■	■	■	■	■	
Electronic <sup>④</sup>	LI	—	—	—	—	—	■ <sup>⑥</sup>	■ <sup>⑥</sup>	
	LS	■	■	■	■	■	■	■	
	LSI	■	■	■	■	■	■	■	
	LIG	—	—	—	—	—	■ <sup>⑥</sup>	■ <sup>⑥</sup>	
	LSG	■	■	■	■	■	■	■	
	LSIG	■	■	■	■	■	■	■	
	ALSI	■	■	■	■	—	■	■	
	ALSIG	■	■	■	■	—	■	■	
Utilization category		A	A	A	A	A	A	A	

#### Notes

- ① NG 1600 ampere frame is not UL or CSA listed.
- ② Not KEMA-KEUR listed.
- ③ IEC 60947-2 H.5 Annex H is not KEMA-KEUR tested.
- ④ Not suitable for DC application. Four-pole ground fault not available.
- ⑤ RG 310+ are interchangeable with the exception of: FROM not ground fault equipped TO ground fault equipped
- ⑥ Available only on Digitrip 910 trip units.

## General Specifications

## All Series G Frames

	EG		JG		LG		NG		RG	
Maximum rated current $I_n$ depending on the version	160 A <sup>①</sup>		250 A		400, 630 A <sup>②</sup>		800, 1200, 1600 A <sup>③</sup>		1600, 2000, 2500 A	
Rated insulation voltage U, according to IEC 60947-2										
Main conducting paths	500 Vac		750 Vac		750 Vac		750 Vac		750 Vac	
Auxiliary circuits	500 Vac		690 Vac		690 Vac		690 Vac		690 Vac	
Rated impulse withstand voltage $U_{imp}$										
Main conducting paths	6 kV		8 kV		8 kV		8 kV		8 kV	
Auxiliary circuits	4 kV		4 kV		4 kV		4 kV		4 kV	
Rated operational voltage $U_e$										
IEC	415 Vac		690 Vac		690 Vac		690 Vac		690 Vac	
NEMA	600Y/347 Vac		600 Vac		600 Vac		600 Vac		600 Vac	
UL and CSA listed	Yes <sup>①</sup>		Yes		Yes <sup>②</sup>		Yes <sup>③</sup>		Yes	
Permissible ambient temperature	-20 ° to 70 °C		-20 ° to 70 °C		-20 ° to 70 °C		-20 ° to 70 °C		-20 ° to 70 °C	
Permissible load for various ambient temperatures close to the circuit breaker, related to the rated current of the circuit breaker	④      ⑤		④      ⑤		④      ⑤		—		—	
Circuit breakers for plant protection										
At 40 °C	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
At 50 °C	96%	92%	96%	94%	96%	91%	91%	91%	91%	91%
At 55 °C	93%	87%	94%	90%	93%	86%	85%	85%	85%	85%
At 60 °C	91%	83%	92%	87%	90%	82%	81%	81%	81%	81%
At 70 °C	86%	73%	88%	80%	84%	70%	70%	70%	70%	70%
Circuit breakers for motor protection										
At 40 °C	—		100%		100%		—		—	
At 50 °C	—		100%		100%		—		—	
At 55 °C	—		100%		100%		—		—	
At 60 °C	—		100%		100%		—		—	
At 70 °C	—		90%		90%		—		—	
Circuit breakers for starter combinations and isolating circuit breakers										
At 40 °C	100%		100%		100%		100%		100%	
At 50 °C	100%		100%		100%		91%		91%	
At 55 °C	96%		96%		95%		85%		85%	
At 60 °C	91%		82%		90%		81%		81%	
At 70 °C	86%		88%		84%		—		—	
Rated short-circuit breaking capacity (DC) Not for circuit breakers for motor protection (Time constant $t = 10$ rms)										
Two conducting paths in series For EG to LG up to 250 Vdc	42 kA max.		42 kA max.		42 kA max.		⑥		⑥	
NEMA (time constant $t = 8$ rms) Two conducting paths in series 250 Vdc	42 kA max.		42 kA max.		42 kA max.		⑥		⑥	

## Notes

- ① 125 amperes is the maximum UL and CSA rating for the EG.
- ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ③ 1200 amperes is the maximum UL and CSA rating for the NG.
- ④ Thermal overload release set to the lower value.
- ⑤ Thermal overload release set to the upper value.
- ⑥ Not suitable for DC switching.



# 2.3

## Molded Case Circuit Breakers

### Series G

#### All Series G Frames, continued

2

	EG	JG	LG	NG	RG	
Main switch characteristics according to IEC 60947-2 in combination with lockable rotary drives	Yes	Yes	Yes	Yes	Yes	
Rated short circuit breaking capacity according to IEC 60947-2 (at AC 50/60 Hz)	For rated short circuit breaking capacity, see <b>Page V4-T2-113</b> .					
Endurance (operating cycles)	10,000	10,000	8,000	3,000	3,000	
Maximum switching frequency	300 1/h	240 1/h	240 1/h	60 1/h	60 1/h	
Conductor cross sections and terminal types for main conductors	Box terminals	Box terminals	Box terminals	Flat bar terminals	Flat bar terminals	Flat bar terminals
Solid or stranded	2.5 to 95 mm <sup>2</sup>	50 to 150 mm <sup>2</sup>	95 to 240 mm <sup>2</sup>	—	—	—
Finely stranded with end sleeve	2.5 to 50/70 mm <sup>2</sup>	35 to 120 mm <sup>2</sup>	70 to 150 mm <sup>2</sup>	—	—	—
Busbar	—	—	—	600 A	Optional	Optional
Tightening torque for box terminals	5.6 Nm	20 Nm	42 Nm	31 Nm	31 Nm	—
Tightening torque for busbar connection pieces	5.6 Nm	15 Nm	30 Nm	6 Nm	50 Nm	20 Nm
Conductor cross sections for auxiliary circuits with terminal connection or terminal strip						
Solid	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	Up to 2x4 mm <sup>2</sup>	Up to 2x4 mm <sup>2</sup>	
Finely stranded with end sleeve	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	0.75 to 2.5 mm <sup>2</sup>	Up to 2x2.5 mm <sup>2</sup>	Up to 2x2.5 mm <sup>2</sup>	
With brought-out cable ends	—	0.82 (AWG 18) mm <sup>2</sup>	0.82 (AWG 18) mm <sup>2</sup>	0.82 (AWG 18) mm <sup>2</sup>	0.82 (AWG 18) mm <sup>2</sup>	
Tightening torque for fitting screws	—	0.8 to 1.4 Nm	0.8 to 1.4 Nm	0.8 to 1.4 Nm	0.8 to 1.4 Nm	
Power loss per circuit breaker at maximum rated current I <sub>n</sub> (the power losses of the undervoltage releases ("r" releases) must be observed if necessary) at three-phase symmetrical load)			<b>400 A:</b>	<b>600 A:</b>		
For plant protection	40 W	45 W	65 W	120 W	87/210 W	220/270/400 W
As isolating circuit breaker	40 W	45 W	65 W	120 W	87/210 W	220/270/400 W
For starter combinations	40 W	45 W	65 W	120 W	—	—
For motor protection	—	45 W	65 W	120 W	—	—
Permissible mounting position						
Arc spacing— suitable for reverse-feed applications	Yes (except HMCPE)	Yes	Yes	Yes	Yes	
<b>Auxiliary Switches</b>						
Rated thermal current I <sub>th</sub>	6A	6A	6A	6A	6A	
Rated making capacity	20 A	20 A	20 A	20 A	20 A	
	<b>AC-14</b>	<b>AC-14</b>	<b>AC-14</b>	<b>AC-15</b>	<b>AC-15</b>	
Rated operational voltage	230/400/600 V	230/400/600 V	230/400/600 V	600 V	600 V	
Rated operational current	6/3/0.25 A	6/3/0.25 A	6/3/0.25 A	6A	6A	
				<b>DC-13</b>	<b>DC-13</b>	
Rated operational voltage	125/250V	125/250V	125/250V	125/250V	125/250V	
Rated operational current	0.5/0.15 A	0.5/0.15 A	0.5/0.15 A	0.5/0.25 A	0.5/0.25 A	
Backup fuse	6/4/4 A	(4) 6/4/4 A	(4) 6/4/4 A	(4) 6/4/4 A	(4) 6/4/4 A	
Miniature circuit breaker	6/4 A	6/4 A	6/4 A	6/4 A	6/4 A	

## All Series G Frames, continued

	EG	JG	LG	NG	RG
<b>Releases</b>					
Undervoltage releases ("r" releases)					
Response voltage:					
Drop (breaker tripped) $U_s$	35–70%	35–70%	35–70%	35–70%	35–70%
Pickup (breaker may be switched on) $U_s$	85–110%	85–110%	85–110%	85–110%	85–110%
Power consumption in continuous operation at:					
50/60 Hz 12 Vac	—	—	—	1.9 VA	2.9 VA
50/60 Hz 24 Vac	0.72 VA	3.9 VA	3.9 VA	2.4 VA	3.1 VA
50/60 Hz 48–60 Vac	1.15–1.78 VA	2.5–3.8 VA	2.5–3.8 VA	2.3–4.1 VA	3.4–6.0 VA
50/60 Hz 110–127 Vac	0.96–1.25 VA	1.8–2.4 VA	1.8–2.4 VA	3.4–4.2 VA	3.3–3.8 VA
50/60 Hz 208–240 Vac	1.28–1.68 VA	2.7–3.8 VA	2.7–3.8 VA	4.8–6.5 VA	4.2–7.2 VA
50/60 Hz 380–500 Vac	2.2–3.9 VA	3.4–5.8 VA	3.4–5.8 VA	6.8–12.0 VA	3.8–10.0 VA
50/60 Hz 525–600 Vac	3.4–4.3 VA	3.4–4.3 VA	3.4–4.3 VA	—	—
12 Vdc	—	—	—	2.6W	3.4W
24 Vdc	0.70 W	3.1W	3.1W	3.6W	4.3W
48–60 Vdc	1.12–1.76W	2.0–3.1W	2.0–3.1W	3.5–5.5W	4.8–7.2W
110–125 Vdc	0.94–1.21W	1.6–2.2W	1.6–2.2W	2.9–3.6W	3.3–3.8W
220–250 Vdc	1.45–1.86W	3.1–4W	3.1–4W	4.8–6.3W	6.6–7.5W
Maximum opening time	50 ms	50 ms	50 ms	62 ms	62 ms
<b>Shunt Trips</b>					
Shunt trips ("f" releases)					
Response voltage:					
Pickup (breaker tripped) $U_s$	70–110%	70–110%	70–110%	70–110%	70–110%
Power consumption in (short time) at:					
50/60 Hz 24 Vac	10–41 VA	87–405 VA	87–405 VA	98–475 VA	612 VA
50/60 Hz 48–60 Vac	139–210 VA	710–1105 VA	710–1105 VA	24–50 VA	403–666 VA
50/60 Hz 48–127 Vac	—	—	—	—	—
50/60 Hz 110–240 Vac	83–360 VA	66–432 VA	66–432 VA	67–432 VA	396–1896 VA
50/60 Hz 380–440 Vac	—	127–188 VA	127–188 VA	76–110 VA	1596–2156 VA
50/60 Hz 380–600 Vac	418–1080 VA	—	—	—	—
50/60 Hz 480–600 Vac	—	34–60 VA	34–60 VA	19–42 VA	230–384 VA
12–24 Vdc	29–120 W	164–631 W	164–631 W	145–610 W	396 W
48–60 Vdc	475–720 W	830–1580 W	830–1580 W	67–102 W	341–528 W
110–125 Vdc	99–121 W	112–150 W	112–150 W	121–150 W	264–350 W
220–250 Vdc	—	40–58W	40–58 W	46–55 W	374–475 W
Maximum load duration	Interrupts automatically	Interrupts automatically	Interrupts automatically	Interrupts automatically	Interrupts automatically
Maximum opening time	50 ms	50 ms	50 ms	62 ms	62 ms
<b>Molded Case Switch (with High Magnetic Trip)</b>					
Unfused kAIC at 480 Vac (415 Vac)	65 (70)	65 (70)	65 (70)	65 (70)	65 (70)
Self-protected, will trip above	1250 for EG125; 1600 for EG160	2500	4000/6300	12,500	20,000



# 2.3

## Molded Case Circuit Breakers

### Series G

#### Dimensions and Weights

Approximate Dimensions in Inches (mm)

2

##### Series G—Frame EG, JG and LG

	EG			JG			LG		
	H	W	D	H	W	D	H	W	D
<b>Single-pole</b>	5.50 (139.7)	1.00 (25.4)	2.99 (76.0)	—	—	—	—	—	—
<b>Two-pole</b>	5.50 (139.7)	2.00 (50.8)	2.99 (76.0)	7.00 (177.8)	4.13 (105.0)	3.57 (87.4)	—	—	—
<b>Three-pole</b>	5.50 (139.7)	3.00 (76.2)	2.99 (76.0)	7.00 (177.8)	4.13 (105.0)	3.57 (87.4)	10.13 (258.0)	5.48 (140.0)	4.09 (104.0)
<b>Four-pole</b>	5.50 (139.7)	4.00 (101.6)	2.99 (76.0)	7.00 (177.8)	5.34 (135.6)	3.57 (87.4)	10.13 (258.0)	7.22 (183.0)	4.09 (104.0)

##### Series G—Frame NG and RG

	NG			RG		
	H	W	D	H	W	D
<b>Single-pole</b>	—	—	—	—	—	—
<b>Two-pole</b>	—	—	—	—	—	—
<b>Three-pole</b>	16.00 (406.0)	8.25 (210.0)	5.50 (140.0)	16.00 (406.0)	15.50 (394.0)	9.75 (229.0)
<b>Four-pole</b>	16.00 (406.0)	11.13 (280.0)	5.50 (140.0)	16.00 (406.0)	20.00 (508.0)	9.75 (229.0)

Approximate Shipping Weight in Lbs (kg)

##### Series G—Frame EG, JG and LG

	EG	JG	LG	NG	RG
<b>Single-pole</b>	0.85 (0.39)	—	—	—	—
<b>Two-pole</b>	1.57 (0.71)	11.3 (5.13)	—	—	—
<b>Three-pole</b>	2.28 (1.04)	5.06 (2.30) T/M 5.31 (2.41) ETU	12.36 (5.61) T/M 13.04 (5.92) ETU	46.8 (21.3)	103.0 (47.0)
<b>Four-pole</b>	2.85 (1.29)	6.76 (3.07) T/M 7.12 (3.23) ETU	16.27 (7.39) T/M 16.92 (7.68) ETU	62.0 (28.3)	118.4 (54.0)

**EG-Frame (15–125 Amperes)****EG-Frame (15–125 Amperes)****Product Description**

EG breaker is HACR rated.

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JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-133</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-189</b>
Motor Protector Circuit Breakers (MPCB). . . . .	<b>V4-T2-193</b>
30 mA Ground Fault (Earth Leakage) Module. . . . .	<b>V4-T2-196</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-200</b>
High Instantaneous Circuit Breaker for	
Selective Coordination . . . . .	<b>V4-T2-205</b>
Special Features and Accessories. . . . .	<b>V4-T2-208</b>
Motor Operators . . . . .	<b>V4-T2-216</b>
Plug-In Blocks . . . . .	<b>V4-T2-218</b>
Drawout Cassette . . . . .	<b>V4-T2-219</b>

# 2.3

## Molded Case Circuit Breakers

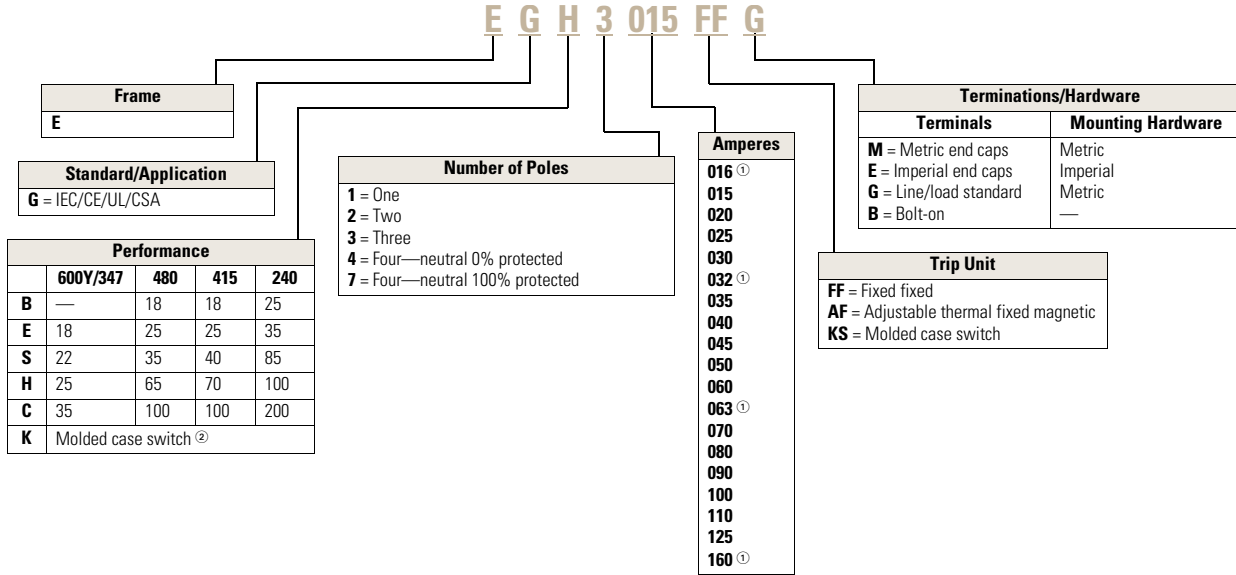
### Series G

2

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### Series G—EG-Frame (15–125 Amperes)



#### Notes

- ① Cannot be UL rated.
- ② Available only as 125 and 160 A sizes.

## Product Selection

Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware) IC Rating at 415/480 Volts

EG-Frame



## EG-Frame—18/18

Maximum Continuous Amps at 40 °C ①	Single-Pole	Two-Pole	Three-Pole	Adjustable ② Thermal, Fixed Magnetic	Four-Pole ③	Adjustable ② Thermal, Fixed Magnetic
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number
15	EGB1015FFG	EGB2015FFG	EGB3015FFG	—	EGB4015FFG	—
16	EGB1016FFG	EGB2016FFG	EGB3016FFG	—	EGB4016FFG	—
20	EGB1020FFG	EGB2020FFG	EGB3020FFG	—	EGB4020FFG	EGB4020AFG
25	EGB1025FFG	EGB2025FFG	EGB3025FFG	EGB3025AFG	EGB4025FFG	EGB4025AFG
30	EGB1030FFG	EGB2030FFG	EGB3030FFG	—	EGB4030FFG	—
32	EGB1032FFG	EGB2032FFG	EGB3032FFG	EGB3032AFG	EGB4032FFG	EGB4032AFG
35	EGB1035FFG	EGB2035FFG	EGB3035FFG	—	EGB4035FFG	—
40	EGB1040FFG	EGB2040FFG	EGB3040FFG	EGB3040AFG	EGB4040FFG	EGB4040AFG
45	EGB1045FFG	EGB2045FFG	EGB3045FFG	—	EGB4045FFG	—
50	EGB1050FFG	EGB2050FFG	EGB3050FFG	EGB3050AFG	EGB4050FFG	EGB4050AFG
60	EGB1060FFG	EGB2060FFG	EGB3060FFG	—	EGB4060FFG	—
63	EGB1063FFG	EGB2063FFG	EGB3063FFG	EGB3063AFG	EGB4063FFG	EGB4063AFG
70	EGB1070FFG	EGB2070FFG	EGB3070FFG	—	EGB4070FFG	—
80	EGB1080FFG	EGB2080FFG	EGB3080FFG	EGB3080AFG	EGB4080FFG	EGB4080AFG
90	EGB1090FFG	EGB2090FFG	EGB3090FFG	—	EGB4090FFG	—
100	EGB1100FFG	EGB2100FFG	EGB3100FFG	EGB3100AFG	EGB4100FFG	EGB4100AFG
110	EGB1110FFG	EGB2110FFG	EGB3110FFG	—	EGB4110FFG	—
125	EGB1125FFG	EGB2125FFG	EGB3125FFG	EGB3125AFG	EGB4125FFG	EGB4125AFG
160	—	—	EGB3160FFG	EGB3160AFG	EGB4160FFG	EGB4160AFG

## Notes

① 16, 32, 63 and 160 A are not UL listed ratings.

② Adjustable thermal are not UL listed.

③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.

# 2.3

## Molded Case Circuit Breakers

### Series G

EG-Frame—25/25 Single-Pole Unavailable

2

EG-Frame

EG-Frame—25/25



Maximum Continuous Amps at 40 °C <sup>①</sup>	Two-Pole		Three-Pole		Four-Pole <sup>③</sup>	
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number
15	EGE2015FFG	EGE3015FFG	—	—	EGE4015FFG	—
16	EGE2016FFG	EGE3016FFG	—	—	EGE4016FFG	—
20	EGE2020FFG	EGE3020FFG	—	—	EGE4020FFG	EGE4020AFG
25	EGE2025FFG	EGE3025FFG	EGE3025AFG	—	EGE4025FFG	EGE4025AFG
30	EGE2030FFG	EGE3030FFG	—	—	EGE4030FFG	—
32	EGE2032FFG	EGE3032FFG	EGE3032AFG	—	EGE4032FFG	EGE4032AFG
35	EGE2035FFG	EGE3035FFG	—	—	EGE4035FFG	—
40	EGE2040FFG	EGE3040FFG	EGE3040AFG	—	EGE4040FFG	EGE4040AFG
45	EGE2045FFG	EGE3045FFG	EGE3050AFG	—	EGE4045FFG	—
50	EGE2050FFG	EGE3050FFG	—	—	EGE4050FFG	EGE4050AFG
60	EGE2060FFG	EGE3060FFG	—	—	EGE4060FFG	—
63	EGE2063FFG	EGE3063FFG	EGE3063AFG	—	EGE4063FFG	EGE4063AFG
70	EGE2070FFG	EGE3070FFG	—	—	EGE4070FFG	—
80	EGE2080FFG	EGE3080FFG	EGE3080AFG	—	EGE4080FFG	EGE4080AFG
90	EGE2090FFG	EGE3090FFG	—	—	EGE4090FFG	—
100	EGE2100FFG	EGE3100FFG	EGE3100AFG	—	EGE4100FFG	EGE4100AFG
125	EGE2125FFG	EGE3125FFG	EGE3125AFG	—	EGE4125FFG	EGE4125AFG
160	—	EGE3160FFG	EGE3160AFG	—	EGE4160FFG	EGE4160AFG

**Notes**

- ① 16, 32, 63 and 160 A are not UL listed ratings.
- ② Adjustable thermal are not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.

## EG-Frame

## EG-Frame—40/35



Maximum Continuous Amps at 40 °C <sup>①</sup>	Single-Pole	Two-Pole	Three-Pole	Adjustable Thermal, Fixed Magnetic <sup>②</sup> Catalog Number	Four-Pole <sup>③</sup>	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number		Fixed Thermal, Fixed Magnetic Catalog Number	
15	EGS1015FFG	EGS2015FFG	EGS3015FFG	—	EGS4015FFG	—
16	EGS1016FFG	EGS2016FFG	EGS3016FFG	—	EGS4016FFG	—
20	EGS1020FFG	EGS2020FFG	EGS3020FFG	—	EGS4020FFG	EGS4020AFG
25	EGS1025FFG	EGS2025FFG	EGS3025FFG	EGS3025AFG	EGS4025FFG	EGS4025AFG
30	EGS1030FFG	EGS2030FFG	EGS3030FFG	—	EGS4030FFG	—
32	EGS1032FFG	EGS2032FFG	EGS3032FFG	EGS3032AFG	EGS4032FFG	EGS4032AFG
35	EGS1035FFG	EGS2035FFG	EGS3035FFG	—	EGS4035FFG	—
40	EGS1040FFG	EGS2040FFG	EGS3040FFG	EGS3040AFG	EGS4040FFG	EGS4040AFG
45	EGS1045FFG	EGS2045FFG	EGS3045FFG	—	EGS4045FFG	—
50	EGS1050FFG	EGS2050FFG	EGS3050FFG	EGS3050AFG	EGS4050FFG	EGS4050AFG
60	EGS1060FFG	EGS2060FFG	EGS3060FFG	—	EGS4060FFG	—
63	EGS1063FFG	EGS2063FFG	EGS3063FFG	EGS3063AFG	EGS4063FFG	EGS4063AFG
70	EGS1070FFG	EGS2070FFG	EGS3070FFG	—	EGS4070FFG	—
80	EGS1080FFG	EGS2080FFG	EGS3080FFG	EGS3080AFG	EGS4080FFG	EGS4080AFG
90	EGS1090FFG	EGS2090FFG	EGS3090FFG	—	EGS4090FFG	—
100	EGS1100FFG	EGS2100FFG	EGS3100FFG	EGS3100AFG	EGS4100FFG	EGS4100AFG
125	EGS1125FFG	EGS2125FFG	EGS3125FFG	EGS3125AFG	EGS4125FFG	EGS4125AFG
160	—	—	EGS3160FFG	EGS3160AFG	EGS4160FFG	EGS4160AFG

**Notes**

- ① 16, 32, 63 and 160 A are not UL listed ratings.  
 ② Adjustable thermal are not UL listed.  
 ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.



# 2.3

## Molded Case Circuit Breakers

### Series G

2

EG-Frame



#### EG-Frame—70/65

Maximum Continuous Amps at 40 °C <sup>①</sup>	Single-Pole	Two-Pole	Three-Pole	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number	Four-Pole <sup>③</sup>	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number
	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number		Fixed Thermal, Fixed Magnetic Catalog Number	
15	EGH1015FFG	EGH2015FFG	EGH3015FFG	—	EGH4015FFG	—
16	EGH1016FFG	EGH2016FFG	EGH3016FFG	—	EGH4016FFG	—
20	EGH1020FFG	EGH2020FFG	EGH3020FFG	EGH3020AFG	EGH4020FFG	EGH4020AFG
25	EGH1025FFG	EGH2025FFG	EGH3025FFG	EGH3025AFG	EGH4025FFG	EGH4025AFG
30	EGH1030FFG	EGH2030FFG	EGH3030FFG	—	EGH4030FFG	—
32	EGH1032FFG	EGH2032FFG	EGH3032FFG	EGH3032AFG	EGH4032FFG	EGH4032AFG
35	EGH1035FFG	EGH2035FFG	EGH3035FFG	—	EGH4035FFG	—
40	EGH1040FFG	EGH2040FFG	EGH3040FFG	EGH3040AFG	EGH4040FFG	EGH4040AFG
45	EGH1045FFG	EGH2045FFG	EGH3045FFG	—	EGH4045FFG	EGH4050AFG
50	EGH1050FFG	EGH2050FFG	EGH3050FFG	EGH3050AFG	EGH4050FFG	—
60	EGH1060FFG	EGH2060FFG	EGH3060FFG	—	EGH4060FFG	—
63	EGH1063FFG	EGH2063FFG	EGH3063FFG	EGH3063AFG	EGH4063FFG	EGH4063AFG
70	EGH1070FFG	EGH2070FFG	EGH3070FFG	—	EGH4070FFG	—
80	EGH1080FFG	EGH2080FFG	EGH3080FFG	EGH3080AFG	EGH4080FFG	EGH4080AFG
90	EGH1090FFG	EGH2090FFG	EGH3090FFG	—	EGH4090FFG	—
100	EGH1100FFG	EGH2100FFG	EGH3100FFG	EGH3100AFG	EGH4100FFG	EGH4100AFG
125	EGH1125FFG	EGH2125FFG	EGH3125FFG	EGH3125AFG	EGH4125FFG	EGH4125AFG

**Notes**

- ① 16, 32, 63A are not UL listed ratings.
- ② Adjustable thermal are not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on the LH side.

EG-Frame—100/100 Current Limiting (Single-Pole and Two-Pole Unavailable)

EG-Frame



## EG-Frame — 100/100

Maximum Continuous Amps at 40 °C <sup>①</sup>	Three-Pole		Four-Pole 0% Protected Neutral <sup>③</sup>	
	Fixed Thermal, Fixed Magnetic Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number	Fixed Thermal, Fixed Magnetic Catalog Number	Adjustable <sup>②</sup> Thermal, Fixed Magnetic Catalog Number
15	EGC3015FFG	—	EGC7015FFG	—
16	EGC3016FFG	—	EGC7016FFG	—
20	EGC3020FFG	EGC3020AFG	EGC7020FFG	EGC7020AFG
25	EGC3025FFG	EGC3025AFG	EGC7025FFG	EGC7025AFG
30	EGC3030FFG	—	EGC7030FFG	—
32	EGC3032FFG	EGC3032AFG	EGC7032FFG	EGC7032AFG
35	EGC3035FFG	—	EGC7035FFG	—
40	EGC3040FFG	EGC3040AFG	EGC7040FFG	EGC7040AFG
45	EGC3045FFG	—	EGC7045FFG	—
50	EGC3050FFG	EGC3050AFG	EGC7050FFG	EGC7050AFG
60	EGC3060FFG	—	EGC7060FFG	—
63	EGC3063FFG	EGC3063AFG	EGC7063FFG	EGC7063AFG
70	EGC3070FFG	—	EGC7070FFG	—
80	EGC3080FFG	EGC3080AFG	EGC7080FFG	EGC7080AFG
90	EGC3090FFG	—	EGC7090FFG	—
100	EGC3100FFG	EGC3100AFG	EGC7100FFG	EGC7100AFG
125	EGC3125FFG	EGC3125AFG	EGC7125FFG	EGC7125AFG

Molded Case Switches <sup>④</sup>Catalog  
Number

EGK3125KSG

EGK7125KSG

EGK3160KSG

EGK7160KSG

## Notes

- ① 16, 32, 63A are not UL listed ratings.
- ② Adjustable thermal is not UL listed.
- ③ Change the fourth digit to 7 for 100% neutral protection. Neutral is on LH side.
- ④ Molded case switches may open above 1250 A.

**EG Bolt-On Complete Breaker (Includes Frame, Trip Unit and Mounting Hardware)**

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**EG-Frame****EG-Frame—18 kAIC at 480 Vac**

Maximum Continuous Amps at 40 °C	Single-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>①</sup>	Two-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>②</sup>	Three-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>③</sup>
15	EGB1015FFB	EGB2015FFB	EGB3015FFB
20	EGB1020FFB	EGB2020FFB	EGB3020FFB
25	EGB1025FFB	EGB2025FFB	EGB3025FFB
30	EGB1030FFB	EGB2030FFB	EGB3030FFB
35	EGB1035FFB	EGB2035FFB	EGB3035FFB
40	EGB1040FFB	EGB2040FFB	EGB3040FFB
45	EGB1045FFB	EGB2045FFB	EGB3045FFB
50	EGB1050FFB	EGB2050FFB	EGB3050FFB
60	EGB1060FFB	EGB2060FFB	EGB3060FFB
70	EGB1070FFB	EGB2070FFB	EGB3070FFB
80	EGB1080FFB	EGB2080FFB	EGB3080FFB
90	EGB1090FFB	EGB2090FFB	EGB3090FFB
100	EGB1100FFB	EGB2100FFB	EGB3100FFB
110	EGB1110FFB	EGB2110FFB	EGB3110FFB
125	EGB1125FFB	EGB2125FFB	EGB3125FFB

**EG-Frame****EG-Frame—35 kAIC at 480 Vac**

Maximum Continuous Amps at 40 °C	Single-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>①</sup>	Two-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>②</sup>	Three-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>③</sup>
15	EGS1015FFB	EGS2015FFB	EGS3015FFB
20	EGS1020FFB	EGS2020FFB	EGS3020FFB
25	EGS1025FFB	EGS2025FFB	EGS3025FFB
30	EGS1030FFB	EGS2030FFB	EGS3030FFB
35	EGS1035FFB	EGS2035FFB	EGS3035FFB
40	EGS1040FFB	EGS2040FFB	EGS3040FFB
45	EGS1045FFB	EGS2045FFB	EGS3045FFB
50	EGS1050FFB	EGS2050FFB	EGS3050FFB
60	EGS1060FFB	EGS2060FFB	EGS3060FFB
70	EGS1070FFB	EGS2070FFB	EGS3070FFB
80	EGS1080FFB	EGS2080FFB	EGS3080FFB
90	EGS1090FFB	EGS2090FFB	EGS3090FFB
100	EGS1100FFB	EGS2100FFB	EGS3100FFB
110	EGS1110FFB	EGS2110FFB	EGS3110FFB
125	EGS1125FFB	EGS2125FFB	EGS3125FFB

**Notes**

- ① For bulk pack 24, add suffix BP24 and order quantities of 24.  
 ② For bulk pack 12, add suffix BP12 and order quantities of 12.  
 ③ For bulk pack 8, add suffix BP8 and order quantities of 8.

## EG-Frame



## EG-Frame—65 kAIC at 480 Vac

Maximum Continuous Amps at 40 °C	Single-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>①</sup>	Two-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>②</sup>	Three-Pole Fixed Thermal, Fixed Magnetic Catalog Number <sup>③</sup>
15	EGH1015FFB	EGH2015FFB	EGH3015FFB
20	EGH1020FFB	EGH2020FFB	EGH3020FFB
25	EGH1025FFB	EGH2025FFB	EGH3025FFB
30	EGH1030FFB	EGH2030FFB	EGH3030FFB
35	EGH1035FFB	EGH2035FFB	EGH3035FFB
40	EGH1040FFB	EGH2040FFB	EGH3040FFB
45	EGH1045FFB	EGH2045FFB	EGH3045FFB
50	EGH1050FFB	EGH2050FFB	EGH3050FFB
60	EGH1060FFB	EGH2060FFB	EGH3060FFB
70	EGH1070FFB	EGH2070FFB	EGH3070FFB
80	EGH1080FFB	EGH2080FFB	EGH3080FFB
90	EGH1090FFB	EGH2090FFB	EGH3090FFB
100	EGH1100FFB	EGH2100FFB	EGH3100FFB
110	EGH1110FFB	EGH2110FFB	EGH3110FFB
125	EGH1125FFB	EGH2125FFB	EGH3125FFB

## Load Terminals

Maximum Breaker Amps	Terminal, Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range	(Package of Three Terminals) Catalog Number
<b>Standard Cu/Al Pressure Type Terminals</b>					
15–50	Aluminum	Cu/Al	2.5–50	#14–1/0	3TA125EF
60–125	Aluminum	Cu/Al	16–70	#6–3/0	3TA150EF

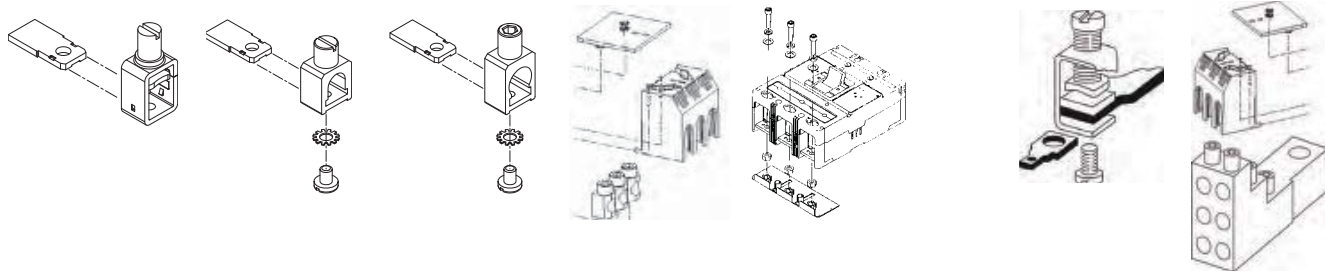
**Notes**

- ① For bulk pack 24, add suffix BP24 and order quantities of 24.  
 ② For bulk pack 12, add suffix BP12 and order quantities of 12.  
 ③ For bulk pack 8, add suffix BP8 and order quantities of 8.

#### Accessories Selection Guide and Ordering Information

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#### EG-Frame



3T125EF	3TA125EF	3TA150EF	3TA160EFK	EF2RTWK, Two-Pole–Metric EF3RTWK, Three-Pole–Metric EF4RTWK, Four-Pole–Metric EF2RTDK, Two-Pole–Imperial EF3RTDK, Three-Pole–Imperial EF4RTDK, Four-Pole–Imperial	Control Wire Terminal Kit GCWTK	Multiwire Connectors
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#### Line and Load Terminals

Maximum Breaker Amps	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range	(Package of Three Terminals) Catalog Number
<b>Standard Cu/Al Pressure Type Terminals</b>					
125	Steel	Al	4–6	#14-3/0	3T125EF ①
125	Steel	Cu	2.5–95	#14-3/0	3T125EF ①
125	Aluminum	Cu/Al	2.5–50	#14-1/0	3TA125EF
160	Aluminum	Cu/Al	16–70	#6-3/0	3TA150EF
160	Aluminum	Cu/Al	35–120	#3-250	3TA160EFK
160	Aluminum	Cu/Al	35–120	#3-250	4TA160EFK ②

EG-Frame circuit breakers and molded case switches have line and load terminals as standard equipment.

Insert collar enclosing conductor as shown. Locate nut on top of conductor and tighten securely with screw and washer.

**Caution:** Collar must surround conductor.

Insert collar enclosing conductor and center on extrusion. Tighten securely with screw and washer. Endcap kits are used on the E-Frame breaker line side to connect busbar or similar electrical connections. Includes hardware.

#### Notes

- ① Standard line and load terminals.
- ② Four-pole kit with four terminals.

### Control Wire Terminal Kit

	Catalog Number
Control wire terminal kit	5652B38G01
Package of 12—priced individually	

For use with steel or stainless steel standard line and load terminals only.

### Interphase Barriers

	Catalog Number
Interphase barriers	EIPBK
Package includes 2 barriers	

The interphase barrier is available for extended insulation between circuit breaker poles. Specify quantity when ordering.

### Base Mounting Hardware—DIN Rail Mounting

	Catalog Number
DIN rail adapter—single-pole	EF1DIN
DIN rail adapter—two-pole	EGDIN
DIN rail adapter—three- or four-pole	EF34DIN
Metal DIN rail adapter—three-pole	EGDDIN

Metric base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order S/N 8703C80G08.

**Note:** English mounting hardware kit can be supplied separate. Catalog number is **BMHE #6–32** x 3 inches for two-, three- and four-pole. Single-pole mounting hardware metric order **8703C80G11**. English hardware **8703C80G12**. Both sold in quantities of 100.

### Terminal Shields

The terminal shield is available for line terminal areas in three- and four-pole circuit breakers. Special terminal shields are also available for use when an electrical (solenoid) operator is mounted on the circuit breaker. The standard style number by pole for each terminal shield is for a package of 10 and is priced per each package. Special terminal shields are packaged individually.

### Terminal Shields—IP30 Protection

Number of Poles	Catalog Number
3	EFTS3K
4	EFTS4K

### Terminal End Covers (Gas Barrier)

The terminal end cover is available for three-pole circuit breakers only. Two conductor opening sizes are available. Specify quantity (one per circuit breaker) when ordering.

### Terminal End Covers

Conductor Opening Diameter Inches (mm)	Catalog Number
6.35 (0.25)	EEC3K
10.41 (0.41)	EEC4K

### Multiwire Connectors

Field-installed multiwire connectors for the load side (OFF) end terminals. They are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include mounting hardware, terminal shield insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

### EG-Frame Multiwire Connectors Ordering Information (Package of 3) <sup>Ⓢ</sup>

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number
125	3	14–2	3TA125E3K
125	6	14–6	3TA125E6K

#### Note

<sup>Ⓢ</sup> For four-pole kit, change “3” at beginning of catalog number to “4.”

### Accessories

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#### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

#### EG-Frame Accessories

Description	Reference Page	Single-Pole	Two-Pole		Three-Pole			Four-Pole			Neutral
		Center	Left	Right	Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only one internal accessory per pole)</b>											
Alarm lockout (Make/Break)	V4-T2-213	—	—	■	—	—	■	—	—	■	—
Alarm lockout (2Make/2Break)	V4-T2-213	—	—	■	—	—	■	—	—	■	—
Auxiliary switch (1A, 1B)	V4-T2-213	—	—	■	—	—	■	—	—	■	—
Auxiliary switch (2A, 2B)	V4-T2-213	—	—	■	—	—	■	—	—	■	—
Auxiliary switch and alarm switch combination	V4-T2-213	—	—	■	—	—	■	—	—	■	—
Shunt trip—standard	V4-T2-213	—	—	—	■	—	—	■	—	—	—
Undervoltage release mechanism	V4-T2-214	—	—	—	■	—	—	■	—	—	—
<b>External Accessories</b>											
End cap kit	V4-T2-129	—	●	●	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-129	●	●	●	●	●	●	●	●	●	●
Multiwire connectors	V4-T2-129	●	●	●	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-129	●	●	●	●	●	●	●	●	●	●
Terminal shields	V4-T2-129	●	●	●	●	●	●	●	●	●	●
Terminal end covers	V4-T2-129	—	—	—	●	●	●	—	—	—	—
Interphase barriers	V4-T2-129	—	●	●	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-211	■	■	—	—	■	—	—	■	—	—
Snap-on padlockable handle lock hasp	V4-T2-211	■	■	—	—	■	—	—	■	—	—
Padlockable handle lock hasp	V4-T2-211	—	—	■	□	—	□	□	—	□	—
Walking beam interlock—requires two breakers	V4-T2-211	—	—	—	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-211	—	●	●	●	●	●	●	●	●	●
Electrical operator	V4-T2-211	—	—	—	●	●	●	—	—	—	—
Handle mechanisms	V4-T2-496	—	—	—	●	●	●	—	—	—	—
<b>Modifications (Refer to Eaton)</b>											
Moisture fungus treatment	V4-T2-209	●	●	●	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●	●	●	●
Marine/naval application, UL 489 Supplement SA and SB	—	●	●	●	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Technical Data and Specifications**

**UL 489/IEC 60947-2 Interrupting Capacity (Symmetrical Amperes) (kA) Ratings**

Circuit Breaker Type	Number of Poles	Volts AC (50/60 Hz)										Volts DC <sup>①</sup>					
		220–240					380–415					690 <sup>②</sup>		125		250 <sup>③④</sup>	
		120	I <sub>CU</sub>	I <sub>CS</sub>	277	347	I <sub>CU</sub>	I <sub>CS</sub>	480	600Y/347	I <sub>CU</sub>	I <sub>CS</sub>	I <sub>CU</sub>	I <sub>CS</sub>	I <sub>CU</sub>	I <sub>CS</sub>	
EGB125	1	35	25	25	18	—	—	—	—	—	—	—	—	10	10	—	—
	2, 3, 4	—	25	25	—	—	18	18	18	—	—	—	—	—	—	10	10
EGE125	2, 3, 4	—	35	35	—	—	25	25	25	18	—	—	—	—	—	10	10
	1	100	85	43	35	22	—	—	—	—	—	—	—	35	35	—	—
EGS125	2, 3, 4	—	85	43	—	—	40	30	35	22	—	—	—	—	—	35	35
	1	200	100	50	65	25	—	—	—	—	—	—	—	42	42	—	—
EGH125	2, 3, 4	—	100	50	—	—	70	35	65	25	—	—	—	—	—	42	42
	3, 4	—	200	200	—	—	100	100	100	35	—	—	—	—	—	42	42
EGC125 <sup>⑤</sup>	3, 4	—	200	200	—	—	100	100	100	35	—	—	—	—	—	42	42
	3, 4	—	25	25	—	—	18	18	18	—	—	—	—	—	—	10	10
EGB160 <sup>②</sup>	3, 4	—	35	35	—	—	25	25	25	18	—	—	—	—	—	10	10
	3, 4	—	85	43	—	—	40	30	35	22	—	—	—	—	—	35	35
EGE160 <sup>②</sup>	3, 4	—	200	200	—	—	100	100	100	35	—	—	—	—	—	42	42
	3, 4	—	25	25	—	—	18	18	18	—	—	—	—	—	—	10	10
EGS160 <sup>②</sup>	3, 4	—	35	35	—	—	25	25	25	18	—	—	—	—	—	10	10
	3, 4	—	85	43	—	—	40	30	35	22	—	—	—	—	—	35	35

**UL 489 Current Limiting Data**

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
EGC	240 V/200 kA	24.5	0.6310
EGC	480 V/100 kA	24.5	0.6310
EGC	600 Y/35 kA	20.0	1.392

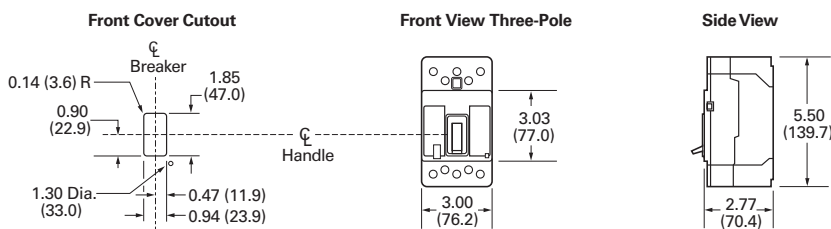
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**EG-Frame**

Number of Poles	Width	Height	Depth
1	1.00 (25.4)	5.50 (139.7)	2.99 (75.9)
2	2.00 (50.8)	5.50 (139.7)	2.99 (75.9)
3	3.00 (76.2)	5.50 (139.7)	2.99 (75.9)
4	4.00 (101.6)	5.50 (139.7)	2.99 (75.9)

**EG-Frame**



Approximate Shipping Weight in Lbs (kg)

**EG-Frame**

EG Breaker Type	Number of Poles			
	1	2	3	4
EGB125	1.5 (0.68)	2.0 (0.91)	3.0 (1.36)	4.9 (1.82)

**Notes**

- ① DC ratings apply to substantially non-inductive circuits.
- ② IEC only.
- ③ Two-pole circuit breaker, or two poles of three-pole circuit breaker.
- ④ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 42 kA.
- ⑤ Current limiting per UL 489.



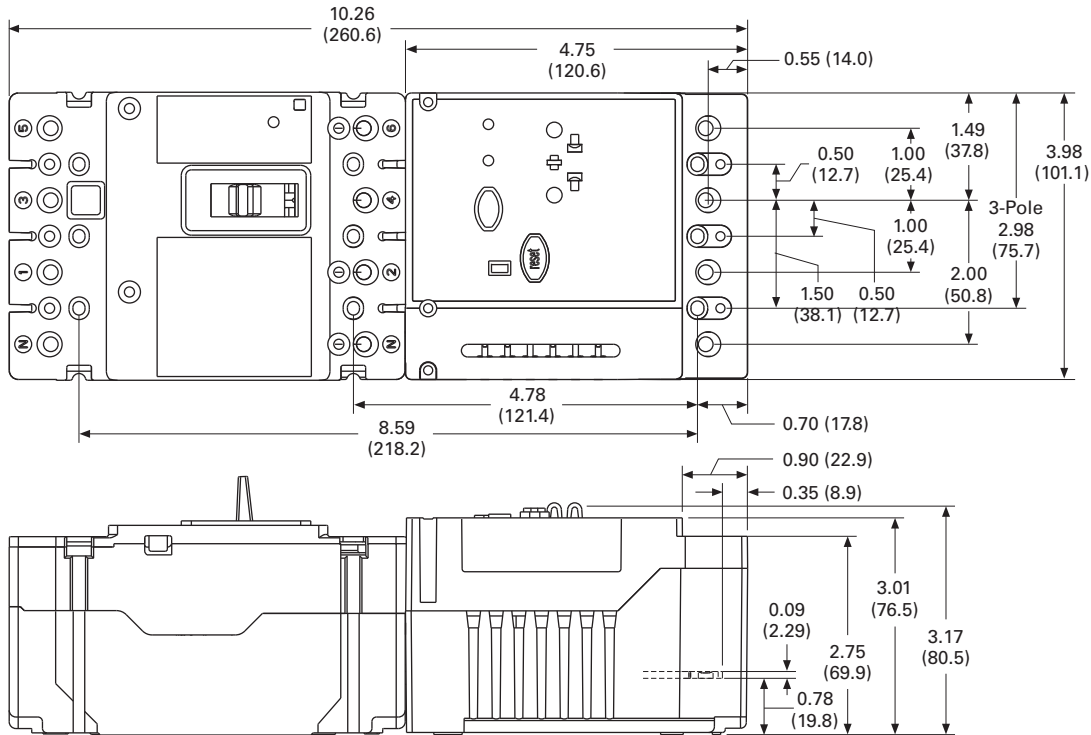
# 2.3

## Molded Case Circuit Breakers

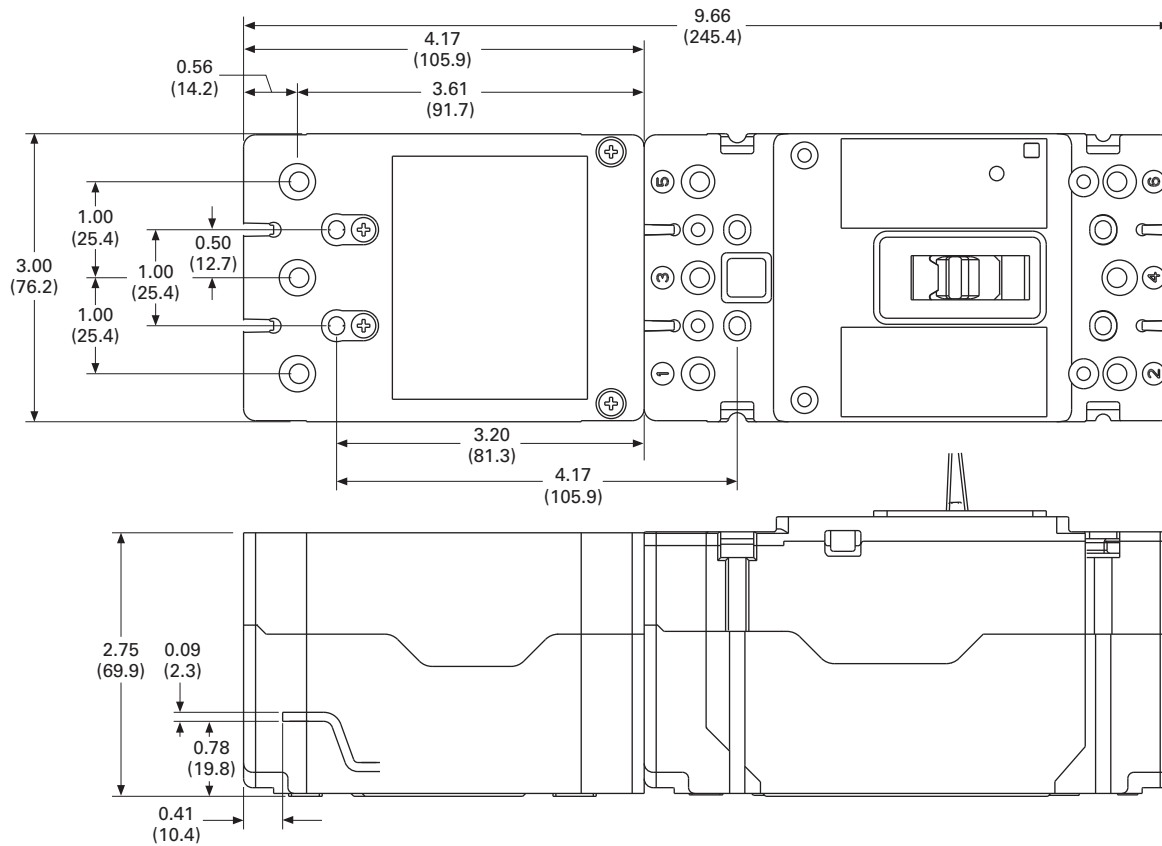
### Series G

#### EG-Frame With Earth Leakage Module

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#### EG-Frame With Current Limiter Module



**JG-Frame (63–250 Amperes)****JG-Frame (63–250 Amperes)****Product Description**

JG breaker is HACR rated.

**Contents****Description**

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Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-193</b>
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Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-200</b>
High Instantaneous Circuit Breaker for	
Selective Coordination . . . . .	<b>V4-T2-205</b>
Special Features and Accessories . . . . .	<b>V4-T2-208</b>
Motor Operators . . . . .	<b>V4-T2-216</b>
Plug-In Blocks . . . . .	<b>V4-T2-218</b>
Drawout Cassette . . . . .	<b>V4-T2-219</b>

# 2.3

## Molded Case Circuit Breakers

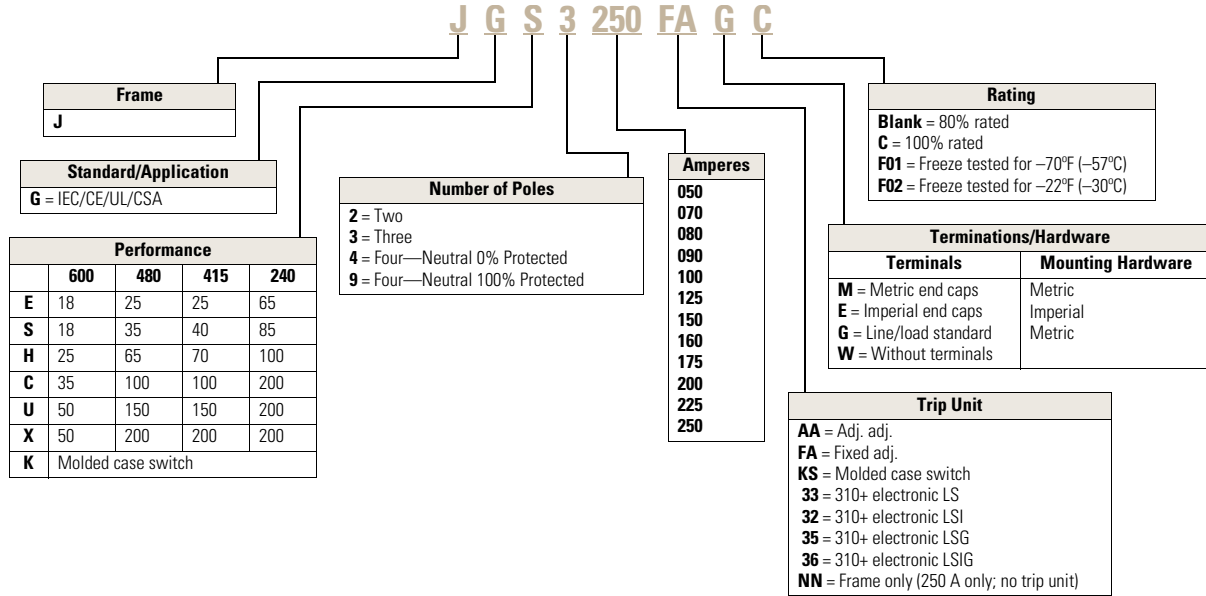
### Series G

#### Catalog Number Selection

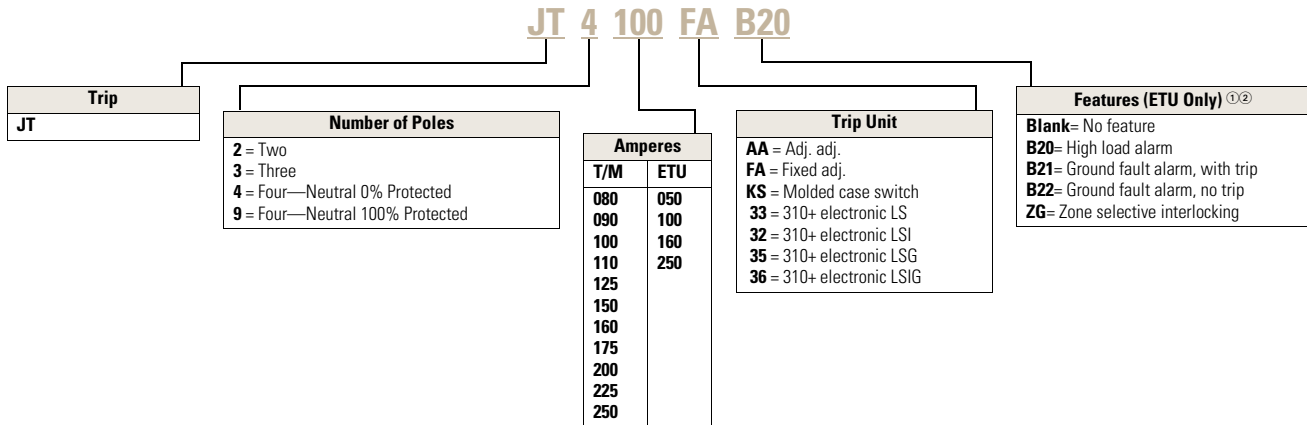
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

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#### Series G—JG-Frame (63–250 Amperes)



#### Trip Unit



#### Notes

- ① Bxx features cannot be combined with other Bxx features.
- ② B21 and B22 available with LSG and LSIG trip units.

## Product Selection

**Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)—IC Rating at 415/480 Volts**

## JG-Frame



## JG-Frame—IEC/CE/UL/CSA—25/25

Maximum Continuous Amperes	Magnetic Range	Two-Pole	Three-Pole	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>	Four-Pole 0% <sup>②</sup>	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>
		Fixed Thermal, Adjustable Magnetic	Fixed Thermal, Adjustable Magnetic		Fixed Thermal, Adjustable Magnetic	
		Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
70	350–700	JGE2070FAG	JGE3070FAG	—	JGE4070FAG	—
90	450–900	JGE2090FAG	JGE3090FAG	—	JGE4090FAG	—
100	500–1000	JGE2100FAG	JGE3100FAG	JGE3100AAG	JGE4100FAG	JGE4100AAG
125	625–1250	JGE2125FAG	JGE3125FAG	JGE3125AAG	JGE4125FAG	JGE4125AAG
150	750–1550	JGE2150FAG	JGE3150FAG	—	JGE4150FAG	—
160	800–1600	—	—	JGE3160AAG	—	JGE4160AAG
175	875–1750	JGE2175FAG	JGE3175FAG	—	JGE4175FAG	—
200	1000–2000	JGE2200FAG	JGE3200FAG	JGE3200AAG	JGE4200FAG	JGE4200AAG
225	1125–2250	JGE2225FAG	JGE3225FAG	—	JGE4225FAG	—
250	1250–2500	JGE2250FAG	JGE3250FAG	JGE3250AAG	JGE4250FAG	JGE4250AAG

## JG-Frame



## JG-Frame—IEC/CE/UL/CSA—40/35, Two-Pole

Maximum Continuous Amperes	Magnetic Range	Two-Pole	Three-Pole	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>	Four-Pole 0% <sup>②</sup>	Adjustable Thermal, Adjustable Magnetic <sup>①</sup>
		Fixed Thermal, Adjustable Magnetic	Fixed Thermal, Adjustable Magnetic		Fixed Thermal, Adjustable Magnetic	
		Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
70	350–700	JGS2070FAG	JGS3070FAG	—	JGS4070FAG	—
90	450–900	JGS2090FAG	JGS3090FAG	—	JGS4090FAG	—
100	500–1000	JGS2100FAG	JGS3100FAG	JGS3100AAG	JGS4100FAG	JGS4100AAG
125	625–1250	JGS2125FAG	JGS3125FAG	JGS3125AAG	JGS4125FAG	JGS4125AAG
150	750–1550	JGS2150FAG	JGS3150FAG	—	JGS4150FAG	—
160	800–1600	—	—	JGS3160AAG	—	JGS4160AAG
175	875–1750	JGS2175FAG	JGS3175FAG	—	JGS4175FAG	—
200	1000–2000	JGS2200FAG	JGS3200FAG	JGS3200AAG	JGS4200FAG	JGS4200AAG
225	1125–2250	JGS2225FAG	JGS3225FAG	—	JGS4225FAG	—
250	1250–2500	JGS2250FAG	JGS3250FAG	JGS3250AAG	JGS4250FAG	JGS4250AAG

## Notes

- <sup>①</sup> EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.  
<sup>②</sup> 9 for 0–100% neutral protection. Neutral is on LH side.

JG-Frame



## JG-Frame—IEC/CE/UL/CSA—70/65

Maximum Continuous Amperes	Magnetic Range	Two-Pole Fixed Thermal, Adjustable Magnetic Catalog Number	Three-Pole Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Fixed Magnetic <sup>①</sup> Catalog Number	Four-Pole 0% <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Fixed Magnetic <sup>①</sup> Catalog Number
70	350–700	JGH2070FAG	JGH3070FAG	—	JGH4070FAG	—
90	450–900	JGH2090FAG	JGH3090FAG	—	JGH4090FAG	—
100	500–1000	JGH2100FAG	JGH3100FAG	JGH3100AAG	JGH4100FAG	JGH4100AAG
125	625–1250	JGH2125FAG	JGH3125FAG	JGH3125AAG	JGH4125FAG	JGH4125AAG
150	750–1550	JGH2150FAG	JGH3150FAG	—	JGH4150FAG	—
160	800–1600	—	—	JGH3160AAG	—	JGH4160AAG
175	875–1750	JGH2175FAG	JGH3175FAG	—	JGH4175FAG	—
200	1000–2000	JGH2200FAG	JGH3200FAG	JGH3200AAG	JGH4200FAG	JGH4200AAG
225	1125–2250	JGH2225FAG	JGH3225FAG	—	JGH4225FAG	—
250	1250–2500	JGH2250FAG	JGH3250FAG	JGH3250AAG	JGH4250FAG	JGH4250AAG

**Notes**

<sup>①</sup> EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.

<sup>②</sup> 9 for 0–100% neutral protection. Neutral is on LH side.

Two-Pole not available in IEC/CE/UL/CSA 100/100, 150/150

## JG-Frame

## JG-Frame—IEC/CE/UL/CSA—100/100, Current Limiting



Maximum Continuous Amperes	Magnetic Range	Three-Pole		Four-Pole 0% <sup>②</sup>	
		Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number
70	350–700	JGC3070FAG	—	JGC4070FAG	—
80	400–800	—	JGC3080AAG	—	JGC4080AAG
90	450–900	JGC3090FAG	—	JGC4090FAG	—
100	500–1000	JGC3100FAG	JGC3100AAG	JGC4100FAG	JGC4100AAG
125	625–1250	JGC3125FAG	JGC3125AAG	JGC4125FAG	JGC4125AAG
150	750–1550	JGC3150FAG	—	JGC4150FAG	—
160	800–1600	—	JGC3160AAG	—	JGC4160AAG
175	875–1750	JGC3175FAG	—	JGC4175FAG	—
200	1000–2000	JGC3200FAG	JGC3200AAG	JGC4200FAG	JGC4200AAG
225	1125–2250	JGC3225FAG	—	JGC4225FAG	—
250	1250–2500	JGC3250FAG	JGC3250AAG	JGC4250FAG	JGC4250AAG

## JG-Frame

## JG-Frame—IEC/CE/UL/CSA—150/150, Current Limiting



Maximum Continuous Amperes	Magnetic Range	Three-Pole		Four-Pole 0% <sup>②</sup>	
		Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number
70	350–700	JGU3070FAG	—	JGU4070FAG	—
80	400–800	—	JGU3080AAG	—	JGU4080AAG
90	450–900	JGU3090FAG	—	JGU4090FAG	—
100	500–1000	JGU3100FAG	JGU3100AAG	JGU4100FAG	JGU4100AAG
125	625–1250	JGU3125FAG	JGU3125AAG	JGU4125FAG	JGU4125AAG
150	750–1550	JGU3150FAG	—	JGU4150FAG	—
160	800–1600	—	JGU3160AAG	—	JGU4160AAG
175	875–1750	JGU3175FAG	—	JGU4175FAG	—
200	1000–2000	JGU3200FAG	JGU3200AAG	JGU4200FAG	JGU4200AAG
225	1125–2250	JGU3225FAG	—	JGU4225FAG	—
250	1250–2500	JGU3250FAG	JGU3250AAG	JGU4250FAG	JGU4250AAG

**Notes**

<sup>①</sup> EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.

<sup>②</sup> 9 for 0–100% neutral protection. Neutral is on LH side.

# 2.3

## Molded Case Circuit Breakers

### Series G

Two-Pole not available in IEC/CE/UL/CSA 200/200

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#### JG-Frame



#### JG-Frame—IEC/CE/UL/CSA 200/200, Current Limiting

Maximum Continuous Amperes	Magnetic Range	Three-Pole		Four-Pole <sup>②</sup>	
		Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>①</sup> Catalog Number
70	350–700	JGX3070FAG	—	JGX4070FAG	—
80	400–800	—	JGX3080AAG	—	JGX4080AAG
90	450–900	JGX3090FAG	—	JGX4090FAG	—
100	500–1000	JGX3100FAG	JGX3100AAG	JGX4100FAG	JGX4100AAG
125	625–1250	JGX3125FAG	JGX3125AAG	JGX4125FAG	JGX4125AAG
150	750–1550	JGX3150FAG	—	JGX4150FAG	—
160	800–1600	—	JGX3160AAG	—	JGX4160AAG
175	875–1750	JGX3175FAG	—	JGX4175FAG	—
200	1000–2000	JGX3200FAG	JGX3200AAG	JGX4200FAG	JGX4200AAG
225	1125–2250	JGX3225FAG	—	JGX4225FAG	—
250	1250–2500	JGX3250FAG	JGX3250AAG	JGX4250FAG	JGX4250AAG

#### Molded Case Switches <sup>③</sup>

##### Catalog Number

JGK3250KSG

JGK7250KSG

##### Notes

- ① EC-EN 60947-2 only. Adjustment is 0.8 and 1.0.
- ② 9 for 0–100% neutral protection. Neutral is on LH side.
- ③ Molded case switches will trip above 2500 amperes.

## Frame—IC Rating at 415/480 Volts

Maximum Amperes	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole 0% Catalog Number
<b>25/25</b>			
250	JGE2250NN	JGE3250NN	JGE4250NN
<b>40/35</b>			
250	JGS2250NN	JGS3250NN	JGS4250NN
<b>70/65</b>			
250	JGH2250NN	JGH3250NN	JGH4250NN
<b>100/100 Current Limiting Per UL 489</b>			
250	—	JGC3250NN	JGC4250NN
<b>150/150 Current Limiting Per UL 489</b>			
250	—	JGU3250NN	JGU4250NN
<b>200/200 Current Limiting Per UL 489</b>			
250	—	JGX3250NN	JGX4250NN
<b>25/25 100% Rated Per UL 489 ①</b>			
250	—	JGE3250NNC	—
<b>40/35 100% Rated Per UL 489 ①</b>			
250	—	JGS3250NNC	—
<b>70/65 100% Rated Per UL 489 ①</b>			
250	—	JGH3250NNC	—

## Thermal-Magnetic Trip Unit

Ampere Rating	Range	Catalog Number		Range	Catalog Number		Catalog Number
70	350–700	JT2070FA	JT3070FA	—	—	JT4070FA	—
80	400–800	—	JT3080FA	JT3080AA ②	64–100	—	JT4080AA ②
90	450–900	JT2090FA	JT3090FA	—	—	JT4090FA	—
100	500–1000	JT2100FA	JT3100FA	JT3100AA ②	80–100	JT4100FA	JT4100AA ②
125	625–1250	JT2125FA	JT3125FA	JT3125AA ②	100–125	JT4125FA	JT4125AA ②
150	750–1550	JT2150FA	JT3150FA	—	—	JT4150FA	—
160	800–1600	—	—	JT3160AA ②	128–160	—	JT4160AA ②
175	875–1750	JT2175FA	JT3175FA	—	—	JT4175FA	—
200	1000–2000	JT2200FA	JT3200FA	JT3200AA ②	160–200	JT4200FA	JT4200AA ②
225	1125–2250	JT2225FA	JT3225FA	—	—	JT4225FA	—
250	1250–2500	JT2250FA	JT3250FA	JT3250AA ②	200–250	JT4250FA	JT4250AA ②

## Notes

① Components—100% rated frame.

② Adjustable thermal trip units are typically used in IEC markets and are not UL or CSA listed.



**310+ Electronic Trip Units**

See 310+ adjustability specifications on **Page V4-T2-148**.

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**JG 310+ Electronic Trip Units**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JT305033	JT305032	JT305035	JT305036	JGFCT050
100	JT310033	JT310032	JT310035	JT310036	JGFCT100
160	JT316033	JT316032	JT316035	JT316036	JGFCT160
250	JT325033	JT325032	JT325035	JT325036	JGFCT250
<b>Four-Pole <sup>②③</sup></b>					
50	JT405033	JT405032	JT405035	JT405036	—
100	JT410033	JT410032	JT410035	JT410036	—
160	JT416033	JT416032	JT416035	JT416036	—
250	JT425033	JT425032	JT425035	JT425036	—

**310+ Electronic Trip Unit Accessories**

Description	Catalog Number
Electronic portable test kit	MTST230V
Trip unit tamper protection wire seal	5108A03H01
External neutral sensor (250 A)	JGFCT250
External neutral sensor (160 A)	JGFCT160
External neutral sensor (100 A)	JGFCT100
External neutral sensor (80 A)	JGFCT050
Breaker-mount cause-of-trip indication	TRIP-LED
Breaker-mount ammeter module	DIGIVIEW
Remote-mount ammeter module	DIGIVIEWR06

**Notes**

- ① For use on a three-pole breaker used in a four-wire system if ground fault protection for the neutral is required.
- ② Neutral protection 4 = 0%, 7 = 100% electronic trip unit neutral protection is not adjustable.
- ③ Four-pole breakers with LSG and LSIG trip units are only available with 0% neutral protection.

**Complete Breaker with 310+ Electronic Trip Units**See 310+ adjustability specifications on **Page V4-T2-148**.**IEC/UL/CSA—25/25**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGE305033G	JGE305032G	JGE305035G	JGE305036G	JGFCT050
100	JGE310033G	JGE310032G	JGE310035G	JGE310036G	JGFCT100
160	JGE316033G	JGE316032G	JGE316035G	JGE316036G	JGFCT160
250	JGE325033G	JGE325032G	JGE325035G	JGE325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGE405033G	JGE405032G	JGE405035G	JGE405036G	—
100	JGE410033G	JGE410032G	JGE410035G	JGE410036G	—
160	JGE416033G	JGE416032G	JGE416035G	JGE416036G	—
250	JGE425033G	JGE425032G	JGE425035G	JGE425036G	—

**IEC/UL/CSA—40/35**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGS305033G	JGS305032G	JGS305035G	JGS305036G	JGFCT050
100	JGS310033G	JGS310032G	JGS310035G	JGS310036G	JGFCT100
160	JGS316033G	JGS316032G	JGS316035G	JGS316036G	JGFCT160
250	JGS325033G	JGS325032G	JGS325035G	JGS325036G	JGFCT250
<b>Four-Pole <sup>②③</sup></b>					
50	JGS405033G	JGS405032G	JGS405035G	JGS405036G	—
100	JGS410033G	JGS410032G	JGS410035G	JGS410036G	—
160	JGS416033G	JGS416032G	JGS416035G	JGS416036G	—
250	JGS425033G	JGS425032G	JGS425035G	JGS425036G	—

**IEC/UL/CSA—70/65**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGH305033G	JGH305032G	JGH305035G	JGH305036G	JGFCT050
100	JGH310033G	JGH310032G	JGH310035G	JGH310036G	JGFCT100
160	JGH316033G	JGH316032G	JGH316035G	JGH316036G	JGFCT160
250	JGH325033G	JGH325032G	JGH325035G	JGH325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGH405033G	JGH405032G	JGH405035G	JGH405036G	—
100	JGH410033G	JGH410032G	JGH410035G	JGH410036G	—
160	JGH416033G	JGH416032G	JGH416035G	JGH416036G	—
250	JGH425033G	JGH425032G	JGH425035G	JGH425036G	—

**Notes**<sup>①</sup> Required for four-wire systems if neutral protection is required.<sup>②</sup> Neutral protection 4 = 0%, 7 = 100% electronic trip unit neutral protection is not adjustable.<sup>③</sup> Four-pole breakers with LSG and LSIG trip units are only available with 0% neutral protection.

## IEC/UL/CSA—100/100, Current Limiting Per UL 489

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGC305033G	JGC305032G	JGC305035G	JGC305036G	JGFCT050
100	JGC310033G	JGC310032G	JGC310035G	JGC310036G	JGFCT100
160	JGC316033G	JGC316032G	JGC316035G	JGC316036G	JGFCT160
250	JGC335033G	JGC325032G	JGC325035G	JGC325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGC405033G	JGC405032G	JGC405035G	JGC405036G	—
100	JGC410033G	JGC410032G	JGC410035G	JGC410036G	—
160	JGC416033G	JGC416032G	JGC416035G	JGC416036G	—
250	JGC435033G	JGC425032G	JGC425035G	JGC425036G	—

## IEC/UL/CSA—150/150, Current Limiting Per UL 489

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGU305033G	JGU305032G	JGU305035G	JGU305036G	JGFCT050
100	JGU310033G	JGU310032G	JGU310035G	JGU310036G	JGFCT100
160	JGU316033G	JGU316032G	JGU316035G	JGU316036G	JGFCT160
250	JGU335033G	JGU325032G	JGU325035G	JGU325036G	JGFCT250
<b>Four-Pole <sup>②③</sup></b>					
50	JGU405033G	JGU405032G	JGU405035G	JGU405036G	—
100	JGU410033G	JGU410032G	JGU410035G	JGU410036G	—
160	JGU416033G	JGU416032G	JGU416035G	JGU416036G	—
250	JGU435033G	JGU425032G	JGU425035G	JGU425036G	—

## IEC/UL/CSA—200/200, Current Limiting Per UL 489

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
50	JGX305033G	JGX305032G	JGX305035G	JGX305036G	JGFCT050
100	JGX310033G	JGX310032G	JGX310035G	JGX310036G	JGFCT100
160	JGX316033G	JGX316032G	JGX316035G	JGX316036G	JGFCT160
250	JGX325033G	JGX325032G	JGX325035G	JGX325036G	JGFCT250
<b>Four-Pole <sup>②</sup></b>					
50	JGX405033G	JGX405032G	JGX405035G	JGX405036G	—
100	JGX410033G	JGX410032G	JGX410035G	JGX410036G	—
160	JGX416033G	JGX416032G	JGX416035G	JGX416036G	—
250	JGX425033G	JGX425032G	JGX425035G	JGX425036G	—

**Notes**

- ① Required for four-wire systems if neutral protection is required.  
 ② Neutral protection 4 = 0%, 7 = 100% electronic trip unit neutral protection is not adjustable.  
 ③ Four-pole breakers with LSG and LSIG trip units are only available with 0% neutral protection.

**JG 100% Rated Circuit Breaker—Thermal-Magnetic Trip Unit****Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)—IC Rating at 415/480 Volts****JG-Frame****JG-Frame—IEC/CE/UL/CSA—25/25**

Maximum Continuous Amperes	Magnetic Range	Three-Pole
		Fixed Thermal, Adjustable Magnetic Catalog Number
70	350–700	JGE3070FAGC
90	450–900	JGE3090FAGC
100	500–1000	JGE3100FAGC
125	625–1250	JGE3125FAGC
150	750–1550	JGE3150FAGC
160	800–1600	—
175	875–1750	JGE3175FAGC
200	1000–2000	JGE3200FAGC
225	1125–2250	JGE3225FAGC
250	1250–2500	JGE3250FAGC

**JG-Frame—IEC/CE/UL/CSA—70/65**

Maximum Continuous Amperes	Magnetic Range	Three-Pole
		Fixed Thermal, Adjustable Magnetic Catalog Number
70	350–700	JGH3070FAGC
90	450–900	JGH3090FAGC
100	500–1000	JGH3100FAGC
125	625–1250	JGH3125FAGC
150	750–1550	JGH3150FAGC
160	800–1600	—
175	875–1750	JGH3175FAGC
200	1000–2000	JGH3200FAGC
225	1125–2250	JGH3225FAGC
250	1250–2500	JGH3250FAGC

**JG-Frame—IEC/CE/UL/CSA—40/35**

Maximum Continuous Amperes	Magnetic Range	Three-Pole
		Fixed Thermal, Adjustable Magnetic Catalog Number
70	350–700	JGS3070FAGC
90	450–900	JGS3090FAGC
100	500–1000	JGS3100FAGC
125	625–1250	JGS3125FAGC
150	750–1550	JGS3150FAGC
160	800–1600	—
175	875–1750	JGS3175FAGC
200	1000–2000	JGS3200FAGC
225	1125–2250	JGS3225FAGC
250	1250–2500	JGS3250FAGC

**JG 100% Rated 310+ Electronic Trip Unit Circuit Breaker**See 310+ adjustability specifications on **Page V4-T2-148**.

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**IEC/UL/CSA—25/25**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
50	JGE305033GC	JGE305032GC	JGE305035GC	JGE305036GC	JGFCT050
100	JGE310033GC	JGE310032GC	JGE310035GC	JGE310036GC	JGFCT100
160	JGE316033GC	JGE316032GC	JGE316035GC	JGE316036GC	JGFCT160
250	JGE325033GC	JGE325032GC	JGE325035GC	JGE325036GC	JGFCT250

**IEC/UL/CSA—40/35**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
50	JGS305033GC	JGS305032GC	JGS305035GC	JGS305036GC	JGFCT050
100	JGS310033GC	JGS310032GC	JGS310035GC	JGS310036GC	JGFCT100
160	JGS316033GC	JGS316032GC	JGS316035GC	JGS316036GC	JGFCT160
250	JGS325033GC	JGS325032GC	JGS325035GC	JGS325036GC	JGFCT250

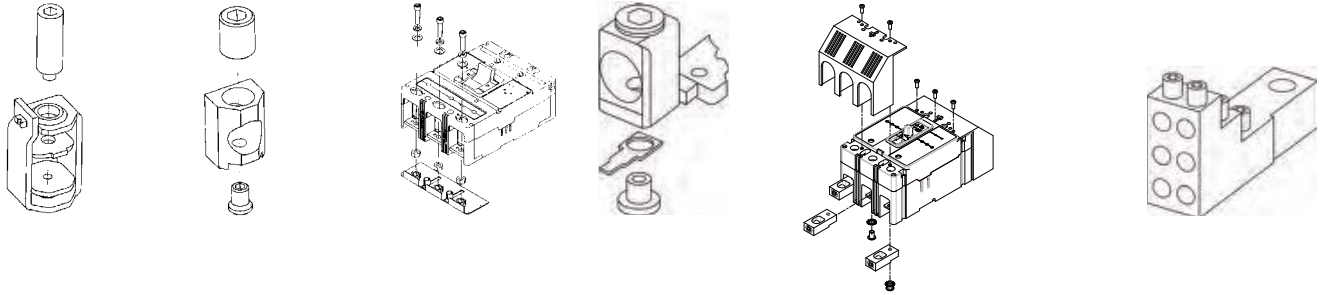
**IEC/UL/CSA—70/65**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
50	JGH305033GC	JGH305032GC	JGH305035GC	JGH305036GC	JGFCT050
100	JGH310033GC	JGH310032GC	JGH310035GC	JGH310036GC	JGFCT100
160	JGH316033GC	JGH316032GC	JGH316035GC	JGH316036GC	JGFCT160
250	JGH325033GC	JGH325032GC	JGH325035GC	JGH325036GC	JGFCT250

**Note**<sup>①</sup> Required for four-wire systems if neutral protection is required.

Accessories Selection Guide and Ordering Information

JG-Frame



T250FJ	TA250FJ	Endcap Kit	Control Wire Terminal Kit	Rear Fed Terminals	Multiwire Connectors
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Load and Line Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range/ Number of Conductors	Catalog Number
<b>Standard Pressure Type Terminals</b>					
250	Stainless steel	Cu	25–185	#4–350 (1)	T250FJ ①
250	Aluminum	Cu/Al	10–185	#8–350 (1)	TA250FJ ①②

JG-Frame circuit breakers include aluminum terminals TA250FJ as standard. When optional stainless steel only terminals are required, order by catalog number.

Endcap Kits

Number of Poles	Catalog Number	
	Metric	Imperial
3	FJ3RTWK	FJ3RTDK
4	FJ4RTWK	FJ4RTDK

Endcap kits are used on J250-Frame breaker to connect busbar or similar electrical connections. Includes hardware.

Control Wire Terminal Kit

Description	Catalog Number
Package of 14 (priced individually)	FJCWTK

For use with aluminum or copper terminals only.

Rear Fed Terminals

Maximum Amperes	Wire Size Range AWG Cu	Catalog Number
250	#4–350 kcmil	TA250JGRF
		3TA250JGRF

Rear fed terminals allow the cable to connect to the breaker from the back instead of the top. Terminal shields or interphase barriers are included with each rear fed terminal kit (depending on frame size). When catalog number starts with a 3, it indicates a kit with three terminals in each kit. Catalog number beginning with a TA indicates one terminal.

Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order 66A2546G02.

Terminal Shields IP30

Location	Number of Poles	Catalog Number
Line or Load	2, 3	FJTS3K
	4	FJTS4K

Interphase Barriers

Number of Poles	Catalog Number
3	FJIPBK ③
4	FJIPBK4 ③

Multiwire Connectors

Field-installed multiwire connectors for the load side (OFF) end terminals are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include terminal shield, mounting hardware, insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

JG-Frame Multiwire Connectors Ordering Information (Package of 3)

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number
250	3	14–2	3TA250FJ3
250	6	14–6	3TA250FJ6

Notes

- ① Individually packed.
- ② Standard line and load.
- ③ Individually priced.

## Accessories

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### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### JG-Frame Accessories

Description	Reference Page	Two- and Three-Pole			Four-Pole			
		Left	Center	Right	Left	Center	Right	Neutral
<b>Internal Accessories (Only one internal accessory per pole)</b>								
Alarm lockout (Make/Break)	V4-T2-213	—	—	■	—	—	■	—
Auxiliary switch (1A, 1B)	V4-T2-213	—	—	■	—	—	■	—
Auxiliary switch (2A, 2B)	V4-T2-213	—	—	■	—	—	■	—
Auxiliary switch and alarm switch combination	V4-T2-213	—	—	■	—	—	■	—
Shunt trip—standard	V4-T2-213	■	—	—	■	—	—	—
Undervoltage release mechanism	V4-T2-214	■	—	—	■	—	—	—
<b>External Accessories</b>								
End cap kit	V4-T2-145	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-145	●	●	●	●	●	●	●
Rear fed terminals	V4-T2-145	●	●	●	●	●	●	●
Multiwire connectors	V4-T2-145	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-145	●	●	●	●	●	●	●
Interphase barriers	V4-T2-145	●	●	●	●	●	●	●
Padlockable handle block	V4-T2-211	—	■	—	—	■	—	—
Padlockable handle lock hasp	V4-T2-211	□	—	□	□	—	□	—
Key interlock kit	V4-T2-211	□	—	□	□	—	□	—
Sliding bar interlock—requires two breakers	V4-T2-211	●	●	●	—	—	—	—
Electrical operator	V4-T2-211	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-211	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-496	●	●	●	●	●	●	●
Earth leakage/ground fault protector	V4-T2-196	●	●	●	●	●	●	●
Drawout cassette	V4-T2-219	●	●	●	●	●	●	●
Digitrip 310+ test kit	V4-T2-140	●	●	●	●	●	●	●
Ammeter/cause of trip display	V4-T2-210	●	●	●	●	●	●	●
Cause of trip LED module	V4-T2-210	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-209	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application, UL 489 supplement SA and SB	①	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Note

① Contact Eaton.

## Technical Data and Specifications

### UL 489/IEC 60947-2 Interrupting Capacity (Symmetrical Amperes) (kA) Ratings

Circuit Breaker Type	Number of Poles	Volts AC (50/60 Hz)								Volts DC <sup>①</sup>
		220–240		380–415		480	600	690 <sup>②</sup>		250 <sup>②③</sup>
		I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>			I <sub>cu</sub>	I <sub>cs</sub>	
JGE250	2, 3, 4	65	65	25	25	25	18	12	6	10
JGS250	2, 3, 4	85	85	40	40	35	18	12	6	22
JGH250	2, 3, 4	100	100	70	70	65	25	14	7	22
JGC250 <sup>④</sup>	3, 4	200	200	100	100	100	35	16	12	42
JGU250 <sup>④</sup>	3, 4	200	200	150	150	150	50	18	14	50
JGX250 <sup>④</sup>	3, 4	200	200	200	200	200	50	18	14	50

### UL 489 Current Limiting Data

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
JGC	240 V/200 kA	45.1	1.820
JGC	480 V/100 kA	45.1	1.820
JGC	600 V/35 kA	32.8	2.140
JGU	240 V/200 kA	45.1	1.820
JGU	480 V/150 kA	45.1	1.820
JGU	600 V/50 kA	32.8	2.140
JGX	240 V/200 kA	45.1	1.820
JGX	480 V/200 kA	45.1	1.820
JGX	600 V/50 kA	32.8	2.140

### JG 310+ Specifications

Description	Specification
Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame designation	JG
Frames available	50 A, 100 A, 160 A 250 A
Continuous current range (A)	20–250A
Ground fault pickup (A)	10–250A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100, 150, 200
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG
Arcflash reduction maintenance system (or maintenance mode)	No
Interchangeable trip unit	Yes
High load alarm (suffix B20) <sup>⑤</sup>	Yes
Ground fault alarm with trip (suffix B21) <sup>⑤</sup>	Yes
Ground fault alarm, no trip (suffix B22) <sup>⑤</sup>	Yes
Zone selective interlocking (suffix ZG)	LSI, LSIG
Cause of trip indication	Yes
Thru-cover accessories	Yes

#### Notes

- ① DC ratings apply to substantially non-inductive circuits.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ④ Current limiting per UL 489.
- ⑤ B2x suffixes cannot be combined with B2x suffixes.



## JG 310+ Adjustability Specifications

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310+ Settings		JG Frame			
		50 A	100 A	160 A	250 A
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$				
	A	20	40	63	100
	B	20	45	80	125
	C	25	50	90	150
	D	30	63	100	160
	E	32	70	110	175
	F	40	80	125	200
	G	45	90	150	225
	H (= $I_n$ )	50	100	160	250
$t_r$ = long delay time (seconds) (All 310+)	Position 1	2	2	2	2
	Position 2	4	4	4	4
	Position 3	7	7	7	7
	Position 4	10	10	10	10
	Position 5	12	12	12	12
	Position 6	15	15	15	15
	Position 7	20	20	20	20
	Position 8	24	24	24	24
$I_{sd}$ (x $I_r$ ) = short delay pickup (All 310+)	Position 1	2x	2x	2x	2x
	Position 2	3x	3x	3x	3x
	Position 3	4x	4x	4x	4x
	Position 4	5x	5x	5x	5x
	Position 5	6x	6x	6x	6x
	Position 6	7x	7x	7x	7x
	Position 7	8x	8x	8x	8x
	Position 8	10x	10x	10x	10x
	Position 9	14x	14x	14x	14x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS, LSG)	Fixed	67 at10x	67 at10x	67 at10x	67 at10x
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG)	Position 1	Inst	Inst	Inst	Inst
	Position 2	120	120	120	120
	Position 3	300	300	300	300
$I_g$ = ground fault pickup (amperes) (LSG, LSIG)	Position 1	10	20	32	50
	Position 2	15	30	48	75
	Position 3	20	40	64	100
	Position 4	30	60	96	150
	Position 5	40	80	128	200
	Position 6	50	100	160	250
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG)	Position 1	Inst	Inst	Inst	Inst
	Position 2	120	120	120	120
	Position 3	300	300	300	300
Independently Adjustable Instantaneous ( $I_i$ ) setting <sup>①</sup>		N/A			
Maintenance Mode pickup (2.5 x $I_n$ ) (amperes) <sup>②</sup>		N/A			

**Notes**

① Not available for JG. Independently adjustable  $I_i$  setting available in LG, NG and RG ALSI and ALSIG trip units.

② Maintenance Mode not available for JG frames. It is available for KD, LD, MDL, LG, NG, and RG.

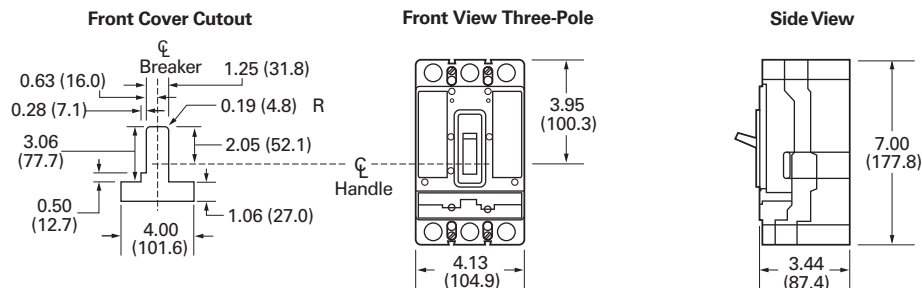
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**JG-Frame**

Number of Poles	Width	Height	Depth
2, 3	4.13 (104.9)	7.00 (177.8)	3.57 (90.7)
4	5.34 (135.6)	7.00 (177.8)	3.57 (90.7)

**JG-Frame**



Approximate Shipping Weight in Lbs (kg)

**JG-Frame**

Breaker Type	Number of Poles	
	2, 3	4
JGC	6.00 (2.70)	8.00 (3.60)
JGE	6.00 (2.70)	8.00 (3.60)
JGH	6.00 (2.70)	8.00 (3.60)
JGS	6.00 (2.70)	8.00 (3.60)
JGU	6.00 (2.70)	8.00 (3.60)
JGX	6.00 (2.70)	8.00 (3.60)

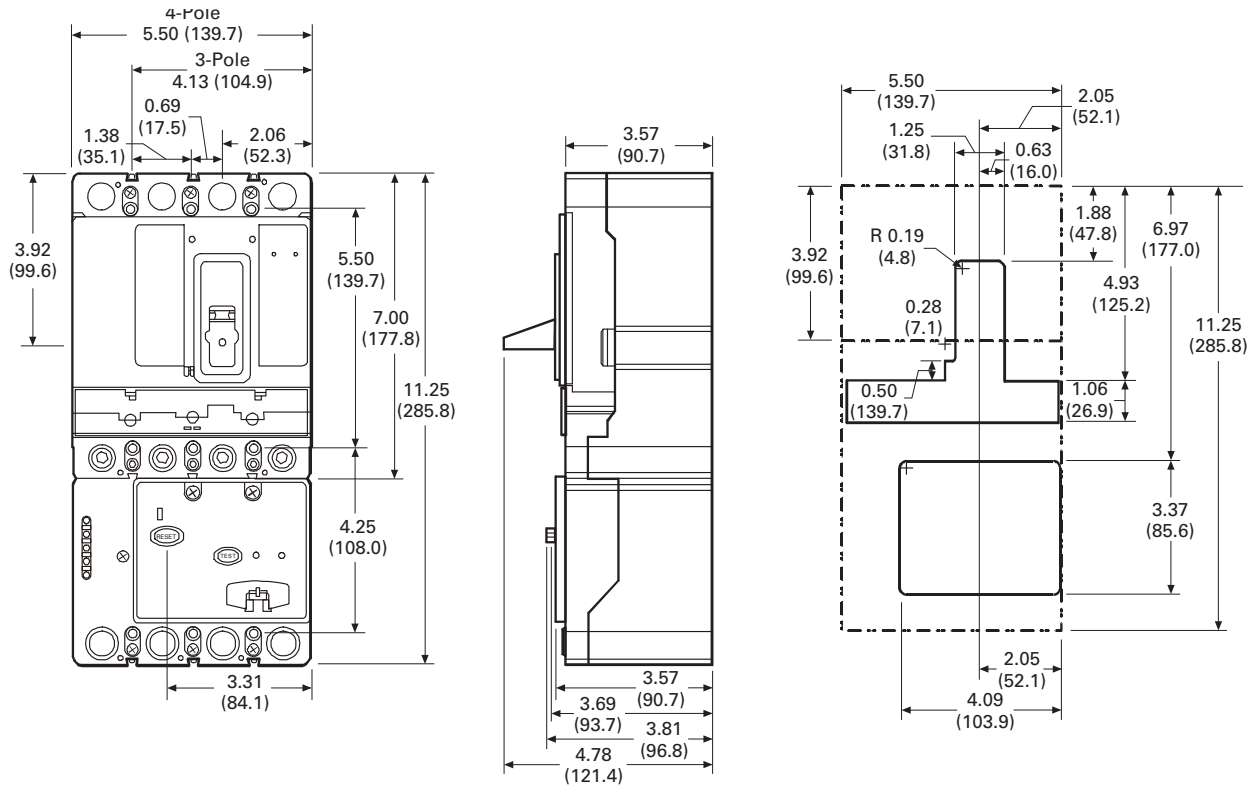
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## Molded Case Circuit Breakers

### Series G

#### JG-Frame With Earth Leakage Module

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**LG-Frame (250–630 Amperes)****LG-Frame (250–630 Amperes)****Product Description**

LG breaker is HACR rated.

**Contents**

<b>Description</b>	<b>Page</b>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-119</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-133</b>
LG-Frame (250–630 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-152</b>
Product Selection . . . . .	<b>V4-T2-153</b>
Accessories . . . . .	<b>V4-T2-164</b>
Technical Data and Specifications . . . . .	<b>V4-T2-165</b>
Dimensions and Weights. . . . .	<b>V4-T2-167</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-189</b>
Motor Protector Circuit Breakers (MPCB). . . . .	<b>V4-T2-193</b>
30 mA Ground Fault (Earth Leakage) Module. . . . .	<b>V4-T2-196</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-200</b>
High Instantaneous Circuit Breaker for	
Selective Coordination . . . . .	<b>V4-T2-205</b>
Special Features and Accessories. . . . .	<b>V4-T2-208</b>
Motor Operators . . . . .	<b>V4-T2-216</b>
Plug-In Blocks . . . . .	<b>V4-T2-218</b>
Drawout Cassette . . . . .	<b>V4-T2-219</b>

# 2.3

## Molded Case Circuit Breakers

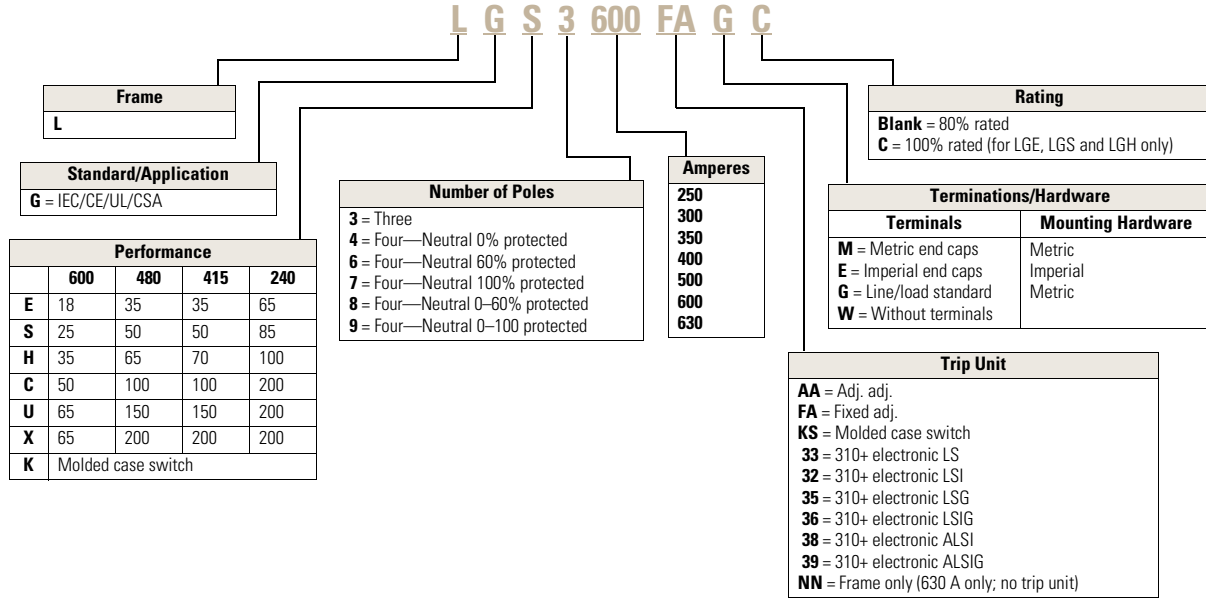
### Series G

#### Catalog Number Selection

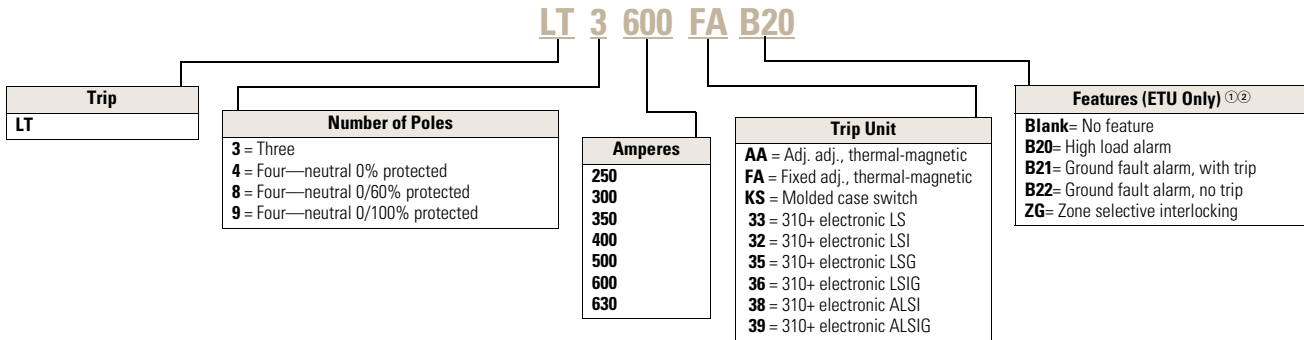
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

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#### Series G—LG-Frame (250–630 Amperes)



#### Trip Unit



#### Notes

- ① Bxx features cannot be combined with other Bxx features.
- ② B21 and B22 available with LSG and LSIG trip units.

## Product Selection

Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)

## LG-Frame


**LG-Frame—630 Amperes (600 Amperes UL, CSA)**  
 IC Rating: 35 kAIC at 415 and 480 Vac <sup>①</sup>

Ampere Rating	Three-Pole <sup>②</sup>		Four-Pole (0%) <sup>③</sup>	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>④⑤</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>④⑤</sup> Catalog Number
250	LGE3250FAG	LGE3250AAG	LGE4250FAG	LGE4250AAG
300	LGE3300FAG	—	LGE4300FAG	—
320	—	LGE3320AAG	—	LGE4320AAG
350	LGE3350FAG	—	LGE4350FAG	—
400	LGE3400FAG	LGE3400AAG	LGE4400FAG	LGE4400AAG
500	LGE3500FAG	LGE3500AAG	LGE4500FAG	LGE4500AAG
600	LGE3600FAG	—	LGE4600FAG	—
630 <sup>④</sup>	—	LGE3630AAG	—	LGE4630AAG

## LG-Frame


**LG-Frame—630 Amperes (600 Amperes UL, CSA)**  
 IC Rating: 50 kAIC at 415 and 480 Vac <sup>①</sup>

Ampere Rating	Three-Pole <sup>②</sup>		Four-Pole (0%) <sup>③</sup>	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>④⑤</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>④⑤</sup> Catalog Number
250	LGS3250FAG	LGS3250AAG	LGS4250FAG	LGS4250AAG
300	LGS3300FAG	—	LGS4300FAG	—
320	—	LGS3320AAG	—	LGS4320AAG
350	LGS3350FAG	—	LGS4350FAG	—
400	LGS3400FAG	LGS3400AAG	LGS4400FAG	LGS4400AAG
500	LGS3500FAG	LGS3500AAG	LGS4500FAG	LGS4500AAG
600	LGS3600FAG	—	LGS4600FAG	—
630 <sup>④</sup>	—	LGS3630AAG	—	LGS4630AAG

## LG-Frame


**LG-Frame—630 Amperes (600 Amperes UL, CSA)**  
 IC Rating: 70 kAIC at 415, 65 kAIC at 480 Vac <sup>①</sup>

Ampere Rating	Three-Pole <sup>②</sup>		Four-Pole (0%) <sup>③</sup>	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>④⑤</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>④⑤</sup> Catalog Number
250	LGH3250FAG	LGH3250AAG	LGH4250FAG	LGH4250AAG
300	LGH3300FAG	—	LGH4300FAG	—
320	—	LGH3320AAG	—	LGH4320AAG
350	LGH3350FAG	—	LGH4350FAG	—
400	LGH3400FAG	LGH3400AAG	LGH4400FAG	LGH4400AAG
500	LGH3500FAG	LGH3500AAG	LGH4500FAG	LGH4500AAG
600	LGH3600FAG	—	LGH4600FAG	—
630 <sup>④</sup>	—	LGH3630AAG	—	LGH4630AAG

## Notes

- ① Replace suffix “G” with “W” for no line and load terminals.
- ② For two-pole applications, use two outer poles.
- ③ Neutral protection is indicated by the fourth character: 4 = 0%, 7 = 100%, 8 = adjustable 0–60% and 9 = 0–100%. Neutral is on LH side.
- ④ 320/630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ⑤ Adjustable thermal units are typically used in IEC markets and are not UL or CSA listed.

# 2.3

## Molded Case Circuit Breakers

### Series G

Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)

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LG-Frame



**LG-Frame—630 Amperes (600 Amperes UL, CSA), Current Limiting Per UL 489**  
**IC Rating: 100 kAIC at 415 and 480 Vac** ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic ④⑤	Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic ④⑤
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
250	LGC3250FAG	LGC3250AAG	LGC4250FAG	LGC4250AAG
300	LGC3300FAG	—	LGC4300FAG	—
320	—	LGC3320AAG	—	LGC4320AAG
350	LGC3350FAG	—	LGC4350FAG	—
400	LGC3400FAG	LGC3400AAG	LGC4400FAG	LGC4400AAG
500	LGC3500FAG	LGC3500AAG	LGC4500FAG	LGC4500AAG
600	LGC3600FAG	—	LGC4600FAG	—
630 ④	—	LGC3630AAG	—	LGC4630AAG

LG-Frame



**LG-Frame—630 Amperes (600 Amperes UL, CSA), Current Limiting Per UL 489**  
**IC Rating: 150 kAIC at 415 and 480 Vac** ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic ④⑤	Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic ④⑤
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
250	LGU3250FAG	LGU3250AAG	LGU4250FAG	LGU4250AAG
300	LGU3300FAG	—	LGU4300FAG	—
320	—	LGU3320AAG	—	LGU4320AAG
350	LGU3350FAG	—	LGU4350FAG	—
400	LGU3400FAG	LGU3400AAG	LGU4400FAG	LGU4400AAG
500	LGU3500FAG	LGU3500AAG	LGU4500FAG	LGU4500AAG
600	LGU3600FAG	—	LGU4600FAG	—
630 ④	—	LGU3630AAG	—	LGU4630AAG

LG-Frame



**LG-Frame—630 Amperes (600 Amperes UL, CSA), Current Limiting Per UL 489**  
**IC Rating: 200 kAIC at 415 and 480 Vac** ①

Ampere Rating	Three-Pole ②		Four-Pole (0%) ③	
	Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic ④⑤	Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic ④⑤
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
250	LGX3250FAG	LGX3250AAG	LGX4250FAG	LGX4250AAG
300	LGX3300FAG	—	LGX4300FAG	—
320	—	LGX3320AAG	—	LGX4320AAG
350	LGX3350FAG	—	LGX4350FAG	—
400	LGX3400FAG	LGX3400AAG	LGX4400FAG	LGX4400AAG
500	LGX3500FAG	LGX3500AAG	LGX4500FAG	LGX4500AAG
600	LGX3600FAG	—	LGX4600FAG	—
630 ④	—	LGX3630AAG	—	LGX4630AAG

**Notes**

- ① Replace suffix "G" with "W" for no line and load terminals.
- ② For two-pole applications, use two outer poles.
- ③ Neutral protection is indicated by the fourth character: 4 = 0%, 7 = 100%, 8 = adjustable 0–60% and 9 = 0–100%. Neutral is on LH side.
- ④ 320/630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ⑤ Adjustable thermal units are typically used in IEC markets and are not UL or CSA listed.

**Molded Case Switches** <sup>①</sup>

Ampere Rating	Number of Poles	Catalog Number
400	3 <sup>②</sup>	LGK3400KSG
	4	LGK4400KSG
630 <sup>③</sup>	3 <sup>②</sup>	LGK3630KSG
	4	LGK4630KSG

**Frame—IC Rating at 415/480 Volts**

Maximum Amperes <sup>③</sup>	Three-Pole <sup>②</sup> Catalog Number	Four-Pole 0% Catalog Number
<b>35/35</b>		
630 <sup>③</sup>	LGE3630NN	LGE4630NN
	LGE3630NNWC <sup>④</sup>	—
<b>50/50</b>		
630 <sup>③</sup>	LGS3630NN	LGS4630NN
	LGS3630NNWC <sup>④</sup>	—
<b>70/53</b>		
630 <sup>③</sup>	LGH3630NN	LGH4630NN
	LGH3630NNWC <sup>④</sup>	—
<b>100/100 Current Limiting Per UL 489</b>		
630	LGC3630NN	LGC4630NN
<b>150/150 Current Limiting Per UL 489</b>		
630	LGU3630NN	LGU4630NN
<b>200/200 Current Limiting</b>		
630	LGX3630NN	LGX4630NN

**Thermal-Magnetic Trip Unit**

Ampere Rating	Three-Pole <sup>②</sup>		Four-Pole (0%) <sup>⑥</sup>	
	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>⑤</sup> Catalog Number	Fixed Thermal, Adjustable Magnetic Catalog Number	Adjustable Thermal, Adjustable Magnetic <sup>⑤</sup> Catalog Number
250	LT3250FA	LT3250AA	LT4250FA	LT4250AA
300	LT3300FA	—	LT4300FA	—
320	—	LT3320AA	—	LT4320AA
350	LT3350FA	—	LT4350FA	—
400	LT3400FA	LT3400AA	LT4400FA	LT4400AA
500	LT3500FA	LT3500AA	LT4500FA	LT4500AA
600	LT3600FA	—	LT4600FA	—
630	—	LT3630AA	—	LT4630AA

**Notes**

- ① Molded case switches will trip above 6300 amperes.
- ② For two-pole applications, use two outer poles.
- ③ 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.
- ④ 100% rated frame.
- ⑤ Adjustable thermal, adjustable magnetic trip units are typically used in IEC markets and are not UL or CSA listed.
- ⑥ Neutral protection is indicated by the third character: 4 = 0%, 7 = 100%, 8 = adjustable 0–60% and 9 = 0–100%.



**Digitrip 310+ Electronic Trip Units**See 310+ adjustability specifications on **Page V4-T2-166**.

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Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
<b>Three-Pole</b>					
250	LT325033	LT325032	LT325035	LT325036	LGFACT250
400	LT340033	LT340032	LT340035	LT340036	LGFACT400
600	LT360033	LT360032	LT360035	LT360036	LGFACT600
630 <sup>②</sup>	LT363033	LT363032	LT363035	LT363036	LGFACT600
<b>Four-Pole <sup>③④</sup></b>					
250	LT425033	LT425032	LT425035	LT425036	—
400	LT440033	LT440032	LT440035	LT440036	—
600	LT460033	LT460032	LT460035	LT460036	—
630 <sup>②</sup>	LT463033	LT463032	LT463035	LT463036	—

**310+ Electronic Trip Unit Accessories**

Description	Catalog Number
Electronic portable test kit	MTST230V
Trip unit tamper protection wire seal	5108A03H01
External neutral sensor (630 A)	LGFACT630
External neutral sensor (600 A)	LGFACT600
External neutral sensor (400 A)	LGFACT400
External neutral sensor (250 A)	LGFACT250
Breaker-mount cause-of-trip indication	TRIP-LED
Breaker-mount ammeter module	DIGIVIEW
Remote-mount ammeter module	DIGIVIEWR06

**Notes**

- ① Required for four-wire systems if neutral protection is desired.
- ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.
- ③ Neutral protection: 4= 0%, 6 = 60%, 7 = 100%. Electronic trip unit neutral protection is not adjustable.
- ④ Four-pole LSG and LSIG trip units are only available with 0% neutral protection.

**IC Rating at 415/480 V****Complete LG Breakers with Electronic Trip Unit (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware) ①**See 310+ adjustability specifications on **Page V4-T2-166**.**IC Rating: 35 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGE325033G	LGE325032G	LGE325035G	LGE325036G	LGFACT250
400	LGE340033G	LGE340032G	LGE340035G	LGE340036G	LGFACT400
600	LGE360033G	LGE360032G	LGE360035G	LGE360036G	LGFACT600
630 ④	LGE363033G	LGE363032G	LGE363035G	LGE363036G	LGFACT600
<b>Four-Pole ⑤</b>					
250	LGE425033G	LGE425032G	LGE425035G	LGE425036G	—
400	LGE440033G	LGE440032G	LGE440035G	LGE440036G	—
600	LGE460033G	LGE460032G	LGE460035G	LGE460036G	—
630 ④	LGE463033G	LGE463032G	LGE463035G	LGE463036G	—

**IC Rating: 50 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGS325033G	LGS325032G	LGS325035G	LGS325036G	LGFACT250
400	LGS340033G	LGS340032G	LGS340035G	LGS340036G	LGFACT400
600	LGS360033G	LGS360032G	LGS360035G	LGS360036G	LGFACT600
630 ④	LGS363033G	LGS363032G	LGS363035G	LGS363036G	LGFACT600
<b>Four-Pole ⑤⑥</b>					
250	LGS425033G	LGS425032G	LGS425035G	LGS425036G	—
400	LGS440033G	LGS440032G	LGS440035G	LGS440036G	—
600	LGS460033G	LGS460032G	LGS460035G	LGS460036G	—
630 ④	LGS463033G	LGS463032G	LGS463035G	LGS463036G	—

**IC Rating: 70 kAIC at 415 Vac, 65 kAIC at 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG ② Catalog Number
<b>Three-Pole ③</b>					
250	LGH325033G	LGH325032G	LGH325035G	LGH325036G	LGFACT250
400	LGH340033G	LGH340032G	LGH340035G	LGH340036G	LGFACT400
600	LGH360033G	LGH360032G	LGH360035G	LGH360036G	LGFACT600
630 ④	LGH363033G	LGH363032G	LGH363035G	LGH363036G	LGFACT600
<b>Four-Pole ⑤⑥</b>					
250	LGH425033G	LGH425032G	LGH425035G	LGH425036G	—
400	LGH440033G	LGH440032G	LGH440035G	LGH440036G	—
600	LGH460033G	LGH460032G	LGH460035G	LGH460036G	—
630 ④	LGH463033G	LGH463032G	LGH463035G	LGH463036G	—

**Notes**

- ① Replace suffix "G" with "W" for no line and load terminals.
- ② Required for four-wire systems if neutral protection is desired.
- ③ For two-pole applications, use two outer poles.
- ④ 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.
- ⑤ Neutral protection: 4 = 0%, 6 = 60%, 7 = 100%. Electronic trip unit neutral protection is not adjustable.
- ⑥ Four-pole breakers with LSG and LSIG trip units are only available with 0% neutral protection.

**IC Rating at 415/480 V****Complete LG Breakers with Electronic Trip Unit (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)**<sup>①</sup>See 310+ adjustability specifications on **Page V4-T2-166**.**IC Rating: 100 kAIC at 415 Vac and 480 Vac, Current Limiting Per UL 489**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>②</sup> Catalog Number
<b>Three-Pole</b> <sup>③</sup>					
250	LGC325033G	LGC325032G	LGC325035G	LGC325036G	LGFACT250
400	LGC340033G	LGC340032G	LGC340035G	LGC340036G	LGFACT400
600	LGC360033G	LGC360032G	LGC360035G	LGC360036G	LGFACT600
630 <sup>④</sup>	LGC363033G	LGC363032G	LGC363035G	LGC363036G	LGFACT600
<b>Four-Pole</b> <sup>⑤⑥</sup>					
250	LGC425033G	LGC425032G	LGC425035G	LGC425036G	—
400	LGC440033G	LGC440032G	LGC440035G	LGC440036G	—
600	LGC460033G	LGC460032G	LGC460035G	LGC460036G	—
630 <sup>④</sup>	LGC463033G	LGC463032G	LGC463035G	LGC463036G	—

**IC Rating: 150 kAIC at 415 Vac and 480 Vac, Current Limiting Per UL 489**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>②</sup> Catalog Number
<b>Three-Pole</b> <sup>③</sup>					
250	LGU325033G	LGU325032G	LGU325035G	LGU325036G	LGFACT250
400	LGU340033G	LGU340032G	LGU340035G	LGU340036G	LGFACT400
600	LGU360033G	LGU360032G	LGU360035G	LGU360036G	LGFACT600
630 <sup>④</sup>	LGU363033G	LGU363032G	LGU363035G	LGU363036G	LGFACT600
<b>Four-Pole</b> <sup>⑤</sup>					
250	LGU425033G	LGU425032G	LGU425035G	LGU425036G	—
400	LGU440033G	LGU440032G	LGU440035G	LGU440036G	—
600	LGU460033G	LGU460032G	LGU460035G	LGU460036G	—
630 <sup>④</sup>	LGU463033G	LGU463032G	LGU463035G	LGU463036G	—

**IC Rating: 200 kAIC at 415 Vac and 480 Vac, Current Limiting Per UL 489**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>②</sup> Catalog Number
<b>Three-Pole</b> <sup>③</sup>					
250	LGX325033G	LGX325032G	LGX325035G	LGX325036G	LGFACT250
400	LGX340033G	LGX340032G	LGX340035G	LGX340036G	LGFACT400
600	LGX360033G	LGX360032G	LGX360035G	LGX360036G	LGFACT600
630 <sup>④</sup>	LGX363033G	LGX363032G	LGX363035G	LGX363036G	LGFACT600
<b>Four-Pole</b> <sup>⑤</sup>					
250	LGX425033G	LGX425032G	LGX425035G	LGX425036G	—
400	LGX440033G	LGX440032G	LGX440035G	LGX440036G	—
600	LGX460033G	LGX460032G	LGX460035G	LGX460036G	—
630 <sup>④</sup>	LGX463033G	LGX463032G	LGX463035G	LGX463036G	—

**Notes**

- ① Replace suffix "G" with "W" for no line and load terminals.
- ② Required for four-wire systems if neutral protection is desired.
- ③ For two-pole applications, use two outer poles.
- ④ 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.
- ⑤ Neutral protection: 4= 0%, 6 = 60%, 7 = 100%. Electronic trip unit neutral protection is not adjustable.
- ⑥ Four-pole breakers with LSG and LSIG trip units are only available with 0% neutral protection.

**LG 100% Rated Circuit Breaker—Thermal-Magnetic Trip Unit****Complete Breaker (Includes Frame, Trip Unit, Standard Terminals and Mounting Hardware)****LG-Frame****LG-Frame—630 Amperes (600 Amperes UL, CSA) IC Rating: 35 kAIC at 415 and 480 Vac <sup>①</sup>**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number
250	LGE3250FAGC
300	LGE3300FAGC
320	—
350	LGE3350FAGC
400	LGE3400FAGC
500	LGE3500FAGC
600	LGE3600FAGC
630 <sup>④</sup>	—

**LG-Frame—630 Amperes (600 Amperes UL, CSA) IC Rating: 50 kAIC at 415 and 480 Vac <sup>①</sup>**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number
250	LGS3250FAGC
300	LGS3300FAGC
320	—
350	LGS3350FAGC
400	LGS3400FAGC
500	LGS3500FAGC
600	LGS3600FAGC
630 <sup>④</sup>	—

**LG-Frame—630 Amperes (600 Amperes UL, CSA) IC Rating: 70 kAIC at 415, 65 kAIC at 480 Vac <sup>①</sup>**

Ampere Rating	Three-Pole <sup>②</sup> Fixed Thermal, Adjustable Magnetic Catalog Number
250	LGH3250FAGC
300	LGH3300FAGC
320	—
350	LGH3350FAGC
400	LGH3400FAGC
500	LGH3500FAGC
600	LGH3600FAGC
630 <sup>④</sup>	—

**Notes**

- <sup>①</sup> Replace suffix "G" with "W" for no line and load terminals.  
<sup>②</sup> For two-pole applications, use two outer poles.

**LG 100% Rated Electronic Breaker Per UL 489**See 310+ adjustability specifications on **Page V4-T2-166**.

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**IEC/UL/CSA 35 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
250	LGE325033GC	LGE325032GC	LGE325035GC	LGE325036GC	LGFACT250
400	LGE340033GC	LGE340032GC	LGE340035GC	LGE340036GC	LGFACT400
600	LGE360033GC	LGE360032GC	LGE360035GC	LGE360036GC	LGFACT600
630 <sup>②</sup>	LGE363033GC	LGE363032GC	LGE363035GC	LGE363036GC	LGFACT600

**IEC/UL/CSA 50 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
250	LGS325033GC	LGS325032GC	LGS325035GC	LGS325036GC	LGFACT250
400	LGS340033GC	LGS340032GC	LGS340035GC	LGS340036GC	LGFACT400
600	LGS360033GC	LGS360032GC	LGS360035GC	LGS360036GC	LGFACT600
630 <sup>②</sup>	LGS363033GC	LGS363032GC	LGS363035GC	LGS363036GC	LGFACT600

**IEC/UL/CSA 70 kAIC at 415 and 480 Vac**

Ampere Rating	LS Catalog Number	LSI Catalog Number	LSG Catalog Number	LSIG Catalog Number	Neutral CT for LSG and LSIG <sup>①</sup> Catalog Number
250	LGH325033GC	LGH325032GC	LGH325035GC	LGH325036GC	LGFACT250
400	LGH340033GC	LGH340032GC	LGH340035GC	LGH340036GC	LGFACT400
600	LGH360033GC	LGH360032GC	LGH360035GC	LGH360036GC	LGFACT600
630 <sup>②</sup>	LGH363033GC	LGH363032GC	LGH363035GC	LGH363036GC	LGFACT600

**Notes**<sup>①</sup> Required for four-wire systems if neutral protection is required.<sup>②</sup> 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.

**LG Electronic Breaker with Arcflash Reduction Maintenance System**

See 310+ adjustability specifications on **Page V4-T2-166**.

Series G LG circuit breakers are available with the Arcflash Reduction Maintenance System™ integrated into the electronic trip units helping to improve safety by providing a

simple and reliable method to reduce fault clearing time. The Arcflash Reduction Maintenance System unit utilizes a separate analog trip circuit that provides faster

interruption times than the standard (digital) “instantaneous” protection. Work locations downstream of a circuit breaker with an Arcflash Reduction

Maintenance System unit can have a significantly lower incident energy level, reducing arc flash potential to the system.

**LG with Arcflash Reduction Maintenance System****LG Electronic Breaker with Arcflash Reduction Maintenance System**

Ampere Rating	ALSI Catalog Number	ALSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
<b>IEC/UL/CSA 35 kAIC at 415 and 480 Vac</b>			
250	LGE325038G	LGE365039G	LGFACT250
400	LGE340038G	LGE340039G	LGFACT400
600	LGE360038G	LGE360039G	LGFACT600
630	LGE363038G	LGE363039G	LGFACT600
<b>IEC/UL/CSA 50 kAIC at 415 and 480 Vac</b>			
250	LGS325038G	LGS365039G	LGFACT250
400	LGS340038G	LGS340039G	LGFACT400
600	LGS360038G	LGS360039G	LGFACT600
630	LGS363038G	LGS363039G	LGFACT600
<b>IEC/UL/CSA 70 kAIC at 415 and 480 Vac</b>			
250	LGH325038G	LGH365039G	LGFACT250
400	LGH340038G	LGH340039G	LGFACT400
600	LGH360038G	LGH360039G	LGFACT600
630	LGH363038G	LGH363039G	LGFACT600
<b>IEC/UL/CSA 100 kAIC at 415 and 480 Vac, Current Limiting Per UL 489</b>			
250	LGC325038G	LGC365039G	LGFACT250
400	LGC340038G	LGC340039G	LGFACT400
600	LGC360038G	LGC360039G	LGFACT600
630	LGC363038G	LGC363039G	LGFACT600
<b>IEC/UL/CSA 150 kAIC at 415 and 480 Vac, Current Limiting Per UL 489</b>			
250	LGU325038G	LGU365039G	LGFACT250
400	LGU340038G	LGU340039G	LGFACT400
600	LGU360038G	LGU360039G	LGFACT600
630	LGU363038G	LGU363039G	LGFACT600
<b>IEC/UL/CSA 200 kAIC at 415 and 480 Vac, Current Limiting Per UL 489</b>			
250	LGX325038G	LGX365039G	LGFACT250
400	LGX340038G	LGX340039G	LGFACT400
600	LGX360038G	LGX360039G	LGFACT600
630	LGX363038G	LGX363039G	LGFACT600

**LG Electronic Trip Units with Arcflash Reduction Maintenance System**

Ampere Rating	ALSI Catalog Number	ALSIG Catalog Number	Neutral CT for LSG and LSIG ① Catalog Number
250	LT325038	LT325039	LGFACT250
400	LT340038	LT340039	LGFACT400
600	LT360038	LT360039	LGFACT600
630	LT363038	LT363039	LGFACT600

**Note**

① Required for four-wire systems if neutral protection is required.

## Accessories Selection Guide and Ordering Information

## 2

## Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range (mm <sup>2</sup> )	Number of Terminals Included	Catalog Number
400	Aluminum	Cu/Al	500–750 (1)	240–380 (1)	3	3TA631LK <sup>①</sup>
400	Aluminum	Cu/Al	500–750 (1)	240–380 (1)	4	4TA631LK <sup>①</sup>
400	Copper	Cu	500–750 (1)	240–380 (1)	3	3T631LK <sup>①</sup>
400	Copper	Cu	500–750 (1)	240–380 (1)	4	4T631LK <sup>①</sup>
630	Aluminum	Cu/Al	2–500 (2)	35–240 (2)	1	TA632L
630	Aluminum	Cu/Al	2–500 (2)	35–240 (2)	3	3TA632LK <sup>①②</sup>
630	Aluminum	Cu/Al	2–500 (2)	35–240 (2)	4	4TA632LK <sup>①②</sup>
630	Copper	Cu	2–500 (2)	35–240 (2)	3	3T632LK <sup>①</sup>
630	Copper	Cu	2–500 (2)	35–240 (2)	4	4T632LK <sup>①</sup>
400	Aluminum	Cu/Al	3–500 (1)	35–240 (1)	1	TA350LK <sup>②</sup>
400	Copper	Cu	3–500 (1)	35–240 (1)	1	T350LK

## Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order 66A4560G03.

## Terminal Covers

Description	Catalog Number
Three-pole terminal cover <sup>③</sup>	LTS3K
Four-pole terminal cover <sup>③</sup>	LTS4K

## End Cap Kits (MIO Metric Nuts)

Number of Poles	Catalog Number
3	L3RTWK
4	L4RTWK

## Control Wire Terminal Kit

Description	Terminal Body Type	Catalog Number
Three-pole kit	Aluminum	3TA632LKW
Four-pole kit	Aluminum	4TA632LKW
Three-pole kit	Copper	3T632LKW
Four-pole kit	Copper	4T632LKW

## Terminal Spreaders

Number of Poles	Catalog Number
3	LGTEW3
4	LGTEW4

## Terminal Extensions

Number of Poles	Catalog Number
3	LGTES3
4	LGTES4

## Handle Extension

Description	Catalog Number
Handle extension	HEXLG

## Interphase Barrier

Package of 2	Catalog Number
Interphase barrier	IPB3

## Rear Fed Terminals

Maximum Amperes	Wire Size Range AWG Cu	Catalog Number
400	2–500 kcmil	TA350LKRF
400	2–500 kcmil	3TA350LKRF
630	2–500 (2) kcmil	TA632LKRF
630	2–500 (2) kcmil	3TA632LKRF

Rear fed terminals allow the cable to connect to the breaker from the back instead of the top. Terminal shields or interphase barriers are included with each rear fed terminal kit (depending on frame size). When catalog number starts with a 3, it indicates a kit with three terminals in each kit. Catalog number beginning with a TA indicates one terminal.

## Multiwire Connectors

Field-installed multiwire connectors for the load side (OFF) end terminals are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include terminal shield, mounting hardware, insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

## LG-Frame Multiwire Connectors Ordering Information (Package of 3)

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number
600	6	14–1/0	3TA600L6K

## Notes

- ① Includes LTS3K (three-pole) or LTS4K (four-pole) terminal covers.
- ② Standard terminal included with complete breaker.
- ③ Included in TA631L, T631L, TA632L kits listed above.

**StrandAble Multiwire Terminals**

Field-installed multiwire terminals are UL listed for nearly any class of rigid or fine strand wire without the use of additional fittings.

Used on the load side of circuit breaker to distribute the load to multiple devices without the use of a power distribution block.

StrandAble multiwire terminals are available in three-pole kits that include the necessary hardware and shielding.

3TA600L6SWK

**LG Frame StrandAble Multiwire Terminals (Three-Pole Kits)**

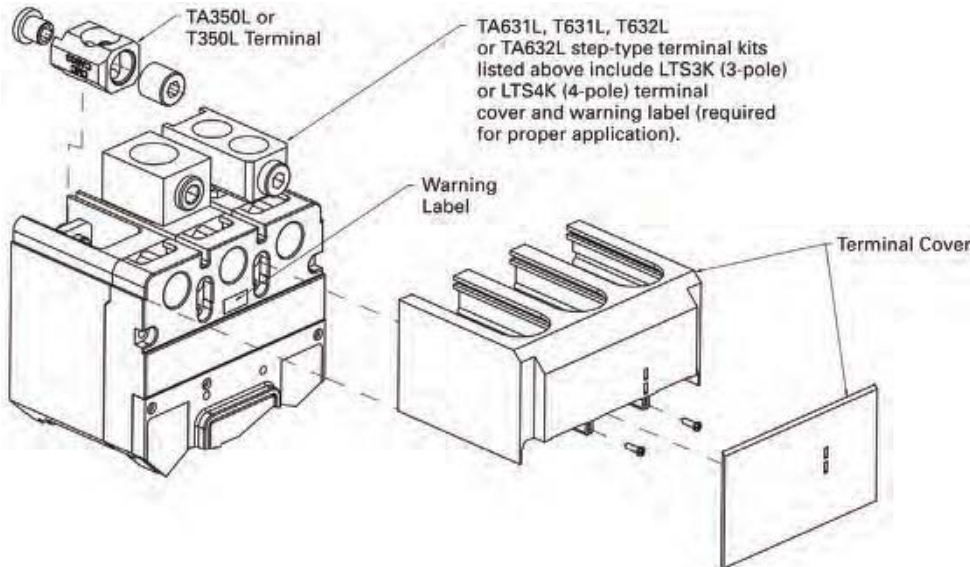


Maximum Amperage	Wire Class	Wire Range	Shield Included	Catalog Number
600	B and C	(6) 12–2/0	Interphase barrier	<b>3TA600L6SWKI</b>
600	D, G, H, I, K, M	(6) 8–1/0	Interphase barrier	
600	B and C	(6) 12–2/0	Terminal shield	<b>3TA600L6SWKS</b>
600	D, G, H, I, K, M	(6) 8–1/0	Terminal shield	

**Terminals and Terminal Cover**

**Terminals and Terminal Cover for the LG Breaker—Includes LTS3K (Three-Pole) or LTS4K (Four-Pole) Terminal Covers**

**Note:** Extended terminal covers add 2.13 inches (54.0 mm) to breaker length.





## Accessories

## 2

**Base Mounting Hardware**

Base mounting hardware is included with a circuit breaker or molded case switch. (Included with breaker.) If required separately, order 66A4560G03.

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

**LG-Frame Accessories**

Description	Reference Page	Three-Pole			Four-Pole			Neu.
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-213			■			■	
Auxiliary switch (1A, 1B)	V4-T2-213			■			■	
Auxiliary switch (2A, 2B)	V4-T2-213			■			■	
Auxiliary switch and alarm switch combination	V4-T2-213			■			■	
Shunt trip—standard	V4-T2-213	■			■			
Undervoltage release mechanism	V4-T2-214	■			■			
<b>External Accessories</b>								
End cap kit	V4-T2-162	●			●			
Handle extension	V4-T2-162	●			●			
Terminal cover	V4-T2-162	●			●			
Rear fed terminals	V4-T2-162	●	●	●	●	●	●	●
Multewire connectors	V4-T2-162	●	●	●	●	●	●	●
Padlockable handle block	V4-T2-211		■			■		
Padlockable handle lock hasp	V4-T2-211	□		□	□		□	
Key interlock kit	V4-T2-211	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-211	●	●	●	●	●	●	●
Electrical operator	V4-T2-211	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-211	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-211	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-496	●	●	●	●	●	●	●
Earth leakage/ground fault protector	V4-T2-196	●	●	●	●	●	●	●
Drawout cassette	V4-T2-219	●	●	●	●	●	●	●
Digitrip 310+ test kit	V4-T2-156	●	●	●	●	●	●	●
Ammeter/cause of trip display	V4-T2-210	●	●	●	●	●	●	●
Cause of trip LED module	V4-T2-210	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-209	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application, UL 489 Supplement SA and SB	①	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

**Note**

① Contact Eaton.

## Technical Data and Specifications

### Interrupting Capacity Ratings

#### UL 489/IEC 60947-2 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA rms Symmetrical Amperes) (kA)								Volts DC <sup>①</sup>	
		Volts AC (50/60 Hz)								250 <sup>②③</sup>	
		240–240		380–415		480	600	690		Icu	Ics
LGE630	3, 4	65	65	35	35	35	18	12	6	22	22
LGS630	3, 4	85	85	50	50	50	25	20	10	22	22
LGH630	3, 4	100	100	70	70	65	35	25	13	42	42
LGC630 <sup>④</sup>	3, 4	200	200	100	100	100	50	30	15	42	42
LGU630 <sup>④</sup>	3, 4	200	200	150	150	150	65	35	18	50	50
LGX630 <sup>④</sup>	3, 4	200 <sup>⑤</sup>	200	200	200	200	65	35	18	50	50

#### UL 489 Current Limiting Data

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
LGC	240 V/200 kA	56.4	5.873
LGC	480 V/100 kA	56.4	5.873
LGC	600 V/50 kA	56.4	6.690
LGU	240 V/200 kA	77.7	7.320
LGU	480 V/150 kA	77.7	7.320
LGU	600 V/65 kA	50.6	6.690
LGX	240 V/200 kA	77.7	7.320
LGX	480 V/200 kA	77.7	7.320
LGX	600 V/65 kA	50.6	6.690

#### LG 310+ Specifications

Description	Specification
Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame designation	LG
Frames available	250 A, 400 A, 600 A
Continuous current range (A)	100–600 A
Ground fault pickup (A)	50–600 A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100, 150, 200
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG, ALSI, ALSIG
Arcflash reduction maintenance system (or maintenance mode)	Yes
Interchangeable trip unit	Yes
High load alarm (suffix B20) <sup>⑥</sup>	Yes
Ground fault alarm with trip (suffix B21) <sup>⑥</sup>	Yes
Ground fault alarm, no trip (suffix B22) <sup>⑥</sup>	Yes
Zone selective interlocking (suffix ZG)	LSI, LSIG, ALSI, ALSIG
Cause of trip indication	Yes
Thru-cover accessories	Yes

#### Notes

- ① DC rating apply to substantially non-inductive circuits.
- ② Two-pole circuit breaker, or two poles of three-pole circuits.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at –kA.
- ④ Current limiting per UL 489.
- ⑤ IEC rating is 300 kA at 240 Vac.
- ⑥ B2x suffixes cannot be combined with B2x suffixes.

## LG 310+ Adjustability Specifications

2

310+ Settings		LG Frame		
		250 A	400 A	600 A
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$			
	A	100	160	250
	B	125	200	300
	C	150	225	315
	D	160	250	350
	E	175	300	400
	F	200	315	450
	G	225	350	500
	H (= $I_n$ )	250	400	600
$t_r$ = long delay time (seconds) (All 310+)	Position 1	2	2	2
	Position 2	4	4	4
	Position 3	7	7	7
	Position 4	10	10	10
	Position 5	12	12	12
	Position 6	15	15	15
	Position 7	20	20	20
	Position 8	24	24	24
	$I_{sd}$ (x $I_r$ ) = short delay pickup (All 310+)	Position 1	2x	2x
Position 2		3x	3x	3x
Position 3		4x	4x	4x
Position 4		5x	5x	5x
Position 5		6x	6x	6x
Position 6		7x	7x	7x
Position 7		8x	8x	8x
Position 8		10x	10x	10x
Position 9		12x	12x	12x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS, LSG)	Fixed	67 at10x	67 at10x	67 at10x
$t_{sd}$ = short delay time flat (milliseconds) ① (LSI, LSIG, ALSI, ALSIG)	Position 1	Inst	Inst	Inst
	Position 2	120	120	120
	Position 3	300	300	300
$I_g$ = ground fault pickup (amperes) (LSG, LSIG, ALSIG)	Position 1	50	80	120
	Position 2	75	120	180
	Position 3	100	160	240
	Position 4	150	240	360
	Position 5	200	320	480
	Position 6	250	400	600
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG, ALSIG)	Position 1	Inst	Inst	Inst
	Position 2	120	120	120
	Position 3	300	300	300
Independently Adjustable Instantaneous ( $I_i$ ) setting (ALSI, ALSIG)	Yes	2.5x, 4x, 6x, 7x, 8x, 10x, 12x	2.5x, 4x, 6x, 7x, 8x, 10x, 12x	2.5x, 4x, 6x, 7x, 8x, 10x, 12x
Maintenance Mode (remote) pickup ( $2.5 \times I_n$ ) ② (ALSI, ALSIG)	Fixed	2.5x		

**Notes**

① 50 ms for ALSI and ALSIG trip units.

② Maintenance Mode is enabled remotely using a 24 Vdc circuit.

**Dimensions and Weights**

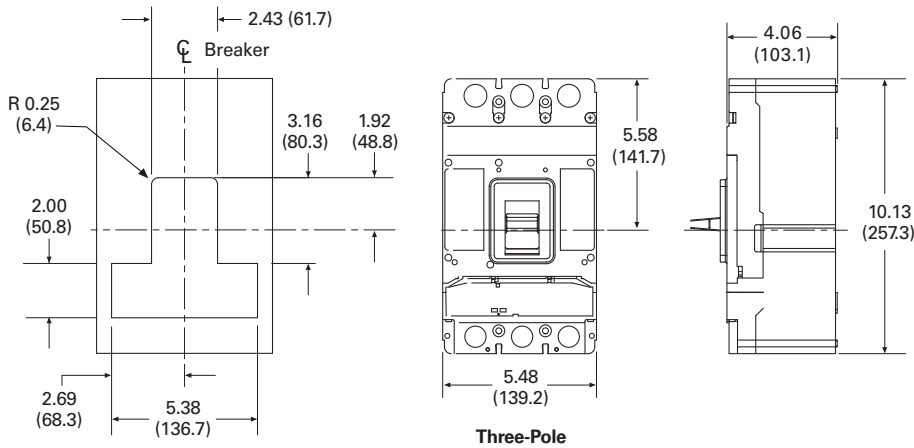
Approximate Dimensions in Inches (mm)

**LG-Frame**

Number of Poles	Width	Height	Depth
2, 3	5.48 (139.2)	10.13 (257.3)	4.09 (103.9)
4	7.22 (183.4)	10.13 (257.3)	4.09 (103.9)

**LG-Frame**

**Note:** TA631L, T631L, T632L, TA632L terminals add 1.19 inches (30.2 mm) to line or load side of LG. LTS3K or LTS4K terminal covers add 2.13 inches (54.1 mm) to line or load side of LG.



Approximate Shipping Weight in Lbs (kg)

**LG-Frame**

Breaker Type	Two- and Three-Pole	Four-Pole
LGE, LGS, LGH, LGC, LGU, LGX	16 (7.3)	20 (9.1)

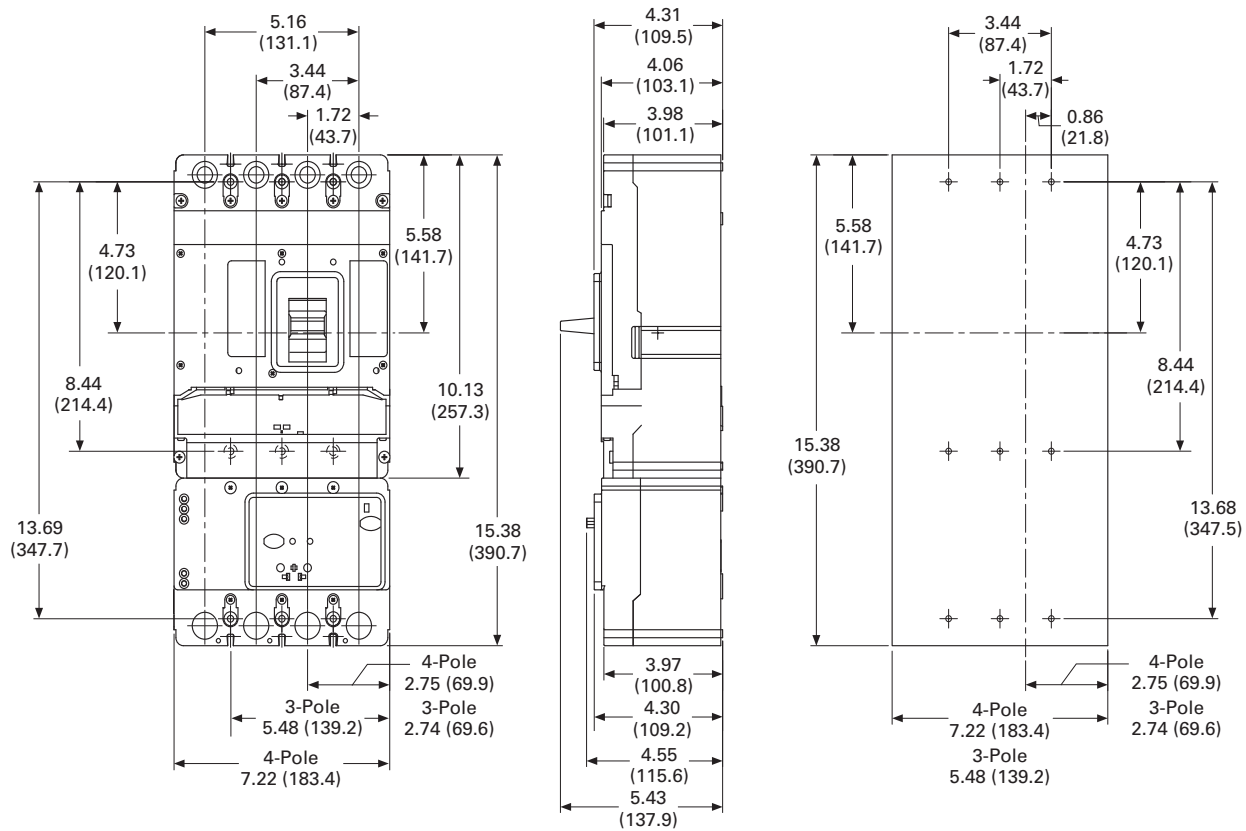
# 2.3

## Molded Case Circuit Breakers

### Series G

#### LG-Frame With Earth Leakage Module

2



**NG-Frame (1200 Ampere)****Contents**

<b>Description</b>	<b>Page</b>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-119</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-133</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-170</b>
Product Selection Guide and Ordering Information . . . . .	<b>V4-T2-171</b>
Accessories . . . . .	<b>V4-T2-174</b>
Technical Data and Specifications . . . . .	<b>V4-T2-175</b>
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RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-189</b>
Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-193</b>
30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-196</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-200</b>
High Instantaneous Circuit Breaker for Selective Coordination . . . . .	<b>V4-T2-205</b>
Special Features and Accessories . . . . .	<b>V4-T2-208</b>
Motor Operators . . . . .	<b>V4-T2-216</b>
Plug-In Blocks . . . . .	<b>V4-T2-218</b>
Drawout Cassette . . . . .	<b>V4-T2-219</b>

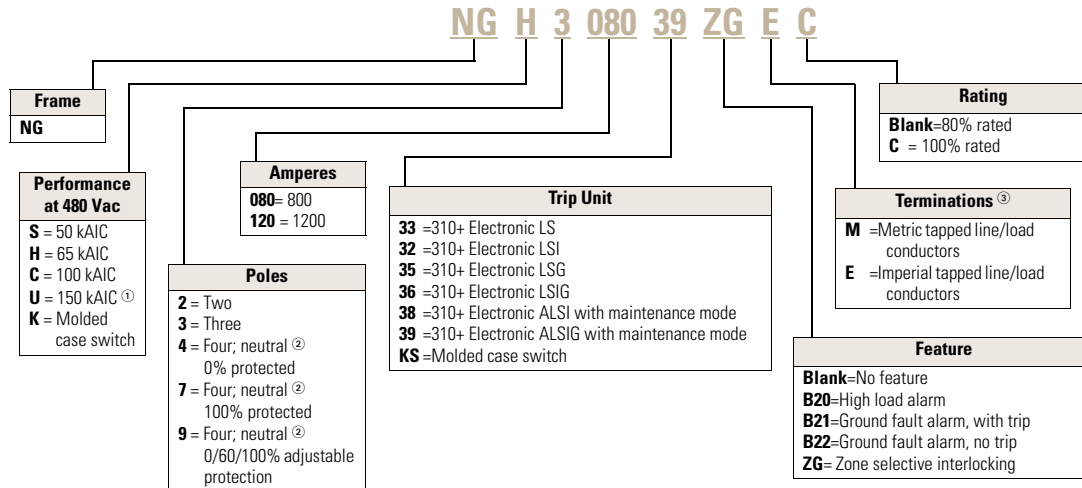
**NG-Frame (320–1200 Amperes)****Product Description**

- All Eaton NG-Frame circuit breakers are suitable for reverse feed use
- All NG-Frame circuit breakers are HACR rated

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### NG Circuit Breaker with 310+ Electronic Trip Unit



#### Notes

- ① 800 A only.
  - ② Neutral inn left pole on GN; right pole on NG.
  - ③ Breakers do not ship with lugs.
- Trip units are factory installable only.

## Product Selection Guide and Ordering Information

### Type NGS Standard Interrupting Capacity— $U_e$ Max. 690 Vac, 50 kA $I_{cu}$ at 480 Vac or 415 Vac

See 310+ adjustability specifications on **Page V4-T2-176**.

Maximum Continuous Ampere Rating at 40 °C <sup>①②</sup>	Number of Poles	Circuit Breaker Frame Including Digitrip Electronic Trip Unit with Imperial Tapped Conductors						Neutral CT for LSG and LSIG <sup>③</sup>
		LS	LSI	LSG	LSIG	ALSI	ALSIG	
800	2	NGS208033E	NGS208032E	NGS208035E	NGS208036E	—	—	—
	3	NGS308033E	NGS308032E	NGS308035E	NGS308036E	NGS308038E	NGS308039E	NGFCT120
	4	NGS408033E	NGS408032E	NGS408035E <sup>④</sup>	NGS408036E <sup>④</sup>	NGS408038E	NGS408039E <sup>④</sup>	—
	4 <sup>⑤</sup>	NGS708033E	NGS708032E	—	—	NGS708038E	—	—
	4 <sup>⑥</sup>	NGS908033E	NGS908032E	—	—	NGS908038E	—	—
1200 <sup>⑥</sup>	2	NGS212033E	NGS212032E	NGS212035E	NGS212036E	—	—	—
	3	NGS312033E	NGS312032E	NGS312035E	NGS312036E	NGS312038E	NGS312039E	NGFCT120
	4	NGS412033E	NGS412032E	NGS412035E <sup>④</sup>	NGS412036E <sup>④</sup>	—	NGS412039E <sup>④</sup>	—
	4 <sup>⑤</sup>	NGS712033E	NGS712032E	—	—	NGS712038E	—	—
	4 <sup>⑥</sup>	NGS912033E	NGS912032E	—	—	NGS912038E	—	—

### Molded Case Switches <sup>⑦⑧⑨⑩</sup>

$U_e$  Maximum 690 Vac

Ampere Rating	Three-Pole	Catalog Number	Four-Pole	Catalog Number
800	MCS with Imperial line and load terminals	NGK3080KSE	MCS with Imperial line and load terminals	NGK4080KSE
1200	MCS with Imperial line and load terminals	NGK3120KSE	MCS with Imperial line and load terminals	NGK4120KSE
1250	MCS with Imperial line and load terminals	NGK3125KSE	MCS with Imperial line and load terminals	NGK43125KSE

#### Notes

- ① For AC use only.
- ② NG MCCBs are suitable for 40 °C or 50 °C applications. Order suffix V3 to eliminate standard 40 °C labeling.
- ③ Required for four-wire systems if neutral protection is desired. Sold separately.
- ④ Neutral 0% protected. NG, neutral in right pole; GN, neutral in left pole.
- ⑤ Neutral 100% protected (denoted by 7 in digit four); no neutral protection available with LSG or LSIG trip units.
- ⑥ Neutral 0%/60%/100% adjustable protection (denoted by 9 in digit four).
- ⑦ Non-UL listed NG 1250 with 1250 ampere trip unit is also available.
- ⑧ For AC use only. Molded case switch will trip above 14,000 amperes.
- ⑨ For two-pole applications, use outer poles of three-pole molded case switch.
- ⑩ Add "M" to above catalog numbers for metric tapped line/load conductors.



# 2.3

## Molded Case Circuit Breakers

### Series G

#### Type NGH High Interrupting Capacity— $U_e$ Max. 690 Vac, 65 kA $I_{cu}$ at 480 Vac or 415 Vac

See 310+ adjustability specifications on **Page V4-T2-176**.

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Maximum Continuous Ampere Rating at 40 °C <sup>①②</sup>	Number of Poles	Circuit Breaker Frame Including Digitrip Electronic Trip Unit						Neutral CT for LSG and LSIG <sup>③</sup>
		LS	LSI	LSG	LSIG	ALSI	ALSIG	
800	2	NGH208033E	NGH208032E	NGH208035E	NGH208036E	—	—	—
	3	NGH308033E	NGH308032E	NGH308035E	NGH308036E	NGH308038E	NGH308039E	NGFCT120
	4	NGH408033E	NGH408032E	NGH408035E <sup>④</sup>	NGH408036E <sup>④</sup>	NGH408038E	NGH408039E <sup>④</sup>	—
	4 <sup>⑤</sup>	NGH708033E	NGH708032E	—	—	NGH708038E	—	—
	4 <sup>⑥</sup>	NGH908033E	NGH908032E	—	—	NGH908038E	—	—
1200	2	NGH212033E	NGH212032E	NGH212035E	NGH212036E	—	—	—
	3	NGH312033E	NGH312032E	NGH312035E	NGH312036E	NGH312038E	NGH312039E	NGFCT120
	4	NGH412033E	NGH412032E	NGH412035E <sup>④</sup>	NGH412036E <sup>④</sup>	—	NGH412039E <sup>④</sup>	—
	4 <sup>⑤</sup>	NGH712033E	NGH712032E	—	—	NGH712038E	—	—
	4 <sup>⑥</sup>	NGH912033E	NGH912032E	—	—	NGH912038E	—	—

#### Type NGC Very High Capacity— $U_e$ Max. 690 Vac, 100 kA $I_{cu}$ at 480 Vac or 415 Vac

See 310+ adjustability specifications on **Page V4-T2-176**.

Maximum Continuous Ampere Rating at 40 °C <sup>①②</sup>	Number of Poles	Circuit Breaker Frame Including Digitrip Electronic Trip Unit						Neutral CT for LSG and LSIG <sup>③</sup>
		LS	LSI	LSG	LSIG	ALSI	ALSIG	
800	2	NGC208033E	NGC208032E	NGC208035E	NGC208036E	—	—	—
	3	NGC308033E	NGC308032E	NGC308035E	NGC308036E	NGC308038E	NGC308039E	NGFCT120
	4	NGC408033E	NGC408032E	NGC408035E <sup>④</sup>	NGC408036E <sup>④</sup>	NGC408038E	NGC408039E <sup>④</sup>	—
	4 <sup>⑤</sup>	NGC708033E	NGC708032E	—	—	NGC708038E	—	—
	4 <sup>⑥</sup>	NGC908033E	NGC908032E	—	—	NGC908038E	—	—
1200	2	NGC212033E	NGC212032E	NGC212035E	NGC212036E	—	—	—
	3	NGC312033E	NGC312032E	NGC312035E	NGC312036E	NGC312038E	NGC312039E	NGFCT120
	4	NGC412033E	NGC412032E	NGC412035E <sup>④</sup>	NGC412036E <sup>④</sup>	—	NGC412039E <sup>④</sup>	—
	4 <sup>⑤</sup>	NGC712033E	NGC712032E	—	—	NGC712038E	—	—
	4 <sup>⑥</sup>	NGC912033E	NGC912032E	—	—	NGC912038E	—	—

#### Type NGU Ultra High Capacity— $U_e$ Max. 600 Vac, 150 kA at 480 Vac

See 310+ adjustability specifications on **Page V4-T2-176**.

Maximum Continuous Ampere Rating at 40 °C <sup>①②</sup>	Number of Poles	Circuit Breaker Frame Including Digitrip Electronic Trip Unit						Neutral CT for LSG and LSIG <sup>③</sup>
		LS	LSI	LSG	LSIG	ALSI	ALSIG	
800	3	NGU308033E	NGU308032E	NGU308035E	NGU308036E	NGU308038E	NGU308039E	NGFCT120

#### Notes

- ① For AC use only.
- ② NG MCCBs are suitable for 40 °C or 50 °C applications. Order suffix V3 to eliminate standard 40 °C labeling.
- ③ Required for four-wire systems if neutral protection is desired. Sold separately.
- ④ Neutral 0% protected. NG, neutral in right pole; GN, neutral in left pole.
- ⑤ Neutral 100% protected (denoted by 7 in digit four); no neutral protection available with LSG or LSIG trip units.
- ⑥ Neutral 0%/60%/100% adjustable protection (denoted by 9 in digit four).

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

N-Frame circuit breakers do not include terminals as standard. When copper or Cu/Al terminals are required, order by catalog number.

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire (Number of Conductors)	AWG Wire Catalog Number <sup>①</sup>	Metric Wire Range mm <sup>2</sup>	Metric Catalog Number <sup>①</sup>
<b>Standard Cu/Al Pressure Terminals</b>						
700	Aluminum	Cu/Al	1–500 (2)	<b>TA700NB1</b>	50–240	<b>TA700NB1M</b>
1000	Aluminum	Cu/Al	3/0–400 (3)	<b>TA1000NB1</b>	95–185	<b>TA1000NB1M</b>
1200	Aluminum	Cu/Al	4/0–500 (4)	<b>TA1200NB1</b>	120–240	<b>TA1200NB1M</b>
1200	Aluminum	Cu/Al	500–750 (3)	<b>TA1201NB1</b>	300–400	<b>TA1201NB1M</b>
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>						
700	Copper	Cu	2/0–500 (2)	<b>T700NB1</b>	70–240	<b>T700NB1M</b>
1000	Copper	Cu	3/0–500 (3)	<b>T1000NB1</b>	95–240	<b>T1000NB1M</b>
1200	Copper	Cu	3/0–400 (4)	<b>T1200NB3</b>	95–185	<b>T1200NB3M</b>

### 310+ Electronic Trip Unit Accessories

Description	Catalog Number
Electronic portable test kit	<b>MTST230V</b>
Trip unit tamper protection wire seal	<b>5108A03H01</b>
External neutral sensor (1200 A) <sup>②</sup>	<b>NGFCT120</b>
External neutral sensor (800 A) <sup>②</sup>	<b>NGFCT120</b>
Breaker-mount cause-of-trip indication	<b>TRIP-LED</b>
Breaker-mount ammeter module	<b>DIGIVIEW</b>
Remote-mount ammeter module	<b>DIGIVIEWR06</b>

### Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or molded case switch.

### Base Mounting Hardware <sup>③</sup>

Number of Poles	Description	Catalog Number
Three- and four-pole	Imperial hardware: 0.3125–18 x 1.25 pan-head steel screws and lock washers	<b>BMH5</b>
Three- and four-pole	Metric hardware: M8 pan-head steel screws and lock washers	<b>BMH5M</b>

### Terminal Shield

### Terminal Shield

Description	Catalog Number
Three-pole terminal shield	<b>NTS3K</b>

### Conductor Extension Kit

### Conductor Extension Kit <sup>④</sup>

Description	Catalog Number
Three-pole both ends Metric	<b>5104A24G04</b>
Three-pole both ends English	<b>5104A24G02</b>

### Keeper Nut

Not required on NG-Frame. Terminals are threaded.

### Handle Extension

Included with breaker. Additional handle extensions are available.

### Handle Extension

Description	Catalog Number
Single handle extension	<b>HEX5</b>

### Interphase Barriers

The interphase barriers provide additional electrical clearance between circuit breaker poles for special termination applications. Barriers are high dielectric insulating plates that are installed in the molded slots between the terminals. (Field installation only.)

### Interphase Barriers

Description	Catalog Number
Interphase barriers <sup>④</sup>	<b>IPB5</b>

### Notes

- <sup>①</sup> Single terminals individually packed.
- <sup>②</sup> Required for four-wire systems if neutral protection is desired. Sold separately.
- <sup>③</sup> Metric hardware included with breaker.
- <sup>④</sup> Included as standard on 100% rated 1200 A breakers only.

## Accessories

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### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### NG-Frame Accessories

Description	Reference Page	Three-Pole			Four-Pole			Neu.
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-213	●		■	●		■	
Auxiliary switch (1A, 1B)	V4-T2-213	●		■	●		■	
Auxiliary switch (2A, 2B)	V4-T2-213	●		■	●		■	
Auxiliary switch and alarm switch combination	V4-T2-213	●		■	●		■	
Shunt trip—standard	V4-T2-213	■			■			
Undervoltage release mechanism	V4-T2-214	■			■			
<b>External Accessories</b>								
Base mounting hardware	V4-T2-173	●	●	●	●	●	●	●
Interphase barriers	V4-T2-173	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-211		■			■		
Padlockable handle lock hasp	V4-T2-211	□		□	□		□	
Key interlock kit	V4-T2-211	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-211	●	●	●				
Electrical operator	V4-T2-211	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-218	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-211	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-496	●	●	●	●	●	●	●
Drawout cassette	V4-T2-219	●	●	●	●	●	●	●
Handle extension	V4-T2-173	●	●	●	●	●	●	●
Ammeter/cause of trip display	V4-T2-210	●	●	●	●	●	●	●
Cause of trip LED module	V4-T2-210	●	●	●	●	●	●	●
Digitrip 310+ test kit	V4-T2-210	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-209	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/Naval application, UL 489 Supplement SA and SB	①	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Note

- ① Contact Eaton.

## Technical Data and Specifications

### Interrupting Capacity Ratings

#### UL 489/IEC 60947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)								
		Volts AC (50/60 Hz)								
		220–240		380–415		480		600		690
		240 (UL)	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	480	600	I <sub>cu</sub>	I <sub>cs</sub>
NGS <sup>①</sup>	2, 3, 4	65	85	85	50	50	50	25	20	10
NGH	2, 3, 4	100	100	100	70	50	65	35	25	13
NGC	2, 3, 4	200	200	100	100	50	100	65	35	18
NGU	3, 4	200	—	—	—	—	150	65	—	—

### NG-Frame Digitrip Specifications

#### NG 310+ Specifications

Description	Specification
Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame designation	NG
Frames available	800 A, 1200 A
Continuous current range (A)	320–1200A
Ground fault pickup (A)	160–1200A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100, 150
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG, ALSI, ALSIG
Arcflash reduction maintenance system (or maintenance mode)	Yes
Interchangeable trip unit	No
High load alarm (suffix B20) <sup>②</sup>	Yes
Ground fault alarm with trip (suffix B21) <sup>②</sup>	Yes
Ground fault alarm, no trip (suffix B22) <sup>②</sup>	Yes
Zone selective interlocking (suffix ZG)	LSI, LSIG, ALSI, ALSIG
Cause of trip indication	Yes
Thru-cover accessories	No

#### Notes

<sup>①</sup> 1600 amperes is not a UL or CSA listed rating. 1200 amperes is the maximum UL and CSA rating for NG.

<sup>②</sup> B2x suffixes cannot be combined with B2x suffixes.

## NG 310+ Adjustability Specifications

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310+ Settings		NG Frame	
		800 A	1200 A
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$		
	A	320	500
	B	400	600
	C	450	630
	D	500	700
	E	600	800
	F	630	900
	G	700	1000
	H (= $I_n$ )	800	1200
$t_r$ = long delay time (seconds) (All 310+)	Position 1	2	2
	Position 2	4	4
	Position 3	6	7
	Position 4	8	10
	Position 5	10	12
	Position 6	12	15
	Position 7	14	20
	Position 8	14	24
$I_{sd}$ (x $I_r$ ) = short delay pickup (All 310+)	Position 1	2x	2x
	Position 2	3x	3x
	Position 3	4x	4x
	Position 4	5x	5x
	Position 5	6x	6x
	Position 6	7x	7x
	Position 7	8x	8x
	Position 8	9x	9x
	Position 9	9x	9x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS, LSG)	Fixed	67 at10x	67 at10x
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG, ALSI, ALSIG) ①	Position 1	Inst	Inst
	Position 2	120	120
	Position 3	300	300
$I_g$ = ground fault pickup (amperes) (LSG, LSIG, ALSIG)	Position 1	160	240
	Position 2	240	360
	Position 3	320	480
	Position 4	480	720
	Position 5	640	960
	Position 6	800	1200
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG, ALSIG)	Position 1	Inst	Inst
	Position 2	120	120
	Position 3	300	300
Independently Adjustable Instantaneous ( $I_i$ ) setting (ALSI, ALSIG)	Yes	2.5x, 4x, 6x, 7x, 8x, 10x, 18x	2.5x, 4x, 6x, 7x, 8x, 10x, 12x
Maintenance Mode (remote) pickup ( $2.5 \times I_n$ ) (ALSI, ALSIG) ②	Fixed	2.5x	2.5x

**Notes**

① 50 ms for ALSI and ALSIG trip units.

② Maintenance Mode is enabled remotely using a 24 Vdc circuit.

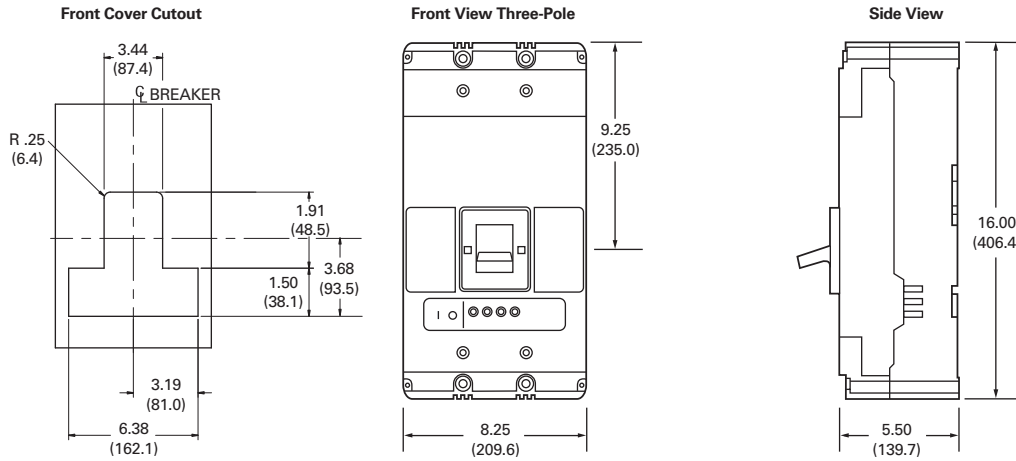
**Dimensions and Weights**

Approximate Dimensions in Inches (mm)

**NG-Frame**

Number of Poles	Width	Height	Depth
3	8.25 (209.6)	16.00 (406.4)	5.50 (139.7)
4	11.13 (282.6)	16.00 (406.4)	5.50 (139.7)

**NG-Frame**



Approximate Shipping Weight in Lbs (kg)

**NG-Frame**

Breaker Type	Complete Breaker	
	Three-Pole	Four-Pole
NGS, NGH, NGC	45 (20.4)	58 (26.3)

RG-Frame (800–2500 Amperes)

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### Contents

<i><b>Description</b></i>	<i><b>Page</b></i>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-119</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-133</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-179</b>
Product Selection . . . . .	<b>V4-T2-180</b>
Accessories . . . . .	<b>V4-T2-185</b>
Technical Data and Specifications . . . . .	<b>V4-T2-186</b>
Dimensions and Weights . . . . .	<b>V4-T2-188</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-189</b>
Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-193</b>
30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-196</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-200</b>
High Instantaneous Circuit Breaker for	
Selective Coordination . . . . .	<b>V4-T2-205</b>
Special Features and Accessories . . . . .	<b>V4-T2-208</b>
Motor Operators . . . . .	<b>V4-T2-216</b>
Plug-In Blocks . . . . .	<b>V4-T2-218</b>
Drawout Cassette . . . . .	<b>V4-T2-219</b>

### RG-Frame (800–2500 Amperes)

#### Product Description

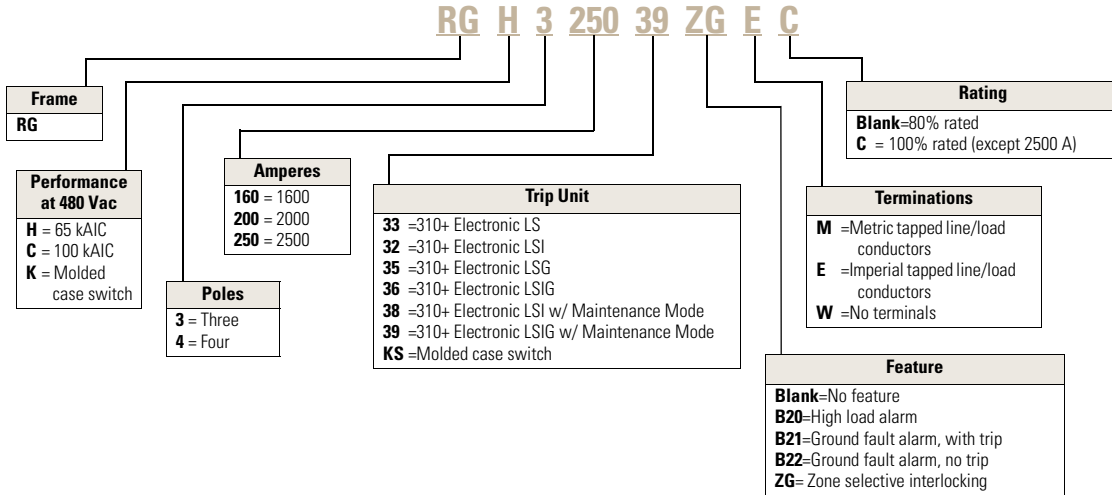
- Eaton's RG-Frame circuit breakers are available as frame (which includes trip unit), rating plug and terminals
- All R-Frame circuit breakers are suitable for reverse feed use

## Catalog Number Selection

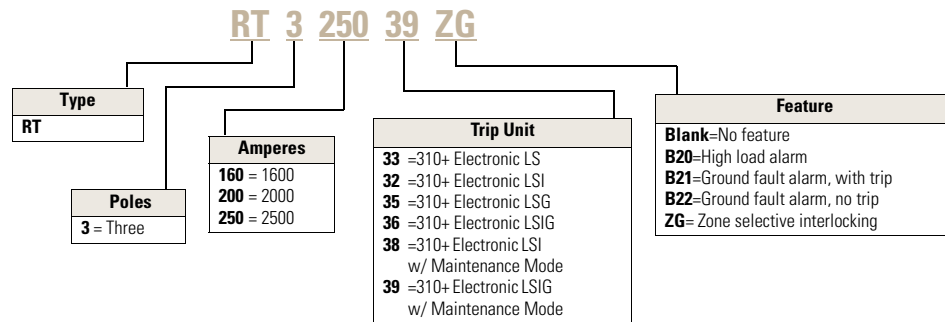
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

70 kA at 415 Vac and 65 kA at 480 Vac

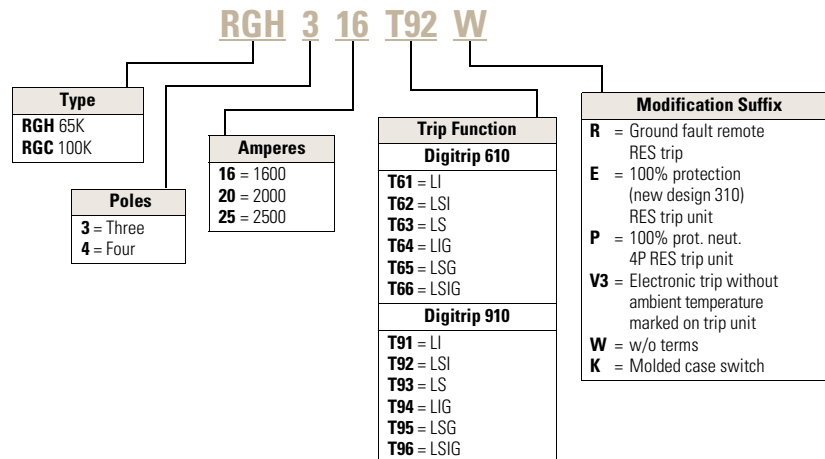
### RG Circuit Breaker With 310+ Electronic Trip Unit



### RG 310+ Electronic Trip Unit



### RG Circuit Breaker with OPTIM 610 and 910 Electronic Trip Unit





## Product Selection

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**70 kA at 415 Vac and 65 kA at 480 Vac****Type RGH with Digitrip 310+ High Interrupting Capacity— $U_e$  Maximum 690 Vac, 70 kA  $I_{cu}$  at 415 Vac**See 310+ adjustability specifications on **Page V4-T2-187**.

Maximum Continuous Ampere Rating at 40 °C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②						Neutral CT for LSG and LSIG ④
		LS	LSI	LSG ③	LSIG ③	ALSI	ALSIG	
1600 ①	3	RGH316033E	RGH316032E	RGH316035E	RGH316036E	RGH316038E	RGH316039E	RGFCT160A
2000	3	RGH320033E	RGH320032E	RGH320035E	RGH320036E	RGH320038E	RGH320039E	RGFCT200A
2500	3	RGH325033E	RGH325032E	RGH325035E	RGH325036E	RGH325038E	RGH325039E	RGFCT250A

**100 kA at Both 415 Vac and 480 Vac****Type RGH with Digitrip 310+ High Interrupting Capacity— $U_e$  Maximum 690 Vac, 70 kA  $I_{cu}$  at 415 Vac**See 310+ adjustability specifications on **Page V4-T2-187**.

Maximum Continuous Ampere Rating at 40 °C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②					
		LS	LSI	LSG ③⑤	LSIG ③⑤	ALSI	ALSIG ③⑤
1600 ①	4 ⑥	RGH416033E	RGH416032E	—	—	RGH416038E	—
2000	4 ⑥	RGH420033E	RGH420032E	—	—	RGH420038E	—
2500	4 ⑥	RGH425033E	RGH425032E	—	—	RGH425038E	—

**Notes**

① For SCR application, use 2000 ampere frame.

② Order terminals separately. Mounting hardware not included.

③ Ground fault equipped trip units available with remote indicating panel. Add "R" to catalog number, for example, "RGH316035RW."

④ Required for four-wire systems if neutral protection is desired. Sold separately.

⑤ No neutral protection available on four-pole breakers with LSG or LSIG trip units.

⑥ Unprotected left pole neutral. Add "P" to catalog number for 100% protected left pole neutral, add "E" for 60% protected, for example, "RGH416033PW," "RGH416033EW."

RG MCCBs have English threading on line and load conductors. Use suffix "M" for metric threading.

**100 kA at Both 415 Vac and 480 Vac****Type RGC with Digitrip 310+ Very High Interrupting Capacity— $U_e$  Maximum 690 Vac, 100 kA  $I_{cu}$  at 415 Vac**See 310+ adjustability specifications on **Page V4-T2-187**.

Maximum Continuous Ampere Rating at 40 °C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②						Neutral CT for LSG and LSIG ④
		LS	LSI	LSG ③	LSIG ③	ALSI	ALSIG	
1600 ①	3	RGC316033E	RGC316032E	RGC316035E	RGC316036E	RGC316038E	RGC316039E	RGFCT160A
2000	3	RGC320033E	RGC320032E	RGC320035E	RGC320036E	RGC320038E	RGC320039E	RGFCT200A
2500	3	RGC325033E	RGC325032E	RGC325035E	RGC325036E	RGC325038E	RGC325039E	RGFCT250A

**Type RGC with Digitrip 310+ Very High Interrupting Capacity— $U_e$  Maximum 690 Vac, 100 kA  $I_{cu}$  at 415 Vac, continued**See 310+ adjustability specifications on **Page V4-T2-187**.

Maximum Continuous Ampere Rating at 40 °C ①	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit with Adjustable Rating Plugs—Catalog Number ②					
		LS	LSI	LSG ③⑤	LSIG ③⑤	ALSI	ALSIG ③⑤
1600 ①	4 ⑥	RGC416033E	RGC416032E	—	—	RGC416038E	—
2000	4 ⑥	RGC420033E	RGC420032E	—	—	RGC420038E	—
2500	4 ⑥	RGC425033E	RGC425032E	—	—	RGC425038E	—

**Molded Case Switches ⑦**

Ampere Rating	Number of Poles	Catalog Number
1600	3	RGK3160KSE
2000	3	RGK3200KSE
1600	4	RGK4160KSE
2000	4	RGK4200KSE

**Notes**

- ① For SCR application, use 2000 ampere frame.
- ② Order terminals separately. Mounting hardware not included.
- ③ Ground fault equipped trip units available with remote indicating panel. Add "R" to catalog number, for example, "RGH316035RW."
- ④ Required for four-wire systems if neutral protection is desired. Sold separately.
- ⑤ No neutral protection available on four-pole breakers with LSG or LSIG trip units.
- ⑥ Unprotected left pole neutral. Add "P" to catalog number for 100% protected left pole neutral, add "E" for 60% protected, for example, "RGH416033PW," "RGH416033EW."
- ⑦ Molded case switch will trip above 17,500 amperes.

RG MCCBs have English threading on line and load conductors. Use suffix "M" for metric threading.

# 2.3

## Molded Case Circuit Breakers

### Series G

2

#### Type RG with Digitrip 610 and 910

Circuit Breaker Frame Including Digitrip RMS 610 and 910 Electronic Trip Unit with Rating Plugs  
Order as Individual Component—Catalog Number ①

Maximum Continuous Ampere Rating at 40 °C	Number of Poles	Circuit Breaker Frame Including Digitrip RMS 610 and 910 Electronic Trip Unit with Rating Plugs Order as Individual Component—Catalog Number ①						Digitrip RMS Interchangeable Rating Plug (Order as Individual Component)	Fixed Rating Plug
		LI	LS	LSI	LIG	LSG	LSIG		
<b>Long Delay Pickup</b>		0.5–1.0 x I <sub>n</sub>	0.5–1.0 <sub>n</sub>	0.5–1.0 x I <sub>n</sub>	0.5–1.0 x I <sub>n</sub>	0.5–1.0 x I <sub>n</sub>	0.5–1.0 x I <sub>n</sub>		
<b>Long Delay Time</b>		2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds		
<b>Short Time Range</b>		2–6 x I <sub>r</sub>	2–6 x I <sub>r</sub>	2–6 x I <sub>r</sub>	2–6 x I <sub>r</sub>	2–6 x I <sub>r</sub>	2–6 x I <sub>r</sub>		
<b>Short Time Delay</b>		—	100–500 ms	100–500 ms	—	100–500 ms	100–500 ms		
<b>Instantaneous</b>		2–6 x M1 and M2	—	2–6 x M1 and M2	2–6 x M1 and M2	—	2–6 x M1 and M2		
<b>Ground Fault Pickup</b>		—	—	—	0.25–1.0 x I <sub>n</sub> ②	0.25–1.0 x I <sub>n</sub> ②	0.25–1.0 x I <sub>n</sub> ②	<b>Ampere Rating</b>	
<b>Ground Fault Delay</b>		—	—	—	100–500 ms	100–500 ms	100–500 ms	<b>Catalog Number</b>	

#### Type RGH with Digitrip 610 High Interrupting Capacity—U<sub>e</sub> Max. 690 Vac, 70 kA I<sub>cu</sub> at 415 Vac

1600	3	RGH316T61WP44	RGH316T63WP44	RGH316T62WP44	RGH316T64WP44	RGH316T65WP44	RGH316T66WP44	800	RP6R16A080
								1000	RP6R16A100
								1200	RP6R16A120
								1250	RP6R16A125
								1600	RP6R16A160
<b>Includes 1600 A rating plug</b>									
2000	3	RGH320T61WP49	RGH320T63WP49	RGH320T62WP49	RGH320T64WP49	RGH320T65WP49	RGH320T66WP49	1000	RP6R20A100
								1200	RP6R20A120
								1250	RP6R20A125
								1600	RP6R20A160
								2000	RP6R20A200
<b>Includes 2000 A rating plug</b>									
2500	3	RGH325T61WP53	RGH325T63WP53	RGH325T62WP53	RGH325T64WP53	RGH325T65WP53	RGH325T66WP53	1600	RP6R25A160
								2000	RP6R25A200
								2500	RP6R25A250

#### Type RGC with Digitrip 610 Very High Interrupting Capacity—U<sub>e</sub> Max. 690 Vac, 100 kA I<sub>cu</sub> at 415 Vac

1600	3	RGC316T61WP44	RGC316T63WP44	RGC316T62WP44	RGC316T64WP44	RGC316T65WP44	RGC316T66WP44	800	RP6R16A080
								1000	RP6R16A100
								1200	RP6R16A120
								1250	RP6R16A125
								1600	RP6R16A160
<b>Includes 1600 A rating plug</b>									
2000	3	RGC320T61WP49	RGC320T63WP49	RGC320T62WP49	RGC320T64WP49	RGC320T65WP49	RGC320T66WP49	1000	RP6R20A100
								1200	RP6R20A120
								1250	RP6R20A125
								1600	RP6R20A160
								2000	RP6R20A200
<b>Includes 2000 A rating plug</b>									
2500	3	RGC325T61WP53	RGC325T63WP53	RGC325T62WP53	RGC325T64WP53	RGC325T65WP53	RGC325T66WP53	1600	RP6R25A160
								2000	RP6R25A200
								2500	RP6R25A250

#### Notes

① Order terminals separately. Mounting hardware not included.

② Not to exceed 1200 ampere ground fault pickup.

RG MCCBs have metric threading on line and load conductors. Use RD MCCBs if imperial threading is required.

Type RG with Digitrip 610 and 910, continued

		Circuit Breaker Frame Including Digitrip RMS 610 and 910 Electronic Trip Unit with Rating Plugs Order as Individual Component—Catalog Number ①						Digitrip RMS Interchangeable Rating Plug (Order as Individual Component)		
Maximum Continuous Ampere Rating at 40 °C	Number of Poles	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Fixed Rating Plug	Ampere Rating	Catalog Number
		LI	LS	LSI	LIG	LSG	LSIG			
Long Delay Pickup		0.5–1.0 x $I_n$	0.5–1.0 $_n$	0.5–1.0 x $I_n$	0.5–1.0 x $I_n$	0.5–1.0 x $I_n$	0.5–1.0 x $I_n$			
Long Delay Time		2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds	2–24 Seconds			
Short Time Range		2–6 x $I_r$	2–6 x $I_r$	2–6 x $I_r$	2–6 x $I_r$	2–6 x $I_r$	2–6 x $I_r$			
Short Time Delay		—	100–500 ms	100–500 ms	—	100–500 ms	100–500 ms			
Instantaneous		2–6 x M1 and M2	—	2–6 x M1 and M2	2–6 x M1 and M2	—	2–6 x M1 and M2			
Ground Fault Pickup		—	—	—	0.25–1.0 x $I_n$ ②	0.25–1.0 x $I_n$ ②	0.25–1.0 x $I_n$ ②			
Ground Fault Delay		—	—	—	100–500 ms	100–500 ms	100–500 ms			
<b>Type RGH with Digitrip 910 High Interrupting Capacity—<math>U_e</math> Max. 690 Vac, 70 kA <math>I_{cu}</math> at 415 Vac</b>										
1600	3	RGH316T91WP44	RGH316T93WP44	RGH316T92WP44	RGH316T94WP44	RGH316T95WP44	RGH316T96WP44	800	RP6R16A080	
								1000	RP6R16A100	
								1200	RP6R16A120	
								1250	RP6R16A125	
		Includes 1600 A rating plug						1600	RP6R16A160	
2000	3	RGH320T91WP49	RGH320T93WP49	RGH320T92WP49	RGH320T94WP49	RGH320T95WP49	RGH320T96WP49	1000	RP6R20A100	
								1200	RP6R20A120	
								1250	RP6R20A125	
								1600	RP6R20A160	
		Includes 2000 A rating plug						2000	RP6R20A200	
2500	3	RGH325T91WP53	RGH325T93WP53	RGH325T92WP53	RGH325T94WP53	RGH325T95WP53	RGH325T96WP53	1600	RP6R25A160	
								2000	RP6R25A200	
								2500	RP6R25A250	
		Includes 2500 A rating plug								
<b>Type RGC with Digitrip 910 Very High Interrupting Capacity—<math>U_e</math> Max. 690 Vac, 100 kA <math>I_{cu}</math> at 415 Vac</b>										
1600	3	RGC316T91WP44	RGC316T93WP44	RGC316T92WP44	RGC316T94WP44	RGC316T95WP44	RGC316T96WP44	800	RP6R16A080	
								1000	RP6R16A100	
								1200	RP6R16A120	
								1250	RP6R16A125	
		Includes 1600 A rating plug						1600	RP6R16A160	
2000	3	RGC320T91WP49	RGC320T93WP49	RGC320T92WP49	RGC320T94WP49	RGC320T95WP49	RGC320T96WP49	1000	RP6R20A100	
								1200	RP6R20A120	
								1250	RP6R20A125	
								1600	RP6R20A160	
		Includes 2000 A rating plug						2000	RP6R20A200	
2500	3	RGC325T91WP53	RGC325T93WP53	RGC325T92WP53	RGC325T94WP53	RGC325T95WP53	RGC325T96WP53	1600	RP6R25A160	
								2000	RP6R25A200	
								2500	RP6R25A250	
		Includes 2500 A rating plug								

Notes

① Order terminals separately. Mounting hardware not included.

② Not to exceed 1200 ampere ground fault pickup.

RG MCCBs have metric threading on line and load conductors. Use RD MCCBs if imperial threading is required.

### Accessories Selection Guide and Ordering Information

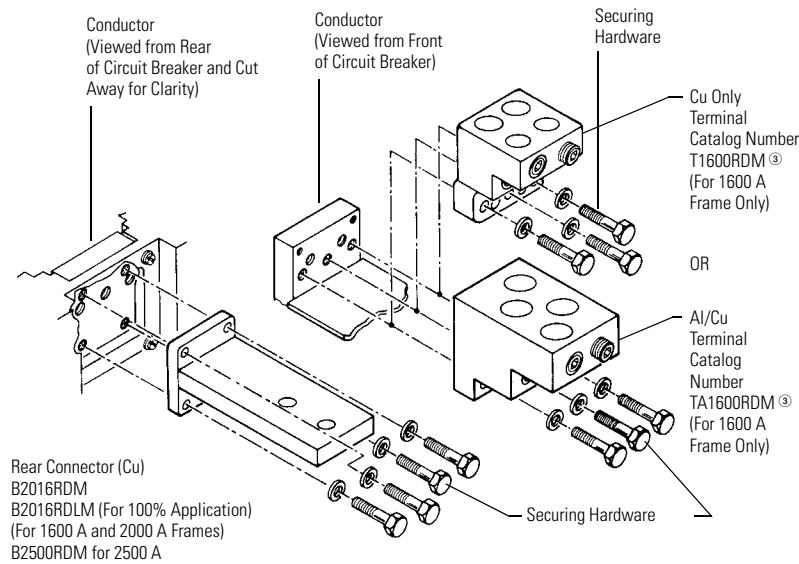
#### Line and Load Terminals

R-Frame circuit breakers use Cu/Al terminals as standard and copper only terminals as an option. Specify if factory installation is required. Must have terminals for 100% rated and or freeze testing requirements.

#### Line and Load Terminals

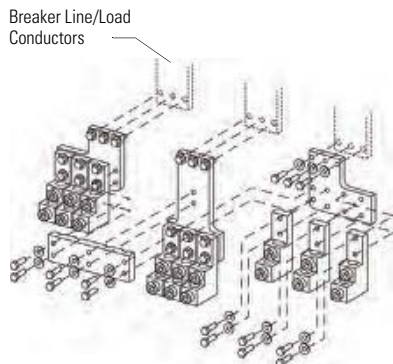
Maximum Breaker Amperes	Terminal Body Material	Wire Type	Hardware	AWG/kcmil Wire Range/ Number of Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Wire Terminals</b>						
1600	Aluminum	Cu/Al	Metric	500–1000 (4)	300–500	<b>TA1600RDM</b> ①
1600	Copper	Cu	Metric	1–600 (4)	50–300	<b>T1600RDM</b> ①
2000	Aluminum	Cu/Al	Metric	2–600 (6)	35–300	<b>TA2000RDM</b> ②
<b>Rear Connectors</b>						
2000	Copper	—	Metric	—	—	<b>B2016RDM</b> ①
2000	Copper	—	Metric	—	—	<b>B2016RDLM</b> ①
2500	Copper	—	Metric	—	—	<b>B2500RDM</b> ①

#### RG Rear Connector Exploded View



#### TA2000RD Wire Terminal

**Note:** Order one TA2000RDM kit per three poles. Catalog number includes bus connection, terminals and hardware for either line side or load side of three-pole breaker.



#### Base Mounting Hardware

Supplied by customer.

#### Handle Extension

Included with breaker. Additional handle extensions are available.

#### Handle Extension

Description	Catalog Number
Single handle extension	<b>HEX6</b>

#### Wire Seal

The wire seal can be used to secure the cover on the trip unit to prevent adjustments after settings are confirmed.

#### Wire Seal

Description	Catalog Number
Wire seal	<b>5108A03H01</b>

#### Notes

- ① Order one per pole—single terminals individually packed.
- ② Order one TA2000RD kit per three poles. Catalog number includes bus connection, terminals and hardware for either line side or load side of three-pole breaker.
- ③ For use with 2500 A Frame. Do not order separately unless for replacement purposes. Included in breaker carton when 2500 A frame is ordered.

RG MCCBs have metric threading on line and load conductors. Use RD MCCBs if imperial threading is required.

## Accessories

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### RG-Frame Accessories

Description	Reference Page	Three-Pole			Four-Pole			
		Left	Center	Right	Left	Center	Right	Neutral
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-213			■			■	
Auxiliary switch (1A, 1B)	V4-T2-213			■			■	
Auxiliary switch (2A, 2B)	V4-T2-213			■			■	
Auxiliary switch and alarm switch combination	V4-T2-213			■			■	
Shunt trip—standard	V4-T2-213			●			●	
Undervoltage release mechanism	V4-T2-214			●			●	
<b>External Accessories</b>								
Base mounting hardware	V4-T2-184	●	●	●	●	●	●	●
Padlockable handle lock hasp	V4-T2-211	□		□	□		□	
Key interlock kit	V4-T2-211	□		□	□		□	
Electrical operator	V4-T2-211	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-496	●	●	●	●	●	●	●
Handle extension	V4-T2-184	●	●	●	●	●	●	●
Digitrip 310+ test kit	V4-T2-210	●	●	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>								
Moisture fungus treatment	V4-T2-209	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application, UL 489 Supplement SA and SB	①	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

### 310+ Electronic Trip Unit Accessories

Description	Catalog Number
Electronic portable test kit	MTST230V
Trip unit tamper protection wire seal	5108A03H01
External neutral sensor (2500 A) ②	RGFCT250A
External neutral sensor (2000 A) ②	RGFCT200A
External neutral sensor (1600 A) ②	RGFCT160A
Breaker-mount cause-of-trip indication ③	—
Breaker-mount ammeter module	DIGIVIEW
Remote-mount ammeter module	DIGIEWR06

#### Notes

- ① Contact Eaton.
- ② Required for four-wire systems if neutral protection is desired. Sold separately.
- ③ Cause-of-trip indication LEDs integrated in RG 310+ trip units.

## Technical Data and Specifications

2

### UL 489/CSA Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			
		Volts AC (50/60 Hz)			
		240	277	480	600
RGH	3, 4	125	—	65	50
RGC	3, 4	200	—	100	65

### IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)		
		Volts AC (50/60 Hz)		
		240	415	690
RGH	3, 4			
$I_{cu}$		135	70	25
$I_{cs}$		100	50	13
RGC	3, 4			
$I_{cu}$		200	100	35
$I_{cs}$		100	50	18

### RG 310+ Specifications

Description	Specification
Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame designation	RG
Frames available	1600 A, 2000 A, 2500 A
Continuous current range (A)	800–2500 A
Ground fault pickup (A)	200–1200 A
Interrupting capacities at 480 Vac (kAIC)	65, 100
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG, ALSI, ALSIG
Arcflash reduction maintenance system (or maintenance mode)	Yes
Interchangeable trip unit	Yes
High load alarm (suffix B20) <sup>②</sup>	Yes
Ground fault alarm with trip (suffix B21) <sup>②</sup>	Yes
Ground fault alarm, no trip (suffix B22) <sup>②</sup>	Yes
Zone selective interlocking (suffix ZG)	LSI, LSIG, ALSI, ALSIG
Cause of trip indication	Yes
Thru-cover accessories	No

#### Notes

<sup>①</sup> Utilization Category A circuit breakers.

<sup>②</sup> B2x suffixes cannot be combined with B2x suffixes.

See **Page V4-T2-178** for trip unit specifications.

## RG 310+ Adjustability Specifications

310+ Settings	RG Frame			
	1600 A	2000 A	2500 A	
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$			
	A	800	1000	1600
	B	900	1200	1700
	C	1000	1400	1800
	D	1100	1600	2000
	E	1200	1700	2100
	F	1400	1800	2200
	G	1500	1900	2400
	H (= $I_n$ )	1600	2000	2500
$t_r$ = long delay time (seconds) (All 310+)	Position 1	2	2	2
	Position 2	4	4	4
	Position 3	7	7	7
	Position 4	10	10	10
	Position 5	12	12	12
	Position 6	15	15	15
	Position 7	20	20	20
	Position 8	24	24	24
$I_{sd}$ ( $\times I_r$ ) = short delay pickup (All 310+)	Position 1	2x	2x	2x
	Position 2	3x	3x	2x
	Position 3	4x	4x	2x
	Position 4	5x	5x	3x
	Position 5	6x	6x	4x
	Position 6	7x	7x	5x
	Position 7	8x	8x	6x
	Position 8	8x	8x	6x
	Position 9	9x	9x	6x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS, LSG)	Fixed	67 at 10x	67 at 10x	67 at 10x
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG, ALSI, ALSIG) ①	Position 1	Inst	Inst	Inst
	Position 2	120	120	120
	Position 3	300	300	300
$I_g$ = ground fault pickup (amperes) (LSG, LSIG, ALSIG)	Position 1	200	200	200
	Position 2	400	400	400
	Position 3	600	600	600
	Position 4	800	800	800
	Position 5	1000	1000	1000
	Position 6	1200	1200	1200
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG, ALSIG)	Position 1	Inst	Inst	Inst
	Position 2	120	120	120
	Position 3	300	300	300
Independently Adjustable Instantaneous ( $I_r$ ) setting (ALSI, ALSIG)	Yes	2.5x, 4x, 6x, 7x, 8x, 11x	2.5x, 4x, 6x, 7x, 8x, 9x	2.5x, 4x, 6x, 7x
Maintenance Mode (remote) pickup ( $2.5 \times I_n$ ) (ALSI, ALSIG) ②	Fixed	2.5x	2.5x	2.5x

**Notes**

- ① 50 ms for ALSI and ALSIG trip units.
- ② Maintenance Mode is enabled remotely using a 24 Vdc circuit.



# 2.3

## Molded Case Circuit Breakers

### Series G

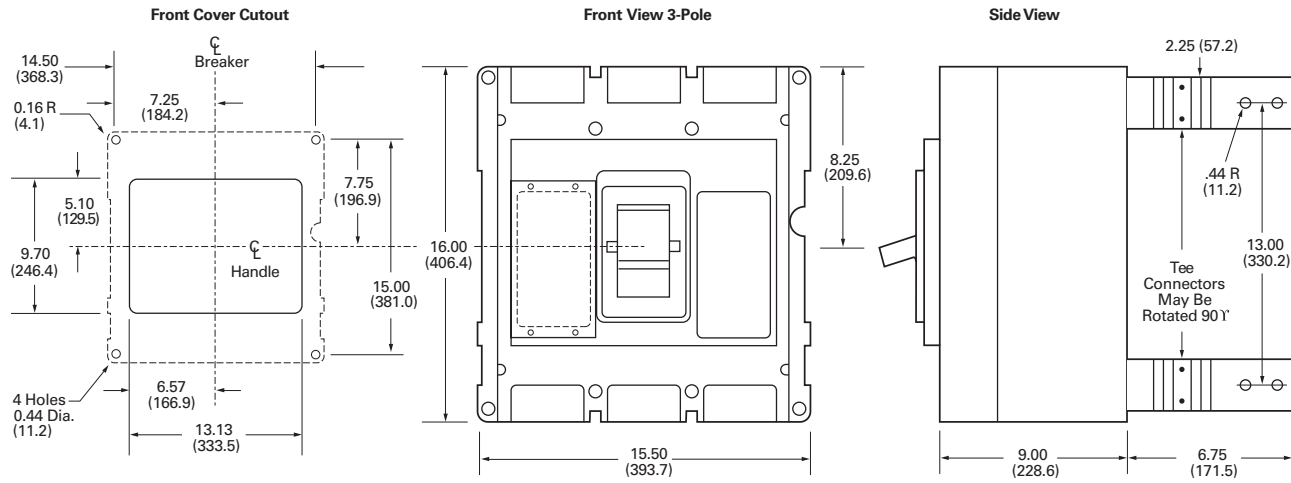
#### Dimensions and Weights

Approximate Dimensions in Inches (mm)

2

#### RG-Frame

Number of Poles	Width	Height	Depth
3	15.50 (393.7)	16.00 (406.4)	9.75 (247.7)
4	20.00 (508.0)	16.00 (406.4)	9.75 (247.7)



Approximate Shipping Weight in Lbs (kg)

#### RG-Frame

Breaker Type	Complete Breaker	
	Number of Poles Three-Pole	Four-Pole
<b>1600 Amperes</b>		
RGH, RGC	102 (46.3)	135 (61.2)
<b>2000 Amperes</b>		
RGH, RGC	102 (46.3)	135 (61.2)
<b>2500 Amperes</b>		
RGH, RGC	135 (61.2)	182 (82.6)

Motor Circuit 480 Vac, Protectors



**Contents**

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JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-133</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
Motor Circuit Protectors (MCP) Product Selection Guide and Ordering Information . . . . .	<b>V4-T2-190</b>
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30 mA Ground Fault (Earth Leakage) Module. . . . .	<b>V4-T2-196</b>
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Drawout Cassette . . . . .	<b>V4-T2-219</b>

**Motor Circuit Protectors  
(MCP)**

## Product Selection Guide and Ordering Information

2

EG-Frame—480 Vac, 600Y/347 Vac Maximum <sup>①</sup>

Continuous Amperes	Cam Setting	Motor Full Load Current Amperes <sup>②</sup>	MCP Trip Setting <sup>③</sup>	MCP Catalog Number
3	A	0.69–0.91	9	HMCPE003A0C
	B	1.1–1.3	15	
	C	1.6–1.7	21	
	D	2.0–2.2	27	
	E	2.3–2.5	30	
	F	2.6–2.8	33	
7	A	1.5–2.0	21	HMCPE007C0C
	B	2.6–3.1	35	
	C	3.7–3.9	49	
	D	4.8–5.2	63	
	E	5.3–5.7	70	
	F	5.8–6.1	77	
15	A	3.4–4.5	45	HMCPE015E0C
	B	5.7–6.8	75	
	C	8.0–9.1	105	
	D	10.4–11.4	135	
	E	11.5–12.6	150	
	F	12.7–13.0	165	
30	A	3.9–9.1	90	HMCPE030H1C
	B	11.5–13.7	150	
	C	16.1–18.3	210	
	D	20.7–22.9	270	
	E	23.0–25.2	300	
	F	25.3–26.1	330	

**Notes**

- ① UL listed for use with Eaton Motor Starters.
- ② Motor FLA ranges are typical. The corresponding trip setting is at 13 times the minimum FLA value shown. Where a 13 times setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- ③ For DC applications, actual trip levels are approximately 40% higher than values shown.

EG-Frame—480 Vac, 600Y/347 Vac Maximum, continued <sup>①</sup>

Continuous Amperes	Cam Setting	Motor Full Load Current Amperes <sup>②</sup>	MCP Trip Setting <sup>③</sup>	MCP Catalog Number
50	A	11.5–15.2	150	HMCPE050K2C
	B	19.2–22.9	250	
	C	26.9–30.6	350	
	D	34.6–38.3	450	
	E	38.4–42.1	500	
	F	42.2–43.5	550	
70	A	16.1–30.6	210	HMCPE070M2C
	B	26.9–32.2	350	
	C	37.6–42.9	490	
	D	48.4–53.7	630	
	E	53.8–59.1	700	
	F	59.2–60.9	770	
100	A	23.0–30.6	300	HMCPE100R3C
	B	38.4–46.0	500	
	C	53.8–61.4	700	
	D	69.2–76.8	900	
	E	76.9–84.5	1000	
	F	84.6–87.0	1100	
100	A	38.4–46.0	500	HMCPE100T3C
	B	57.6–65.2	750	
	C	76.9–84.5	1000	
	D	④	1250	
	E	④	1375	
	F	④	1500	

JG-Frame—600 Vac Maximum, 250 Vdc Maximum <sup>①</sup>

Continuous Amperes	MCP Trip Range (Amperes)	MCP Catalog Number
250	500–1000	HMCPJ250D5L
	625–1250	HMCPJ250F5L
	750–1500	HMCPJ250G5L
	875–1750	HMCPJ250J5L
	1000–2000	HMCPJ250K5L
	1125–2250	HMCPJ250L5L
	1250–2500	HMCPJ250W5L

**Notes**

- <sup>①</sup> UL listed for use with Eaton Motor Starters.
- <sup>②</sup> Motor FLA ranges are typical. The corresponding trip setting is at 13 times the minimum FLA value shown. Where a 13 times setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- <sup>③</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.
- <sup>④</sup> Settings above 10 x  $I_n$  are for special applications. Where the ampere rating of the disconnecting means cannot be less than 115% of the motor full load ampere rating.

LG-Frame—600 Vac Maximum, 250 Vdc Maximum <sup>①</sup>

2

Continuous Amperes	MCP Trip Range (Amperes)	MCP Catalog Number
600	1250–2500	HMCPL600L6G
	1500–3000	HMCPL600N6G
	1750–3500	HMCPL600R6G
	2000–4000	HMCPL600X6G
	2250–4500	HMCPL600Y6G
	2500–5000	HMCPL600P6G
	3000–6000	HMCPL600M6G

**Notes**

<sup>①</sup> UL listed for use with Eaton Motor Starters.

800 and 1200 ampere, 600 Vac maximum motor circuit protectors are available as Series C HMCP product.

### Series G Motor Protector Circuit Breakers (MPCB)



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Drawout Cassette . . . . .	<b>V4-T2-219</b>

### Motor Protector Circuit Breakers (MPCB)

#### Product Description

- Eliminates need for separate overload relay

#### Application Description

- Can be used with contactor to eliminate need for overload relay and still create manual motor control
- Meets requirement for motor branch protection, including:
  - Disconnecting means
  - Branch circuit short circuit protection
  - Overload protection

#### Features and Benefits

- Phase unbalance protection
- Phase loss protection
- Hot trip/cold trip
- High load alarm
- Pre-detection trip relay option
- Class 10, 15, 20, 30 protection

#### Standards and Certifications

- IEC 60947-2
- UL 489 100% rated
- UL 508
- CSA C22.2



## Product Selection

2

## JGMP Catalog Numbers

Continuous Amperes	35 kAIC Catalog Number	65 kAIC Catalog Number
50	JGMPS050G	JGMPH050G
100	JGMPS100G	JGMPH100G
160	JGMPS160G	JGMPH160G
250	JGMPS250G	JGMPH250G

## JGMP FLA Ie Dial Setting

Continuous Amperes	A	B	C	D	E	F	G	H
50	20	20	25	30	32	40	45	50
100	40	45	50	63	70	80	90	100
160	63	80	90	100	110	125	150	160
250	100	125	150	160	175	200	225	250

## LGMP Catalog Numbers

Continuous Amperes	50 kAIC Catalog Number	65 kAIC Catalog Number
250	LGMP250G	LGMPH250G
400	LGMP400G	LGMPH400G
600	LGMP600G	LGMPH600G
630 ①	LGMP630G	LGMPH630G

## LGMP FLA Ie Dial Setting

Continuous Amperes	A	B	C	D	E	F	G	H
250	100	125	150	160	175	200	225	250
400	160	200	225	250	300	315	350	400
600	250	300	315	350	400	450	500	600
630 ①	250	300	315	350	400	500	600	630

**Notes**

① 630 amperes is not a UL listed rating. 600 amperes is the maximum UL or CSA for LG breaker.

For pre-trip alarm option, order Style Number 5721B31G02.

For additional breaker solutions, see **Page V4-T2-371**.

## Technical Data and Specifications

### JGMPS and JGMPH Rating and Ampere Range

Breaker Capacity (kA rms) AC 50–60 Hz			Maximum Rated Current—250 A	
			Breaker Type	
			JGMPS	JGMPH
IEC 60947-2	220–240 Vac	I <sub>cu</sub>	85	100
		I <sub>cs</sub>	85	100
	380–415 Vac	I <sub>cu</sub>	40	70
		I <sub>cs</sub>	40	70
	660–690 Vac	I <sub>cu</sub>	12	14
		I <sub>cs</sub>	6	7
NEMA UL 489	240 Vac		85	100
	480 Vac		35	65
	600 Vac		25	35
Number of poles			3	3
Ampere range			50–250	50–250

### LGMP5 and LGMPH Rating and Ampere Range

Breaker Capacity (kA rms) AC 50–60 Hz			Maximum Rated Current—630 A <sup>①</sup>	
			Breaker Type	
			LGMP5	LGMPH
IEC 60947-2	220–240 Vac	I <sub>cu</sub>	85	100
		I <sub>cs</sub>	85	100
	380–415 Vac	I <sub>cu</sub>	50	70
		I <sub>cs</sub>	50	53
	660–690 Vac	I <sub>cu</sub>	20	25
		I <sub>cs</sub>	10	13
NEMA UL 489	240 Vac		85	100
	480 Vac		50	65
	600 Vac		25	35
Number of poles			3	3
Ampere range			250–630 <sup>①</sup>	250–630 <sup>①</sup>

#### Notes

<sup>①</sup> 630 amperes is not a UL listed rating. 600 amperes is the maximum UL or CSA for LG breaker.

For pre-trip alarm option, order Style Number 5721B31G02.



#### 30 mA Ground Fault (Earth Leakage) Modules



**Clockwise from Left:  
JG, LG, EG MCCBs Shown with  
Ground Fault (Earth Leakage) Module**

### 30 mA Ground Fault (Earth Leakage) Module

#### Product Description

Eaton offers three- and four-pole 30 mA ground fault (earth leakage) protection modules for Series G E-, J- and L-frame molded case circuit breakers (MCCBs). Separate UL listed and IEC rated devices are available for each frame.

The modules are bottom mounted and are available for each frame circuits up to:

- EG: 125 amperes
- JG: 150 (UL), 160 (IEC) or 250 amperes
- LG: 400, 600 (UL) or 630 (IEC) amperes

The module is completely self contained, including a current sensor, relay and power supply inside the device. Current pickup settings are selectable from 0.03 to 10 amperes for all devices, except for the UL listed module, for which settings are selectable from 0.03 to 30 amperes. Time delays are also selectable from Instantaneous to 1.0 second for pickup settings of 0.10 amperes and above. The current pickup setting of 0.03 amperes defaults to an Instantaneous time setting regardless of the time dial's position.

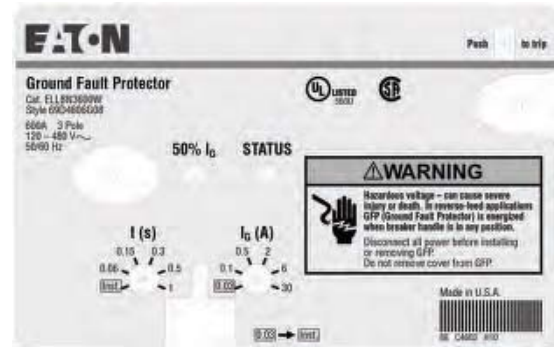
Two alarm contacts are included with each device, which can be wired externally for remote indication. Both of these are also indicated by an LED on the front of the device:

1. 50% pre-trip: alarms when the earth leakage current reaches 50% of the set pickup setting value.
2. 100% after trip: alarms when the breaker reaches the set pickup setting value and the breaker trips.

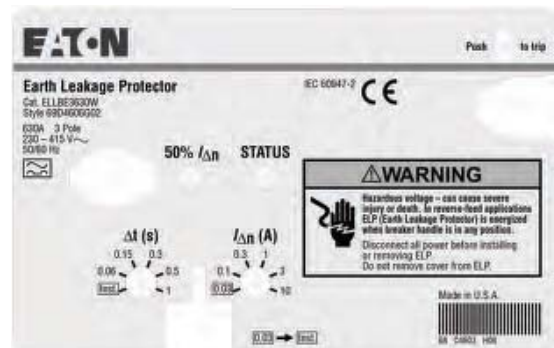
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#### UL-Rated LG-Frame Earth Leakage Module Faceplate



#### IEC-Rated LG-Frame Earth Leakage Module Faceplate



## Product Selection

## EG-Frame


**EG-Frame Ground Fault Modules,  
UL-Rated (Bottom Mounted, 120–480 Vac,  
50/60 Hz) ①**

Ampere Rating	Number of Poles	Catalog Number
125	3	ELEBN3125G
125	4	ELEBN4125G

**EG-Frame Earth Leakage Modules,  
IEC-Rated (Bottom Mounted, 230–415 Vac,  
50/60 Hz)**

Ampere Rating	Number of Poles	Catalog Number
125	3	ELEBE3125G
125	4	ELEBE4125G

## JG-Frame


**JG-Frame Ground Fault Modules,  
UL-Rated (Bottom Mounted, 120–480 Vac,  
50/60 Hz)**

Ampere Rating	Number of Poles	Catalog Number
150	3	ELJBN3150W
150	4	ELJBN4150W
250	3	ELJBN3250W
250	4	ELJBN4250W

**JG-Frame Earth Leakage Modules,  
IEC-Rated (Bottom Mounted, 230–415 Vac,  
50/60 Hz)**

Ampere Rating	Number of Poles	Catalog Number
160	3	ELJBE3160W
160	4	ELJBE4160W
250	3	ELJBE3250W
250	4	ELJBE4250W

**Note**

① Shunt trip and undervoltage release cannot be used in an EG breaker connected to an earth leakage module.

## LG-Frame


**LG-Frame Ground Fault Modules,  
UL-Rated (Bottom Mounted, 120–480 Vac,  
50/60 Hz)**

Ampere Rating	Number of Poles	Catalog Number
400	3	ELLBN3400W
400	4	ELLBN4400W
600	3	ELLBN3600W
600	4	ELLBN4600W

**LG-Frame Earth Leakage Modules,  
IEC-Rated (Bottom Mounted, 230–415 Vac,  
50/60 Hz)**

Ampere Rating	Number of Poles	Catalog Number
400	3	ELLBE3400W
400	4	ELLBE4400W
630	3	ELLBE3630W
630	4	ELLBE4630W

### Dimensions

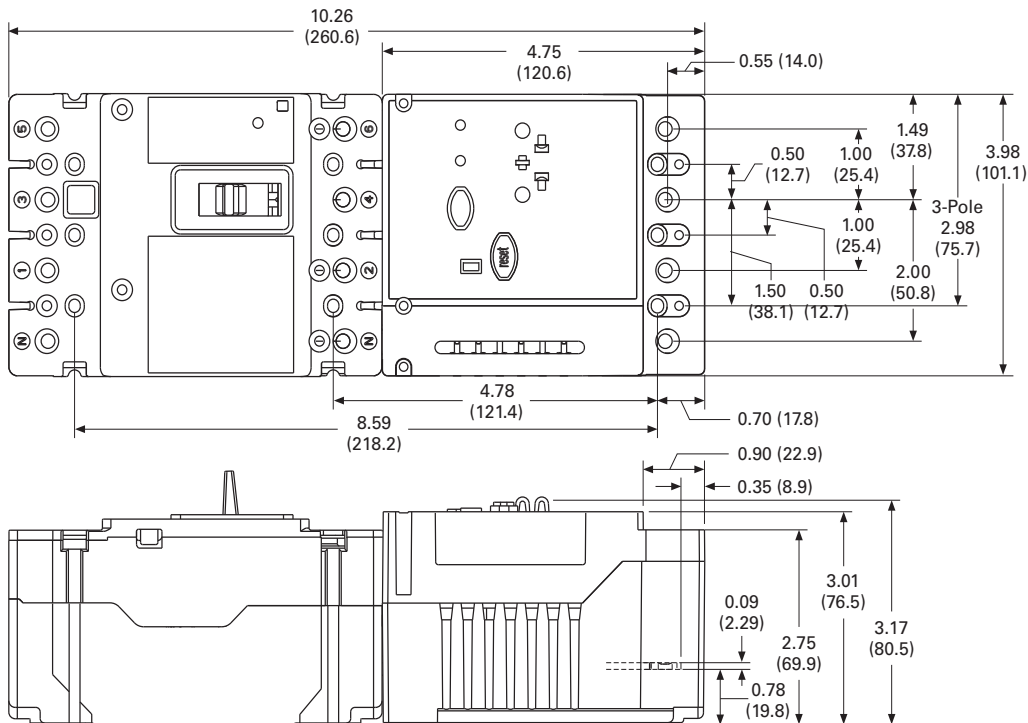
Approximate Dimensions in Inches (mm)

2

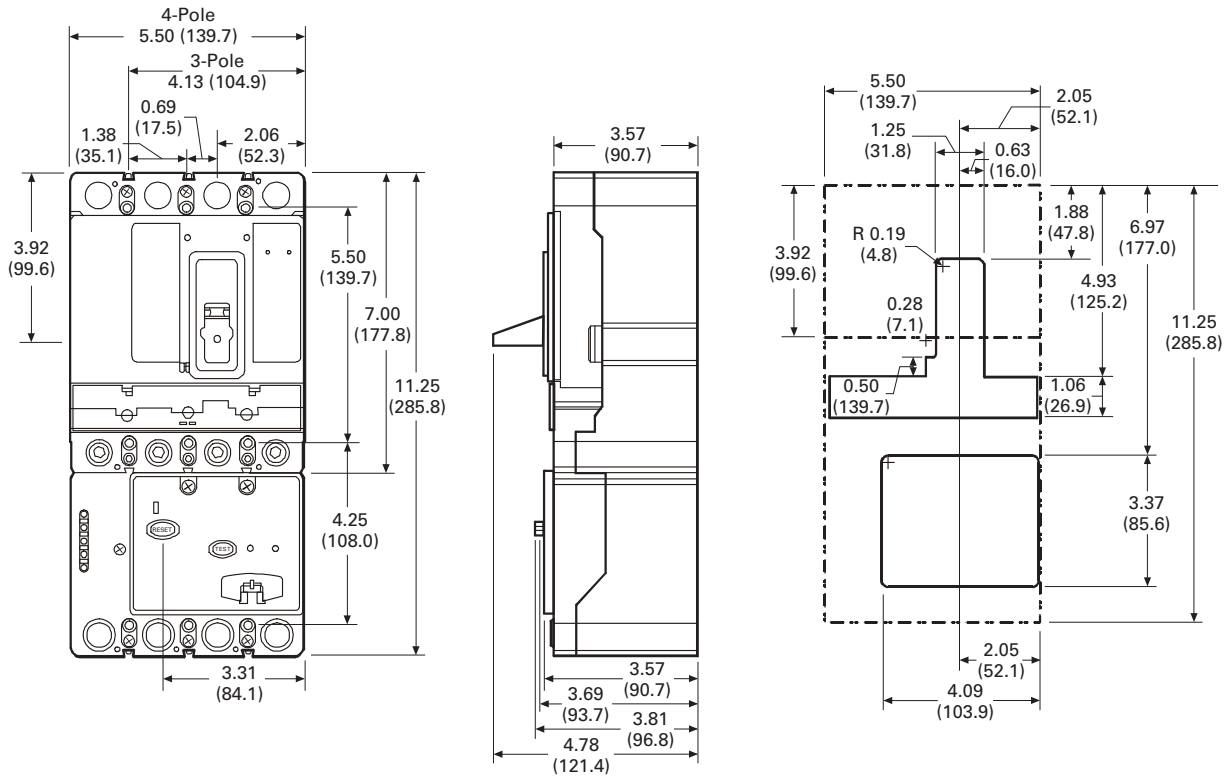
#### Assembled Breaker and Earth Leakage Module

Frame	Height	Width	Depth
<b>Three-Pole</b>			
EG	10.25 (260.3)	3.00 (76.2)	2.98 (75.8)
JG	11.25 (285.8)	4.13 (104.9)	3.57 (90.7)
LG	15.38 (390.7)	5.48 (139.2)	4.06 (103.1)
<b>Four-Pole</b>			
EG	10.25 (260.3)	4.00 (101.6)	2.98 (75.8)
JG	11.25 (285.8)	5.50 (139.7)	3.57 (90.7)
LG	15.38 (390.7)	7.23 (183.6)	4.06 (103.1)

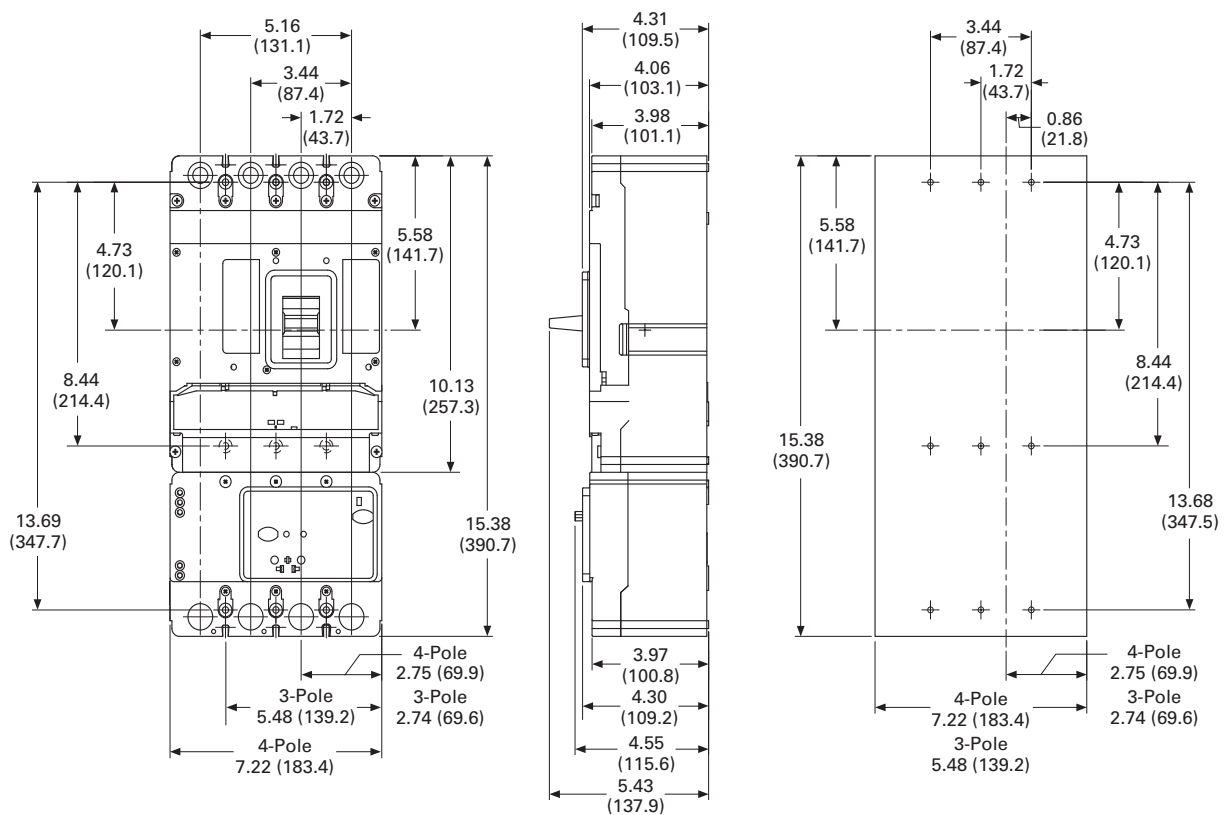
#### EG-Frame With Earth Leakage Module



JG-Frame With Earth Leakage Module



LG-Frame With Earth Leakage Module



#### Current Limiting Circuit Breaker Modules

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Drawout Cassette . . . . .	<b>V4-T2-219</b>

### Current Limiting Circuit Breaker Module

#### Product Overview

Power demand continues to grow in new and existing facilities. To meet increased demand, larger utility supplies, spot networks and large facility transformers are installed. The increased capacity of the electrical source results in increased fault currents in excess of 100 kA short-circuit protection. Eaton manufactures non-fused current limiting modules with interrupting capacities up to 200 kA at 600 Vac or 70 kA at 690 Vac. Unlike fused current limiters with a one-time use, a current limiter module provides an automatic reset of the module after a short-circuit event. Resetting the molded-case circuit breaker is the only action required to restore critical power to the system; there is no time wasted with sourcing the correct replacement fuses or module to bring system back online.

#### Product Description

The current limiting breaker modules use a unique contact design to enhance the system protection similar to that of the circuit breaker. When high short-circuit current is flowing through the contacts of these modules, the design results in very high interrupting capacities and improved current limiting characteristics.

#### Application Description

High-performance breakers are most commonly applied when very high fault levels are available and with applications where the current limiting capability is used upstream of the final load to limit current. Typical loads include lighting, power distribution, and motor control applications.

#### Features and Benefits

Superior system protection:

- Auto reset improves system uptime and eliminates the need for finding replacement parts
- No fuses to replace, reducing the overall cost of ownership and the waste created by fuses
- Overloads, by using inverse time current tripping characteristics of the molded-case circuit breaker
- Low-level short circuits, by using instantaneous and/or short-time delay tripping characteristics of the molded-case circuit breaker
- High-level short circuits, by using ultra-high-speed, blow-apart contacts of the current limiting module in series with the circuit breaker contacts
- Let-through currents, by improved opening speed of the contacts, the resultant rapid rise of arc voltage introduces impedance into the system

#### Standards and Certifications

- IEC 60947-2
- UL 489
- CSA C22.2



## Product Selection

## Series G High Performance Family Offering

Type	Product	Amperes	480 Vac (UL)		415 Vac (IEC)		690 Vac (IEC)	
			I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
EGC 3P thermal-magnetic	Breaker only	15–125	100	35 ①	100	100	—	—
	With limiter	15–100	150	100 ①	150	150	—	—
JG 3P thermal-magnetic	Breaker only	70–250	200	50	200	200	18	14
	With limiter	70–225	200	200	200	150	70	18
JG 3P electronic	Breaker only	20–250	200	50	200	200	18	14
	With limiter	100–250	200	200	200	150	70	18
LG 3P thermal-magnetic	Breaker only	250–600	200	65	200	200	35	18
LG3P electronic	Breaker only	100–600	200	65	200	200	35	18

## EG-Frame



## EG IC Rating—150 kAIC at 415 and 480 Vac

UL Listed (NEMA/IEC Rated) Base Molded Case Circuit Breaker	Breaker with Line Side Mounted Current Limiter	Breaker with Load Side Mounted Current Limiter	Line and Load Terminations Included ②	Interphase Barrier Included for Limiter
EGC3015FFG	EGC3015FFGQ01	EGC3015FFGQ02	T125EF	EIPBSK
EGC3016FFG	EGC3016FFGQ01	EGC3016FFGQ02	T125EF	EIPBSK
EGC3020FFG	EGC3020FFGQ01	EGC3020FFGQ02	T125EF	EIPBSK
EGC3025FFG	EGC3025FFGQ01	EGC3025FFGQ02	T125EF	EIPBSK
EGC3030FFG	EGC3030FFGQ01	EGC3030FFGQ02	T125EF	EIPBSK
EGC3032FFG	EGC3032FFGQ01	EGC3032FFGQ02	T125EF	EIPBSK
EGC3035FFG	EGC3035FFGQ01	EGC3035FFGQ02	T125EF	EIPBSK
EGC3040FFG	EGC3040FFGQ01	EGC3040FFGQ02	T125EF	EIPBSK
EGC3045FFG	EGC3045FFGQ01	EGC3045FFGQ02	T125EF	EIPBSK
EGC3050FFG	EGC3050FFGQ01	EGC3050FFGQ02	T125EF	EIPBSK
EGC3060FFG	EGC3060FFGQ01	EGC3060FFGQ02	T125EF	EIPBSK
EGC3063FFG	EGC3063FFGQ01	EGC3063FFGQ02	T125EF	EIPBSK
EGC3070FFG	EGC3070FFGQ01	EGC3070FFGQ02	T125EF	EIPBSK
EGC3080FFG	EGC3080FFGQ01	EGC3080FFGQ02	T125EF	EIPBSK
EGC3090FFG	EGC3090FFGQ01	EGC3090FFGQ02	T125EF	EIPBSK
EGC3100FFG	EGC3100FFGQ01	EGC3100FFGQ02	T125EF	EIPBSK

## Notes

① 600Y/347V.

② Two interphase barriers included on line end mounted limiter; (2) line end of limiter. Four interphase barriers included on load end mounted limiter; (2) line end of breaker (2) load end of limiter.

### Technical Data and Specifications

2

#### UL 489 Current Limiting Data

Frame	Circuit	$I_p$ (kA)	$I^2T$ ( $10^6 A^2S$ )
EGC...Q	240 V/150 kA	21.80	0.277
EGC...Q	480 V/150 kA	21.80	0.277
EGC...Q	600 V/100 kA	22.60	0.387

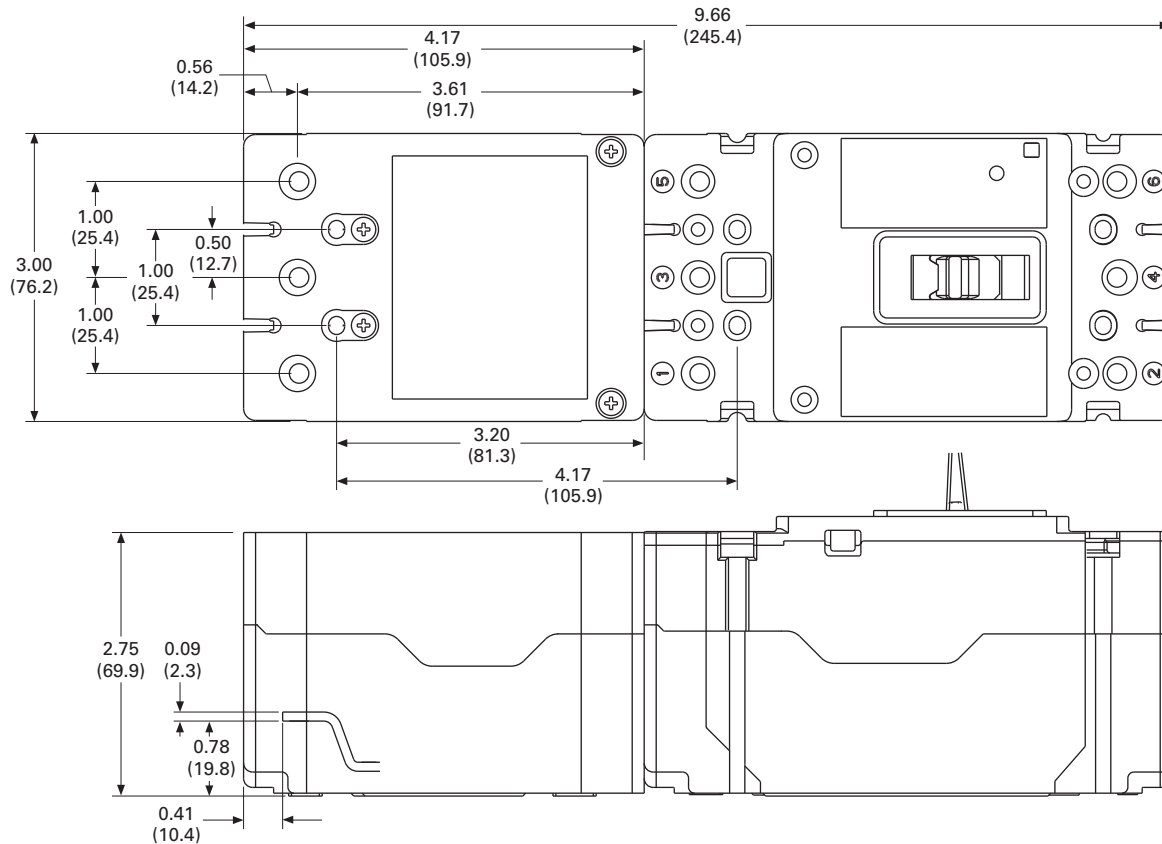
#### Dimensions and Weights

Approximate Dimensions in Inches (mm)

#### Assembled Breaker and Current Limiting Module

Frame	Height	Width	Depth	Weight in lbs (kg)
EG	9.66 (245.7)	3.00 (76.2)	2.98 (75.8)	2.91 (1.32)
HMCP	9.66 (245.7)	3.00 (76.2)	2.98 (75.8)	4.18 (1.90)

#### EG-Frame With Current Limiter Module



JG Frame



### JG IC Rating—200 kAIC at 600 Vac and 70 kAIC at 690 Vac

Ampere Rating	Magnetic Range	UL Listed, IEC Rated Breaker With Line Side Mounted Current Limiter <sup>①</sup>	UL Listed, IEC Rated Breaker With Load Side Mounted Current Limiter <sup>②</sup>	IEC Rated Breaker With Line Side Mounted Current Limiter <sup>①</sup>	IEC Rated Breaker With Load Side Mounted Current Limiter <sup>②</sup>
		Fixed Thermal, Adjustable Magnetic	Adjustable Thermal, Adjustable Magnetic		
70	350–700	JGH3070FAGQ01	JGH3070FAGQ02	—	—
90	450–900	JGH3090FAGQ01	JGH3090FAGQ02	—	—
100	500–1000	JGH3100FAGQ01	JGH3100FAGQ02	JGH3100AAGQ01	JGH3100AAGQ02
125	625–1250	JGH3125FAGQ01	JGH3125FAGQ02	JGH3125AAGQ01	JGH3125AAGQ02
150	750–1550	JGH3150FAGQ01	JGH3150FAGQ02	—	—
160	800–1600	—	—	JGH3160AAGQ01	JGH3160AAGQ02
175	875–1750	JGH3175FAGQ01	JGH3175FAGQ02	—	—
200	1000–2000	JGH3200FAGQ01	JGH3200FAGQ02	JGH3200AAGQ01	JGH3200AAGQ02
225	1125–2250	JGH3225FAGQ01	JGH3225FAGQ02	—	—
<b>Electronic Trip LS</b>					
250	—	JGH325033GQ01	JGH325033GQ02	—	—
<b>Electronic Trip LSI</b>					
250	—	JGH325032GQ01	JGH325032GQ02	—	—
<b>Electronic Trip LSG</b>					
250	—	JGH325035GQ01	JGH325035GQ02	—	—
<b>Electronic Trip LSIG</b>					
250	—	JGH325036GQ01	JGH325036GQ02	—	—

### Series G HMCP

Ampere Rating	Motor Circuit Protector with Line Side Mounted Current Limiter	Breaker with Load Side Mounted Current Limiter
250	HMCPJ250D5LQ01	HMCPJ250D5LQ02
250	HMCPJ250F5LQ01	HMCPJ250F5LQ02
250	HMCPJ250G5LQ01	HMCPJ250G5LQ02
250	HMCPJ250J5LQ01	HMCPJ250J5LQ02
250	HMCPJ250K5LQ01	HMCPJ250K5LQ02
250	HMCPJ250L5LQ01	HMCPJ250L5LQ02

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range/ Number of Conductors	Catalog Number
<b>Standard Pressure Type Terminals</b>					
250	Aluminum	Cu/Al	10–185	#8–350 (1)	TA250FJ <sup>③</sup>

#### Notes

- ① Two interphase barriers provided, mounted on line end of limiter, catalog number **FJIPBK**.
- ② Four interphase barriers provided, (2) line end of breaker, (2) load end of limiter.
- ③ Line and load terminals included with products listed above.



### Technical Data and Specifications

2

#### UL 489 Current Limiting Data

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
JGH...Q	240 V/200 kA	48.60	2.47
JGH...Q	480 V/200 kA	48.60	2.47
JGH...Q	600 V/200 kA	48.60	2.47

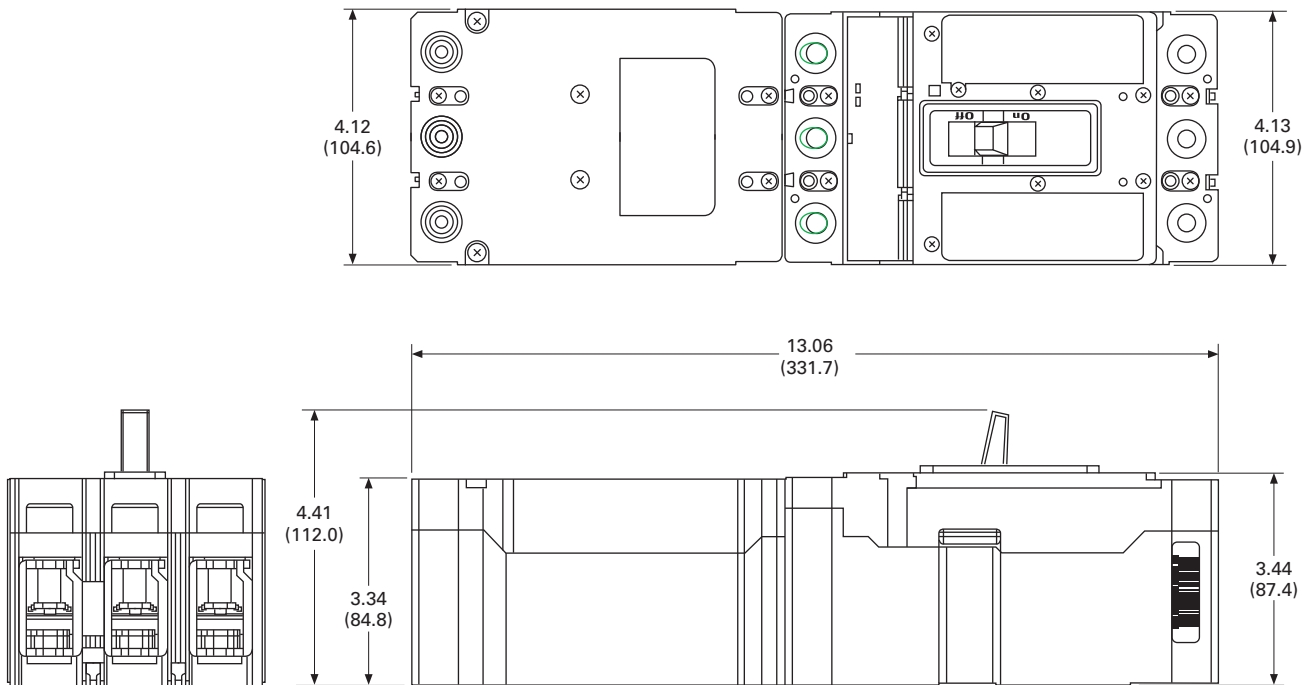
### Dimensions and Weights

Approximate Dimensions in Inches (mm)

#### Assembled Breaker and Current Limiting Module

Frame	Height	Width	Depth	Weight in lbs (kg)
JG + limiter	13.06 (331.7)	4.13 (104.9)	3.44 (87.4)	9.87 (4.48)
HMCP	13.06 (331.7)	4.13 (104.9)	3.44 (87.4)	9.87 (4.48)

#### JG-Frame With Current Limiter Module



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LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-189</b>
Motor Protector Circuit Breakers (MPCB) . . . . .	<b>V4-T2-193</b>
30 mA Ground Fault (Earth Leakage) Module . . . . .	<b>V4-T2-196</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-200</b>
High Instantaneous Circuit Breaker for Selective Coordination	
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Dimensions . . . . .	<b>V4-T2-207</b>
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**High Instantaneous Circuit Breaker for Selective Coordination****Product Description**

Eaton's Electrical Sector introduces new high-magnetic withstand molded case circuit breakers, specifically designed for critical operations and selective coordination requirements. The high-magnetic withstand LHH and NHH frames continue the legacy of circuit breaker innovation for which Eaton is recognized throughout the world. The LHH and NHH breakers are equipped with 125 to 400 ampere trip units with high-magnetic capability. This design enables the breakers to withstand up to 90 times rated current before opening under short-circuit conditions.

The LHH and NHH circuit breakers incorporate a higher level of instantaneous pickup, thus allowing for higher current levels of selective coordination. Standard molded case circuit breakers typically are furnished with a magnetic pickup or electronic instantaneous adjustment or instantaneous override set at 10 times (10x) the continuous trip rating.

**Features, Benefits and Functions**

Eaton's new LHH and NHH molded case circuit breakers are furnished with a higher level of magnetic pickup or electronic instantaneous settings as indicated in table on **Page V4-T2-207**. These higher levels of magnetic pickup and electronic instantaneous values in turn allow the system designer to obtain selective coordination at fault current levels up to these higher ratings. Greater values of selective coordination are available based on manufacturer tested combinations using the LHH and NHH as line-side breakers and standard breakers as load-side devices. Refer to IA01200002E to determine the maximum fault values that selective coordination achieves. When the line-side and load-side molded case circuit breaker trip ratings are chosen to coordinate in the overload range, they also can be selectively coordinated in the fault range up to the values listed in the table on **Page V4-T2-207** or IA01200002E. For overcurrents protected by circuit breakers on the load-side of the LHH or NHH, only the effected load-side

circuit breaker will open, while the line-side LHH and/or NHH circuit breakers remain closed, thus providing continuity of power to the other critical loads supplied by the LHH or NHH circuit breakers.

**Benefits of Using the LHH and NHH Molded Case Circuit Breakers**

Customer expectations and codes are driving product development to protect customers' critical operations. NEC® 2005 and 2008 requires circuits with elevators, emergency systems, legally required standby systems, health care essential systems and critical operation power systems to be selectively coordinated. Simply stated, only the closest protective device directly protecting the circuit having an overcurrent (overload or fault) condition should open.

All other overcurrent protective devices within these systems shall remain closed. Similarly, backup power system designs of a critical nature that are not code mandated may also require overcurrent protective devices to be selectively coordinated as much as practicable to provide a higher level of uptime.

## Product Selection

LHH



## LHH and NHH Catalog Numbers

Ampere Rating	Thermal-Magnetic Trip Unit		LSI Electronic Trip Unit
	LHH Frame	NHH Frame	
125	LHH3125FFG	—	
150	LHH3150FFG	NHH3150T52X15	
175	LHH3175FFG	NHH3175T52X15	
200	LHH3200FFG	NHH3200T52X15	
225	LHH3225FFG	NHH3225T52X15	
250	LHH3250FFG	NHH3250T52X15	
300	LHH3300FFG	NHH3300T52X15	
350	LHH3350FFG	NHH3350T52X15	
400	LHH3400FFG	—	

## 2 Proven Technology and Performance

The LHH is based on the Series G L-Frame circuit breaker, sharing the same small footprint and field-fit accessories as the L-Frame breaker. The NHH is based on the Series G N-Frame circuit breaker and shares the same footprint and accessories as the N-Frame breaker. NHH accessories must be factory installed.

The LHH incorporates a thermal-magnetic trip unit with fixed thermal and fixed magnetic settings. The NHH has an OPTIM™ electronic trip unit with LSI adjustment capabilities. The instantaneous setting is adjustable from 1000–4000 A or may be turned off to default to the frame override of 14,000 A. A hand-held OPTIMizer must be used with the NHH to adjust short-time delay and instantaneous, however, the long delay pickup is fixed and cannot be adjusted.

The LHH and NHH breakers are available in Eaton's panelboards and switchboards.

### Standards and Certifications

- UL
- CSA



**Technical Data and Specifications**

- Three-pole
- 65 kAIC at 480 Vac
- 125–400 ampere LHH
- 150–350 ampere NHH
- Trip units:
- LHH—thermal-magnetic
- NHH—LSI electronic trip unit
- No rating plugs required
- Factory-sealed breakers
- LHH uses same internal and external accessories as standard Series G L-Frame circuit breaker
- NHH uses same internal and external accessories as standard Series G N-Frame circuit breaker

**LHH and NHH Electrical Characteristics**

**Short-Circuit Current Ratings (kA rms) AC 50–60 Hz**

Description	Breaker Type	
	LHH	NHH
Max. rated current (amperes)	400	350
NEMA UL 489		
240 Vac	100	100
480 Vac	65	65
600 Vac	35	35
250 Vac	42	—
IEC 60947-2		
220 Vac	100	100
415 Vac	70	70
690 Vac	25	25
125/250 Vdc	22	—
Number of poles	3	3
Ampere range	125–400 A	150–350 A

**Continuous Current Ratings**

Continuous Current Rating (I <sub>c</sub> )	Magnetic Trip Point	Continuous Current Multiplier	Instantaneous Trip Point	Continuous Current Multiplier	Short Delay Pickup
125 A	2500 A	20x	—	—	—
150 A	2500 A	16x	14,000 A	93x	225–1200 A
175 A	4000 A	22x	14,000 A	80x	260–1400 A
200 A	4000 A	20x	14,000 A	70x	300–1600 A
225 A	6000 A	26x	14,000 A	62x	338–1800 A
250 A	6000 A	24x	14,000 A	56x	375–2000 A
300 A	6000 A	20x	14,000 A	47x	450–2400 A
350 A	6000 A	17x	14,000 A	40x	525–2800 A
400 A	6000 A	15x	—	—	—

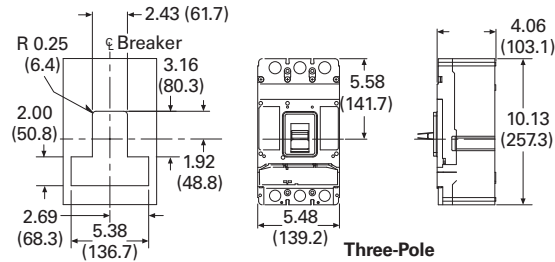
**Dimensions**

Approximate Dimensions in Inches (mm)

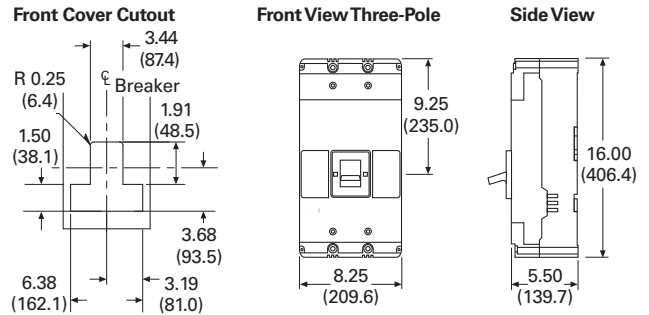
**Dimensions**

Description	Height	Width	Depth	Weight in Lbs (kg)
LHH	10.13 (257.3)	5.48 (139.2)	4.09 (103.9)	12.36 (5.6)
NHH	16.00 (406.4)	8.25 (209.5)	5.50 (139.7)	46.80 (21.2)

**L-Frame**



**N-Frame**



### Contents

<i>Description</i>	<i>Page</i>
EG-Frame (15–125 Amperes) . . . . .	<b>V4-T2-119</b>
JG-Frame (63–250 Amperes) . . . . .	<b>V4-T2-133</b>
LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-189</b>
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Drawout Cassette . . . . .	<b>V4-T2-219</b>

### Special Features and Accessories

Eaton’s molded case circuit breakers are designed to provide circuit protection for low voltage distribution systems. They are described by NEMA as, “... a device for closing and interrupting a circuit between separable contacts under both normal and abnormal conditions,” and furthermore as, “... a breaker assembled as an integral unit in a supporting and enclosing housing of insulating material.” The National Electrical Code (NEC) describes them as, “A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating.”

So designed, Eaton circuit breakers protect conductors against overloads and conductors and connected apparatus, such as motors and motor starters, against short circuits.

In low voltage distribution systems, there are many varied applications of molded case circuit breakers. Eaton offers the most comprehensive family of molded case circuit breakers in the industry.

This section of circuit breakers includes:

- Thermal-magnetic trip breakers
- Electronic rms trip breakers
- Molded case switches
- Motor circuit protectors
- Current limiting breakers
- Special application breakers

#### Modified Breakers

Eaton breakers can be ordered with internal accessories installed. These modified breakers will be subject to an addition charge.

### Special Calibration

Special non-UL listed calibrations are available for certain ambient temperatures other than 40 °C and for frequencies other than 50/60 Hz or DC. Reduced interrupting ratings will apply for 400 Hz applications.

- Add suffix H01 to breaker catalog number for 400 Hz rating

### 50 °C Calibration

**Note:** Breakers equipped with electronic trip units can operate reliably in ambient temperatures of 50 °C. Add suffix “V3” to NG MCCBs to remove standard 40 °C labeling.

Add suffix “V” to catalog number for complete thermal magnetic breaker when ordering listed ampere ratings for breakers to be used in 50 °C ambients. 50 °C ambient MCCBs are not UL listed.

Contact Eaton for availability.

### Calibrations and Treatment

Description	Frame				
	EG	JG	LG	NG	RG
Special calibration	■	■	■	■	■
Moisture-fungus treatment	■	■	■	■	■

**Moisture-Fungus Treatment**

All Eaton circuit breaker cases are molded from glass-polyester, which does not support the growth of fungus. Any parts that are susceptible to the growth of fungus will require special treatment.

Order by description.

- Add suffix J01 to breaker catalog number

**Freeze-Tested Circuit Breakers**

The circuit breakers may be ordered with freeze testing. This option uses special lubrication and mechanical operation is verified at  $-40^{\circ}\text{C}$ .

- Add suffix F01 to catalog number  $-57^{\circ}\text{F}$ , F02  $-30^{\circ}\text{F}$

**Marine Applications**

E- to R-Framed circuit breakers can be supplied to meet the following marine specifications:

- U.S. Coast Guard CFR 46; ABS—American Bureau of Shipping; IEEE 45; DNV; and Lloyds

These specifications generally require molded case circuit breakers to be supplied with  $50^{\circ}\text{C}$  ambient, and plug-in adapter kits. When plug-in adapter kits are used, no terminals need be supplied (switchboard applications).

Circuit breakers can also be supplied to meet UL 489 Supplement SA (Marine use) and UL 489 Supplement SB (Naval Use).

UL 489 Supplement SA applies to vessels over 65 feet (19.8m) in length.

Requirements include  $40^{\circ}\text{C}$  ambient calibration, special labeling, and no use of aluminum conductors or terminals. (No  $50^{\circ}\text{C}$ .)

- Add suffix H08

Or you can choose to add  $50^{\circ}\text{C}$  ambient but then there is no "UL" mark.

- Add suffix VH08

UL 489 Supplement SB requires partial  $50^{\circ}\text{C}$  ambient calibration, vibration testing, special nameplating and no use of aluminum conductors or terminals. Eaton chooses to always fully calibrate to  $50^{\circ}\text{C}$  ambient. ("Naval" labeled per UL but no "UL" mark due to  $50^{\circ}\text{C}$  label.)

- Add suffix VH09

**Certified Test Reports**

Eaton breakers can be ordered with certified test reports at the time of order entry. Test report documents the thermal and magnetic or electronic tripping characteristics of the individual breaker. Breaker and test report must be ordered together. Add suffix 12 to breaker catalog number and enter separate line item on order for certified test report.

**Standards and Certifications**

Molded case circuit breakers are designed to conform with the following standards:

- Underwriters Laboratories Inc., Standard UL 489, molded case circuit breakers and circuit breaker enclosures
- National Electrical Manufacturers Association (NEMA) Standards Publication No. AB1-1993, molded case circuit breakers
- Australian Standard AS 2184, molded case circuit breakers
- British Standards Institution Standard BS 4752: Part 1, switchgear and control gear Part 1: circuit breakers
- Canadian Standards Association (CSA) Standard C22.2 No. 5, service entrance and branch circuit breakers
- International Electrotechnical Commission Recommendations IEC 60947-2, circuit breakers
- Japanese T-Mark Standard molded case circuit breakers
- South African Bureau of Standards, Standard SABS 156, Standard Specification for molded case circuit breakers
- Swiss Electro-Technical Association Standard SEV 157-1, safety regulations for circuit breakers
- Union Technique de l'Electricite Standard NF C 63-120, low voltage switchgear and control gear circuit breaker requirements
- Verband Deutscher Elektrotechniker (Association of German Electrical Engineers) Standard VDE 0660, low voltage switchgear and control gear, circuit breakers

Conformance with these standards satisfies most local and international codes, assuming user acceptability and simplified application.

Molded case circuit breakers equal or exceed Federal Specification Classification W-C-375b requirements for the particular class associated with the circuit breaker frame being considered.

Open breakers do not have service entrance ratings. Service entrance rating is part of the enclosure.



## Internal Accessories

2

### Alarm Lockout

The alarm switches operate when the circuit breaker is tripped by a short circuit or overcurrent, but also when it is tripped by a shunt trip or undervoltage release.

### Auxiliary Switches

Auxiliary switches are used for signaling and control purposes. The various functions of the auxiliary switches (changeover) are shown on **Page V4-T2-212**.

### Shunt Trips

The shunt trip is used for remote tripping.

The coil of the shunt trip is rated only for short-time operation.

It is not permissible with the circuit breaker open to apply a continuous opening command to the shunt trip in order to prevent the breaker from closing. This means that interlocking circuits with continuous commands may not be set up with shunt trips.

### Undervoltage Releases

The circuit breaker cannot be closed until the undervoltage release is energized. If the release is not energized, the circuit breaker can only perform an idle switching operation.

Frequent idle switching actions should be avoided as they shorten the endurance of the circuit breaker.

## Digitrip 310+ Electronic Trip Unit Accessories

### Cause of Trip Display/Remote Mount Cause of Trip Display

The Cause of Trip Display can be field-installed on any Digitrip RMS 310+ trip unit. The device provides breaker information through an LCD screen, such as cause of trip, phrase current, ground current and low loads. The display is ideal for troubleshooting common trips such as ground fault, long delay, and instantaneous/short delay. The DIGIVIEW version will provide a local display at the breaker without additional wiring by connecting directly onto the trip unit. The DIGIVIEWR06 version has a 6 foot cable that allows users to mount the display on the outside of an enclosure door and connect to the trip unit that is contained inside the enclosure.

The DIGIVIEWR06 is NEMA 3R rated.

### Cause of Trip Display/Remote Mount Cause of Trip Display

Catalog  
Number

---

DIGIVIEW

---

DIGIVIEWR06

### Cause of Trip LED Module

The Cause of Trip LED Module can be field-installed on any Digitrip RMS 310+ trip unit. The device provides a cause of trip indication via LED. The Cause of Trip LED Module connects directly onto the trip unit. When the breaker trips, the module indicates the cause of trip (long delay, short delay, instantaneous and ground) via LED indication. The module is reset after the breaker is reset.

### Cause of Trip LED Module

Catalog  
Number

---

TRIP-LED

### Electronic Portable Test Kit

The electronic portable test kit provides a means to complete field tests using secondary injection on all 310+ trip units. The same test kit is also capable of secondary injection testing on Magnum and Series NRX low voltage power circuit breakers' 520 and 1150 trip units.

### Electronic Portable Test Kit

Catalog  
Number

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MTST230V

### Wire Seal

The wire seal can be used to secure the cover of the trip unit to prevent adjustments after settings are confirmed.

### Wire Seal

Catalog  
Number

---

5108A03H01

## External Accessories and Test Kit

## External Accessories

Description	Fit Type	Frame				
		EG	JG	LG	NG	RG
Non-padlockable handle block	Field	EFHB	—	—	LKD4	—
Padlockable handle block	Field	EFPHB	—	—	—	—
Padlockable handle block off-only	Field	EFPHBOFF	FJPHBOFF	LBHPOFF	—	—
Padlockable handle lock hasp	Field	EFPLK	FJPHL	LPHL	PLK5	HLK6
Padlockable handle lock hasp off-only	Field	EFPHLOFF	FJPHLOFF	LPHLOFF	PLK550FF	HLK60FF
Kirk key interlock kit <sup>①②</sup>	Field	—	KYKJG	KYKLG	KYK4	KYK6
Castell key interlock kit <sup>②③</sup>	Field	—	CTKJG	CTKLG	CTK4	CTK6
Slide bar interlock <sup>④</sup>	Field	EFSBI	FJSBI	LGSBI	SBK5	—
Walking beam interlock <sup>④</sup>	Three-pole	EG3WBI	JG3WBI	LG3WBI	WBL5	WBL6
	Four-pole	EG4WBI	JG4WBI	LG4WBI	WBL5	—
Electrical operator <sup>⑤</sup>	120 Vac	MOPEG240C	MOPJG120C	MOPLG120C	EOP5T07	EOP6T08K
	240 Vac	MOPEG240C	MOPJG240C	MOPLG240C	EOP5T11	EOP6T11K
	24 Vdc	MOPEG48D	MOPJG24D	MOPLG24D	EOP5T21	—
	48 Vdc	MOPEG48D	—	—	EOP5T22	EOP6T21K
	125 Vdc	MOPEG120C	MOPJG120C	MOPLG120C	EOP5T26	—
	220 Vdc	—	MOPJG240C	MOPLG240C	—	—
	250 Vdc	—	MOPJG240C	MOPLG240C	—	—
Plug-in adapters	Three-pole	PAD3E	PAD3J	PAD3L	PAD53	—
	Four-pole	PAD4E	PAD4J	PAD4L	—	—
Wohner busbar adapter	Field top	EG-BUS-T	JG-BUS-TB	LG-BUS-TB	—	—
	Field bottom	EG-BUS-B	JG-BUS-TB	LG-BUS-TB	—	—

**Series G MCCB Frames EG, JG, and LG to mount to the SASY 60 mm Wohner Classic System**

- UL file # E197132
- Compact design
- UL508 tested and certified using Wohner system with Eaton breakers
- No line side wiring required
- Up to 630 A MCCB
- Reverse feed possible

**Wohner Busbar Adapter****Wohner Busbar Adapters**

Breaker Frame	Busbar Adapter	Connection Point
EG	EG-BUS-T	Top
EG	EG-BUS-B	Bottom
JG	JG-BUS-TB	Top or bottom
LG	LG-BUS-TB	Top or bottom

**Notes**

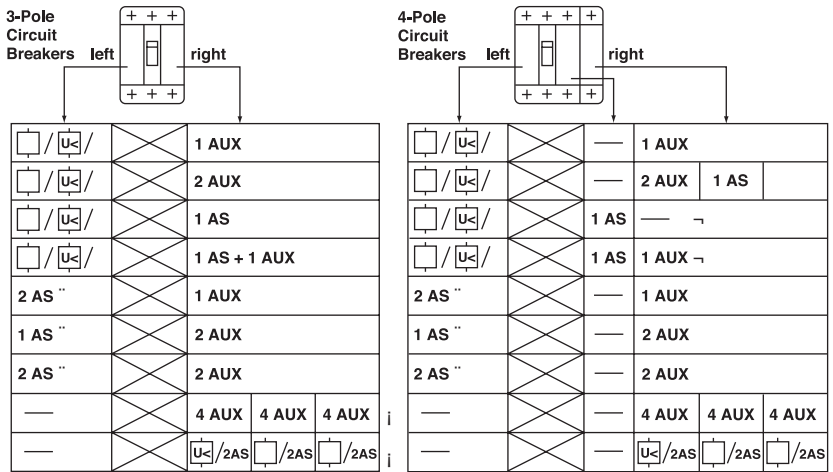
- ① Provision only.
- ② See **Page V4-T2-422** for bolt projection dimensions.
- ③ Castell bolt mounting hole must be 10 mm.
- ④ Requires two breakers.
- ⑤ Contact Eaton for availability of operators for EG- and NG-Frames before December 2004.



### Accessory Configurations for EG–RG Circuit Breakers

## 2

### Internal Accessory Configurations



□ / U<sub>C</sub> / = Shunt Trip or Undervoltage Release

AUX = Auxiliary Switch

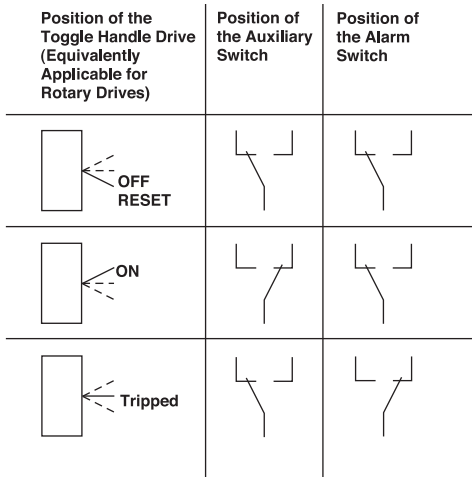
AS = Alarm Switch

" = For N-Frame Circuit Breakers Only

≠ = For R-Frame Circuit Breakers Only

— = For N and R-Frame Circuit Breakers Only

### Contact Making by the Auxiliary and Alarm Switches as a Function of the Switching Position of the Circuit Breaker



## Accessories

### Field Fit Kit Catalog Numbers

#### Alarm Lockout

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
Make/Break	Left	—	A1L5LPK	—
	Right	ALM1M1BEPK ②	A1L5RPK	A1L6RPK
2 Make/2 Break	Left	—	A2L5LPK	—
	Right	ALM2M2BEPK ③	A2L5RPK	A2L6RPK

Description	Pole Location	For Use in Frame	Contact Type	Catalog Number
Make/Break	Right	EG	Silver	ALM1M1BEPK
2 Make/ 2 Break	Right	EG	Silver	ALM2M2BEPK
Make/Break	Right	JG and LG	Silver	ALM1M1BJPK
2 Make/ 2 Break	Right	JG and LG	Silver	ALM2M2BJPK
Make/Break	Right	EG	Gold	ALM1M1BEEPK
2 Make/ 2 Break	Right	EG	Gold	ALM2M2BEEPK
Make/Break	Right	JG and LG	Gold	ALM1M1BEJPK
2 Make/ 2 Break	Right	JG and LG	Gold	ALM2M2BEJPK

#### Auxiliary Switch

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
1A, 1B	Left	—	A1X5PK	—
	Right	AUX1A1BPK	A1X5PK	—
2A, 2B	Left	—	A2X5PK	—
	Right	AUX2A2BPK	A2X5PK	A2X6RPK
3A, 3B	Left	—	A3X5LPK	—
	Right	—	A3X5RPK	—
4A, 4B	Left	—	—	—
	Right	—	—	A4X6RPK

Description	Pole Location	For Use in Frame	Contact Type	Catalog Number
1A, 1B	Right	EG/JG/LG	Silver	AUX1A1BPK
2A, 2B	Right	EG/JG/LG	Silver	AUX2A2BPK
1A, 1B	Right	EG/JG/LG	Gold	AUX1E1BPK
2A, 2B	Right	EG/JG/LG	Gold	AUX2E2BPK

#### Auxiliary Switch/Alarm Lockout

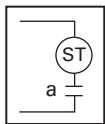
Description	Pole Location	Frame		
		EG, JG and LG	NG	RG ①
—	Left	—	AA115LPK	—
	Right	AUXALRMEPK ④	AA115RPK	—

Description	Pole Location	For Use in Frame	Contact Type	Catalog Number
1A/1B & 1M/1B	Right	EG	Silver	AUXALRMEPK
1A/1B & 1M/1B	Right	JG and LG	Silver	AUXALRMJPK
1A/1B & 1M/1B	Right	EG	Gold	AUXALRMEEPK
1A/1B & 1M/1B	Right	JG and LG	Gold	AUXALRMEJPK

#### Notes

- ① All accessories mount in the RH cavity which will accept one each of shunt trip, UVR, auxiliary switch and alarm switch.
- ② Part number for JG and LG is ALM1M1BJPK.
- ③ Part number for JG and LG is ALM2M2BJPK.
- ④ Part number for JG and LG is AUXALRMJPK.

## Shunt Trip—Standard



## Shunt Trip—Standard

Description	Pole Location	Frame		
		EG, JG and LG <sup>①</sup>	NG	RG <sup>②</sup>
48–60 Vac	Left	SNT4860CPK	SNT5LP05K	—
	Right	—	—	SNT6P05K
110–240 Vac	Left	SNT120CPK	SNT5LP11K	—
	Right	—	—	SNT6P11K
380–600 Vac	Left	SNT480CPK <sup>③</sup>	—	—
	Right	—	—	—
220–250 Vdc or 380–440 Vac	—	—	SNT5LP14K	SNT6P14K
480–600 Vac	—	—	SNT5LP18K	SNT6P18K
12 Vdc	Left	SNT012CPK	—	—
	Right	—	—	—
24 Vac/dc	Left	SNT024CPK	SNT5LP03K	—
	Right	—	—	SNT6P03K
48–60 Vdc	Left	SNT4860CPK	SNT5LP23K	—
	Right	—	—	SNT6P23K
110–125 Vdc	Left	SNT125DPK	SNT5LP26K	—
	Right	—	—	SNT6P26K
250 Vdc	Left	SNT250DPK	—	—
	Right	—	—	—

## Shunt Trip—Low Energy

Description	Pole Location	Frame		
		EG, JG and LG	NG	RG <sup>②</sup>
—	Left	—	LST5LPK	—
—	Right	—	—	LST6RPK

## Undervoltage Release Mechanism

Description	Pole Location	Frame		
		EG, JG and LG <sup>①</sup>	NG	RG <sup>②</sup>
110–127 Vac	Left	UVR120APK	UVH5LP08K	—
	Right	—	—	UVH6RP08K
208–240 Vac	Left	UVR240APK	UVH5LP11K	—
	Right	—	—	UVH6RP11K
24 Vdc	Left	UVR024DPK	UVH5LP21K <sup>④</sup>	—
	Right	—	—	UVH6RP21K <sup>④</sup>
24 Vac	Left	UVR024APK	UVH5LP21K <sup>④</sup>	—
	Right	—	—	UVH6RP21K <sup>④</sup>
48–60 Vdc	Left	UVR048DPK	UVH5LP23K	—
	Right	—	—	UVH6RP23K
48–60 Vac	Left	UVR048APK	UVH5LP05K	—
	Right	—	—	UVH6RP05K
120 Vdc	Left	UVR125DPK	UVH5LP26K	—
	Right	—	—	UVH6RP26K
220–250 Vdc	Left	UVR250DPK	UVH5LP28K	—
	Right	—	—	UVH6RP28K
380–500 Vac	Left	UVR480APK	UVH5LP29K	—
	Right	—	—	UVH6RP29K
525–600 Vac	Left	UVR600APK	—	—
	Right	—	—	—
12 Vdc	Left	—	UVH5LP20K	—
	Right	—	—	UVH6RP20K
12 Vac	Left	—	UVH5LP02K	—
	Right	—	—	UVH6RP02K

## Notes

- ① LH cavity not available for EG frame with earth leakage module.  
 ② All accessories mount in the RH cavity which will accept one each of shunt trip, UVR, auxiliary switch and alarm switch.  
 ③ 380–600 Vdc, 50/60 Hz.  
 ④ 24 Vdc only use UVH5LP03K (NG) UVH6RP03K (RG) for 24 Vac.

### Technical Data and Specifications

**Note:** Gold-plated contacts are well suited for switching low voltages and currents. Lead wires on accessories containing gold-plated contacts are marked with a yellow stripe.

#### Series G Gold Contact Accessory Switch Electrical Ratings

Max. Voltage (Ue)	Frequency	Max. Current (I <sub>n</sub> )	Dielectric Withstand Voltage (UI)
125 V	50/60 Hz	0.1 A	2200 V
30 V	DC	0.25 A	2200 V
5 V	DC	5 mA	2200 V

#### Series G Silver Contact Accessory Switch Electrical Ratings

Max. Voltage (Ue)	Frequency	Max. Current (I <sub>n</sub> )	Dielectric Withstand Voltage (UI)
600 V	50/60 Hz	2 A	2200 V
125/250 V	50/60 Hz	5 A	2200 V
125 V	DC	1 A	2200 V

#### Series GJ Frame: Terminal Extension Kits

	Extension Orientation			
	Edgewise	Right Angle	Spreader	Straight
Three-pole	FJTEE3	FJTER3	FJTEW3	FJTES3
Four-pole	FJTEE4	FJTER4	FJTEW4	FJTES4

#### Series G Motor Operators

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### Motor Operators

#### Product Description

Eaton’s motor operator mechanism enables local and remote ON, OFF and reset switching of a circuit breaker. The motor operator is mounted on the circuit breaker cover within the dimensions of the circuit breaker.

The robust motor operators offer various voltages to maximize customer flexibility. Standard load transfer switching can be accomplished through the use of two circuit breakers fitted with motor operators and a mechanical interlock.

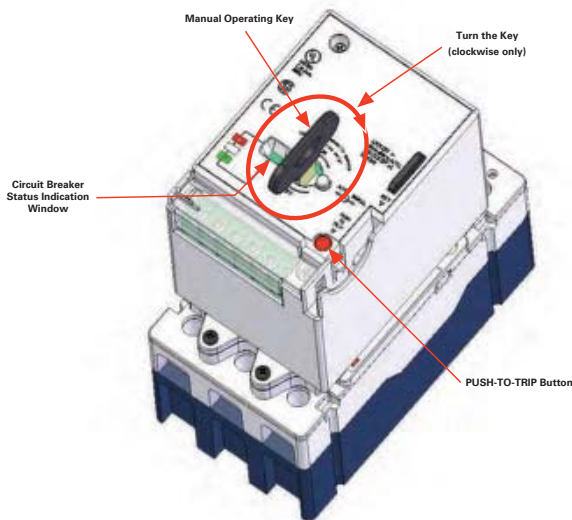
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LG-Frame (250–630 Amperes) . . . . .	<b>V4-T2-151</b>
NG-Frame (320–1200 Amperes) . . . . .	<b>V4-T2-169</b>
RG-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-178</b>
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### Features, Benefits and Functions

The motor operator provides special features for ease of customer use and status indication.

- The motor operator allows the circuit breaker to be opened, closed or reset remotely
- The motor operator contains a motor connected to a cam drive mechanism. The cam drives a slide mechanism to operate the circuit breaker handle
- Internal limit switches and relays are used to control motor operation to prevent overdriving the circuit breaker handle and motor overload conditions
- A key is provided to manually operate the circuit breaker
- A special pull-out locking mechanism provides a method for padlocking the circuit breaker handle in the OFF position
- The locking device will accept three padlock shackles with a maximum diameter of 1/4-inch (6.4 mm) each
- The cover provides visual status of the circuit breaker: ON, OFF or TRIPPED. A PUSH-TO-TRIP button allows the user to manually trip the breaker



### Standards and Certifications

The motor operators are UL and CSA listed, and CE marked.



### Product Selection

#### Motor Operators

Frame	Voltage	Frequency	Inrush Current	Catalog Number
Series G E-Frame	100–240 Vac	50/60 Hz	1A	<b>MOPEG240C</b>
	100–220 Vdc	DC	1A	<b>MOPEG240C</b>
	24/48 Vdc	DC	3A	<b>MOPEG48D</b>
Series C F-Frame	208–240 Vac	50/60 Hz	1A	<b>MOPFD240C</b>
	110–127 Vac	50/60 Hz	1A	<b>MOPFD120C</b>
	220–250 Vdc	DC	1A	<b>MOPFD240C</b>
	110–125 Vdc	DC	1A	<b>MOPFD120C</b>
Series G J-Frame	24 Vdc	DC	3A	<b>MOPFD24D</b>
	208–240 Vac	50/60 Hz	1A	<b>MOPJG240C</b>
	110–127 Vac	50/60 Hz	1A	<b>MOPJG120C</b>
	220–250 Vdc	DC	1A	<b>MOPJG240C</b>
Series G L-Frame	110–125 Vdc	DC	1A	<b>MOPJG120C</b>
	24 Vdc	DC	3A	<b>MOPJG24D</b>
	208–240 Vac	50/60 Hz	2A	<b>MOPLG240C</b>
	110–127 Vac	50/60 Hz	2A	<b>MOPLG120C</b>
Series G L-Frame	220–250 Vdc	DC	2A	<b>MOPLG240C</b>
	110–125 Vdc	DC	2A	<b>MOPLG120C</b>
	24 Vdc	DC	6A	<b>MOPLG24D</b>

LG Breaker with Plug-In Block

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Motor Operators . . . . .	<b>V4-T2-216</b>
Plug-In Blocks	
Drawout Cassette . . . . .	<b>V4-T2-219</b>

### Plug-In Blocks

#### Product Description

Plug-in adapters simplify installation and front removal of circuit breakers. Plug-ins are available for rear connection applications on three- and four-pole circuit breakers. Trip on drawout interlock kits are included. Stabs for EG, JG and LG plug-ins rotate 90 ° for flexible installation. Use terminal shields for IP30 protection.

#### Product Selection

##### Plug-In Blocks

Breaker Frame	Number of Poles	Catalog Number
<b>EG-, JG- and LG-Frame Plug-In Blocks</b>		
EG	3	<b>PAD3E</b>
EG	4	<b>PAD4E</b>
JG	3	<b>PAD3J</b>
JG	4	<b>PAD4J</b>
LG	4	<b>PAD4L</b>
<b>Trip-On Drawout Interlock Kit <sup>①</sup></b>		
EG	3, 4	<b>PIILEG</b>
JG	3, 4	<b>PIILJG</b>
LG	3, 4	<b>PIILLG</b>
<b>Terminal Shields IP30</b>		
EG	3	<b>EFTS3K</b>
EG	4	<b>EFTS4K</b>
JG	3	<b>FJTS3K</b>
JG	4	<b>FJTS4K</b>
LG	3	<b>LTS3K</b>
LG	4	<b>LTS4K</b>

#### Note

<sup>①</sup> Included with plug-in block. Trips the breaker when breaker is removed from plug-in block.

**Drawout Cassettes**



**Drawout Cassette**

**Product Description**

The drawout cassette is available for use with JG, LG and NG, three- and four-pole breakers. The cassettes consist of two separate components: the movable mechanism, which attaches to the breaker, and the stationary mechanism, which houses in the cassette. For the JG, LG and NG drawout cassettes, all necessary parts for installation are included in the one catalog number.

**Features**

Features of the drawout cassettes for the JG, LG and NG include:

- Trip on drawout—breaker will trip if it is in the ON position when withdrawn from the cassette
- Secondary terminal block—the drawout cassettes include a secondary terminal block for easier access when wiring low voltage accessories, including shunts and undervoltage releases

The drawout mechanism has three primary positions:

- Connected—the breaker is fully connected to the primary stabs and secondary contacts
- Disconnected—both the primary stabs and the secondary contacts are disconnected
- Withdraw—the breaker can be removed from the cassette

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Drawout Cassette	

**Product Selection**

**JG Drawout Cassette**



**LG Drawout Cassette**



**JG, LG and NG Drawout Cassettes**

<b>Breaker Frame</b>	<b>Number of Poles</b>	<b>Catalog Number</b>
JG	3	<b>JG3DOM</b>
	4	<b>JG4DOM</b>
LG	3	<b>LG3DOM</b>
	4	<b>LG4DOM</b>
NG	3	<b>NG3DOM</b>
	4	<b>NG4DOM</b>



## Molded Case Circuit Breaker Product Family

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## Product Overview

Eaton's molded case circuit breakers are designed to provide circuit protection for low voltage distribution systems. They are described by NEMA as, "... a device for closing and interrupting a circuit between separable contacts under both normal and abnormal conditions," and furthermore as, "... a breaker assembled as an integral unit in a supporting and enclosing housing of insulating material." The National Electrical Code (NEC) describes them as, "A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating."

So designed, Eaton circuit breakers protect conductors against overloads and conductors and connected apparatus, such as motors and motor starters, against short circuits.

In low voltage distribution systems, there are many varied applications of molded case circuit breakers.

Eaton offers the most comprehensive family of molded case circuit breakers in the industry.

This section of circuit breakers includes:

- Thermal-magnetic trip breakers
- Electronic rms trip breakers
- Molded case switches
- Motor circuit protectors
- Current limiting breakers
- Special application breakers

### Modified Breakers

Eaton breakers can be ordered with internal accessories installed. These modified breakers will be subject to an addition charge.

### Special Calibration

Special non-UL-listed calibrations are available for certain ambient temperatures other than 40 °C and for frequencies other than 50/60 Hz or DC. Reduced interrupting ratings will apply for 400 Hz applications.

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R-Frame (800–2500 Amperes)	V4-T2-341
Motor Circuit Protectors (MCP)	V4-T2-360
Motor Protection Circuit Breakers (MPCB)	V4-T2-371
Type ELC Current Limiter Attachment (Size 0–4)	V4-T2-373
Current Limiting Circuit Breaker Module	V4-T2-374
Internal Accessories	V4-T2-377
External Accessories	V4-T2-410

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Online

### 50 °C Calibration

Add suffix **V** to catalog Number for complete breaker, listed above, when ordering listed ampere ratings for breakers to be used in 50 °C ambients. (No UL label.)

### Moisture-Fungus Treatment

All circuit breaker cases are molded from glass-polyester which does not support the growth of fungus. Any parts which are susceptible to the growth of fungus will require special treatment.

### Freeze-Tested Circuit Breakers

The circuit breakers may be ordered with freeze testing. This option uses special lubrication and mechanical operation is verified at –40 °C.

### Marine Applications

E- to R-Framed circuit breakers can be supplied to meet the following marine specifications:

- U.S. Coast Guard CFR 46; ABS—American Bureau of Shipping; IEEE 45; DNV; Lloyds; and ABS/NVR

These specifications generally require molded case circuit breakers to be supplied with 50 °C ambient, and plug-in adapter kits. When plug-in adapter kits are used, no terminals need be supplied (switchboard applications).

Circuit breakers can also be supplied to meet UL 489 Supplement SA (Marine use) and UL 489 Supplement SB (Naval Use).

UL 489 Supplement SA applies to vessels over 65 feet (19.8 m) in length. Requirements include 40 °C ambient calibration, special labeling, and no use of aluminum conductors or terminals. (No 50 °C.)

- Suffix H08

Or you can choose to add 50 °C ambient but then there is no "UL" mark.

- Suffix VH08

UL 489 Supplement SB requires partial 50 °C ambient calibration, vibration testing, special nameplating and no use of aluminum conductors or terminals. Eaton chooses to always fully calibrate to 50 °C ambient. ("Naval" labeled per UL, and UL now allows 50 °C label here.)

- Suffix VH09

### Certified Test Reports

Eaton breakers can be ordered with certified test reports at the time of order entry. Test report documents the thermal and magnetic or electronic tripping characteristics of the individual breaker. Breaker and test report must be ordered together. Add suffix 12 to breaker catalog number and enter separate line item on order for certified test report.

### Standards and Certifications

Molded case circuit breakers are designed to conform with the following standards:

- Underwriters Laboratories Inc., Standard UL 489, molded case circuit breakers and circuit breaker enclosures
- National Electrical Manufacturers Association (NEMA) Standards Publication No. AB1-1993, molded case circuit breakers
- Australian Standard AS 2184, molded case circuit breakers
- British Standards Institution Standard BS 4752: Part 1, switchgear and control gear Part 1: circuit breakers
- Canadian Standards Association (CSA) Standard C22.2 No. 5, service entrance and branch circuit breakers
- International Electrotechnical Commission Recommendations IEC 60947-2, circuit breakers
- Japanese T-Mark Standard molded case circuit breakers
- South African Bureau of Standards, Standard SABS 156, Standard Specification for molded case circuit breakers
- Swiss Electro-Technical Association Standard SEV 157-1, safety regulations for circuit breakers
- Union Technique de l'Electricite Standard NF C 63-120, low voltage switchgear and control gear circuit breaker requirements
- Verband Deutscher Elektrotechniker (Association of German Electrical Engineers) Standard VDE 0660, low voltage switchgear and control gear, circuit breakers

Conformance with these standards satisfies most local and international codes, assuming user acceptability and simplified application.

Molded case circuit breakers equal or exceed Federal Specification Classification W-C-375b requirements for the particular class associated with the circuit breaker frame being considered.

Open breakers do not have service entrance ratings. Service entrance rating is part of the enclosure.



## Quick Reference

## Industrial Circuit Breakers

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## G-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	No. of Poles	Volts		Type of Trip <sup>①</sup>	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) <sup>②</sup>				
							120	120/240	240	277	480	600	125 <sup>③</sup>	250	
GHB	15–100	1	120	125	N.I.T.U.	11a	65	—	—	—	—	—	14	—	V4-T2-230
GHB	15–100	2, 3	240	125/250	N.I.T.U.	11a10b, 11b	—	—	65	—	—	—	—	14	V4-T2-230
GHB	15–100	1	277	125	N.I.T.U.	12b, 14b	—	—	—	14	—	—	14	—	V4-T2-230
GHB	15–100	2, 3	480Y/277	125/250	N.I.T.U.	15b	—	—	—	14	14	—	—	14	V4-T2-230
HGHB	15–30	1	277	125	N.I.T.U.	12c, 13a, 13b	65	—	—	25	—	—	14	—	V4-T2-230
GHBS	15–30	1, 2	480Y/277	—	—	—	65	65	—	14	—	—	—	—	V4-T1-34
GBHS	15–20	1, 2	600Y/347	—	N.I.T.U.	—	—	—	—	—	—	10	—	—	V4-T1-34
GDB	15–50	2	480	125/250	N.I.T.U.	—	—	—	—	14	—	—	10	—	V4-T2-228
GDB	15–100	3	480	250	N.I.T.U.	—	—	—	—	14	—	—	10	—	V4-T2-228
GD	15–50	2	480	125/250	N.I.T.U.	13b	—	—	65	—	14	—	—	10	V4-T2-227
GD	15–100	3	480	250	N.I.T.U.	13b	—	—	65	—	22	—	—	10	V4-T2-227
GHC	15–100	1	120	125	N.I.T.U.	12c, 13a	65	—	—	—	—	—	14	—	V4-T2-235
GHC	15–100	2, 3	240	125/250	N.I.T.U.	13b	—	—	65	—	—	—	—	1	V4-T2-235
GHC	15–100	1	277	125	N.I.T.U.	12c, 13a	—	—	—	14	—	—	14	—	V4-T2-235
GHC	15–100	2, 3	480Y/277	125/250	N.I.T.U.	13b	—	—	—	14	14	—	—	14	V4-T2-235
HGHC	15–30	1	277	125	N.I.T.U.	—	65	—	—	25	—	—	14	—	V4-T2-235

## Notes

- ① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.
- ③ Single-pole breakers can be applied in DC systems up to 70 A.

## F-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	No. of Poles	Volts		Type of Trip <sup>①</sup>	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) <sup>②</sup>				
							120	120/240	240	277	480	600	125	250	
EDB	100–225	2, 3	240	125	N.I.T.U.	—	—	—	22	—	—	—	10	—	V4-T2-239
EDS	100–225	2, 3	240	125	N.I.T.U.	—	—	—	42	—	—	—	10	—	V4-T2-239
ED	15–225	2, 3	240	125	N.I.T.U.	12b	—	—	65	—	—	—	10	—	V4-T2-239
EDH	100–225	2, 3	240	125	N.I.T.U.	14b	—	—	100	—	—	—	10	—	V4-T2-239
EDC	100–225	2, 3	240	125	N.I.T.U.	1	—	—	200	—	—	—	10	—	V4-T2-239
EHD	15–100	1	277	125	N.I.T.U.	13a	—	—	—	14	—	—	10	—	V4-T2-239
EHD	15–100	2, 3	480	250	N.I.T.U.	13b	—	—	18	—	14	—	—	10	V4-T2-239
FDB	15–150	2, 3	600	250	N.I.T.U.	18a	—	—	18	—	14	14	—	10	V4-T2-239
FDB	15–150	4	600	250	N.I.T.U.	③	—	—	18	—	14	14	—	10	V4-T2-239
FD	15–150	1	277	125	N.I.T.U.	13a	—	—	—	35	—	—	10	—	V4-T2-239
FD	15–225	2, 3	600	250	N.I.T.U.	22a	—	—	65	—	35	18	—	10	V4-T2-239
FD	15–225	4	600	250	N.I.T.U.	③	—	—	65	—	35	18	—	10	V4-T2-239
FDE	15–225	3	600	—	N.I.T.U.	—	—	—	65	—	35	18	—	—	V4-T2-239
HFD	15–150	1	277	125	N.I.T.U.	13a	—	—	—	65	—	—	10	—	V4-T2-239
HFD	15–225	2,3	600	250	N.I.T.U.	22a	—	—	100	—	65	25	—	22	V4-T2-239
HFD	15–225	4	600	250	N.I.T.U.	③	—	—	100	—	65	25	—	22	V4-T2-239
HFDE	15–225	3	600	—	N.I.T.U.	—	—	—	100	—	65	25	—	—	V4-T2-239
FDC <sup>④</sup>	15–225	2, 3	600	250	N.I.T.U.	24a	—	—	200	—	100	35	—	22	V4-T2-239
FDC <sup>④</sup>	15–225	4	600	250	N.I.T.U.	③	—	—	200	—	100	35	—	22	V4-T2-239
FDCE <sup>④⑤</sup>	15–225	3	600	—	N.I.T.U.	—	—	—	200	—	100	25	—	—	V4-T2-239

**Notes**

① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.

② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.

③ Not defined in W-C-375b.

④ Current limiting.

⑤ Check with Eaton for availability.

# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### J-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
JDB	70–250	2, 3	600	250	N.I.T.U.	22a	—	—	65	—	35	18	—	10	V4-T2-260
JD	70–250	2, 3, 4	600	250	I.T.U.	22a	—	—	65	—	35	18	—	10	V4-T2-259
HJD	70–250	2, 3, 4	600	250	I.T.U.	22a	—	—	100	—	65	25	—	22	V4-T2-259
JDC ③	70–250	2, 3, 4	600	250	I.T.U.	22a	—	—	200	—	100	35	—	22	V4-T2-259

#### K-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
DK	250–400	2, 3	240	250	N.I.T.U.	14b	—	—	65	—	—	—	—	10	V4-T2-271
KDB	100–400	2, 3	600	250	N.I.T.U.	23a	—	—	65	—	35	25	—	10	V4-T2-271
KD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	10	V4-T2-268, V4-T2-269, V4-T2-273, V4-T2-276
CKD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	—	V4-T2-270, V4-T2-279, V4-T2-281
HKD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	22	V4-T2-268, V4-T2-269, V4-T2-273, V4-T2-276
CHKD	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	—	V4-T2-270, V4-T2-279, V4-T2-281
KDC ③	100–400	2, 3, 4	600	250	I.T.U.	23a	—	—	200	—	100	65	—	22	V4-T2-268, V4-T2-269, V4-T2-273, V4-T2-276

#### L-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
LDB	300–600	2, 3	600	250	N.I.T.U.	23a	—	—	65	—	35	25	—	22	V4-T2-294
LD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	22	V4-T2-292, V4-T2-293, V4-T2-298
CLD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	65	—	35	25	—	—	V4-T2-294, V4-T2-304
HLD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	25	V4-T2-292, V4-T2-293, V4-T2-298
CHLD	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	100	—	65	35	—	—	V4-T2-294, V4-T2-304
LDC ③	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	200	—	100	50	—	30	V4-T2-292, V4-T2-293, V4-T2-300
CLDC ③	300–600	2, 3, 4	600	250	I.T.U.	23a	—	—	200	—	100	50	—	30	V4-T2-294, V4-T2-306

#### M-Frame

Circuit Breaker Type	Continuous Ampere Rating at 40 °C	No. of Poles	Volts		Type of Trip ①	Federal Specification W-C-375b	UL Listed Interrupting Ratings (rms Symmetrical Amperes)								Page Number
			AC	DC			AC (kA)				DC (kA) ②				
							120	120/240	240	277	480	600	125	250	
MDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	65	—	50	25	—	22	V4-T2-317, V4-T2-319
CMDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	65	—	50	25	—	—	V4-T2-319
HMDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	100	—	65	35	—	25	V4-T2-317, V4-T2-319
CHMDL	300–800	2, 3	600	250	I.T.U.	23a	—	—	100	—	65	35	—	—	V4-T2-319

#### Notes

① N.I.T.U. is non-interchangeable trip unit and I.T.U. is interchangeable trip unit.

② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250 Vdc.

③ Current limiting.

**Molded Case Circuit Breaker Product Family****Contents**

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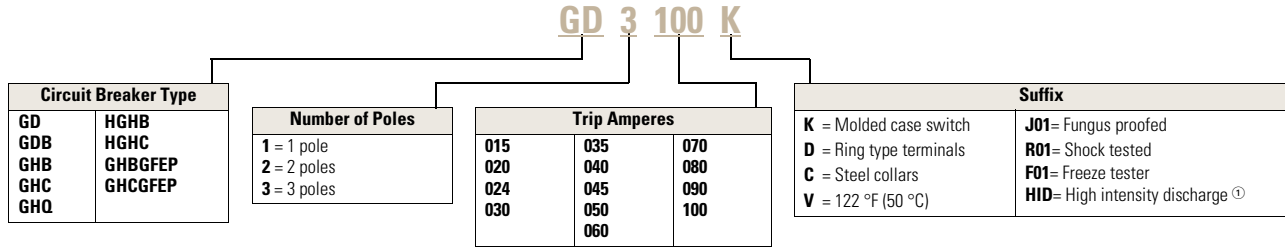
**G-Frame (15–100 Amperes)****Product Description**

- All two- and three-pole circuit breakers are of the common trip type. On all three-phase delta (240 V) Grounded B phase applications, refer to Eaton
- Single-pole circuit breakers, 15 and 20 amperes. Switching duty rated (SWD) for fluorescent lighting applications
- All G-Frame circuit breakers are suitable for reverse feed use
- HACR rated

### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### Circuit Breaker/Frame



### Technical Data and Specifications

#### UL 489 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)						
		Volts AC (50/60 Hz)					Volts DC	
		120	240	277	480	480Y/277	125 ②	250 ③④
GDB	2, 3	—	—	—	14	—	—	10
GD	2	—	65	—	14	—	—	10
GD	3	—	65	—	22	—	—	10
GHQ	—	65	—	14	—	—	—	—
GHB	1	65	—	14	—	—	14	—
GHB	2, 3	—	65	—	—	14	14	—
HGHB	1	65	—	25	—	—	14	—
GHC	1	65	—	14	—	—	14	—
GHC	2, 3	—	65	—	—	14	14	—
HGHC	1	65	—	25	—	—	14	—

#### Terminal Types

For line and load-side. Terminals are UL listed as suitable for wire type and size given below.

#### Terminal Types

Circuit Breaker Amperes	Terminal Type Material	Screw Head Type	Wire Type	AWG Wire Range	Metric Wire Range (mm <sup>2</sup> ) ⑤
<b>Standard</b>					
15–20	Clamp (plated steel)	Slotted	Cu/Al	14–10	2.5–4
25–100	Pressure (aluminum body)	Slotted	Cu/Al	10–1/0	4–50
<b>Optional—GD, GHB, GHC</b>					
15–100	Pressure (steel body)	Slotted	Cu	14–3	—

#### Notes

- ① HID suffix only applies to the GHB and GHC single-pole, 15–20 A circuit breakers.
- ② Single-pole breakers can be applied in DC systems up to 70 A.
- ③ Time constant is 8 milliseconds minimum.
- ④ Two poles of three-pole circuit breaker.
- ⑤ Not UL listed sizes.

Typical G-Frame Circuit Breaker



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**Type GD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (15–100 Amperes)**

**Product Description**

- Cable in, cable out
- Includes mounting hardware and BMHE

**Standards and Certifications**

- UL/CSA



**Product Selection**

**Type GD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units**

Maximum Continuous Ampere Rating at 40 °C	480 Vac Maximum, 250 Vdc		Includes Binding Head Screws and Clamps 10–32 x 0.312
	14 kAIC at 480 Vac	22 kAIC at 480 Vac	
	Includes Line and Load Terminals		
	Two-Pole Catalog Number	Three-Pole Catalog Number	Three-Pole Catalog Number
15	GD2015	GD3015	GD3015D
20	GD2020	GD3020	GD3020D
25	GD2025	GD3025	GD3025D
30	GD2030	GD3030	GD3030D
35	GD2035	GD3035	GD3035D
40	GD2040	GD3040	GD3040D
45	GD2045	GD3045	GD3045D
50	GD2050	GD3050	GD3050D
60	—	GD3060	GD3060D
70	—	GD3070	GD3070D
80	—	GD3080	GD3080D
90	—	GD3090	GD3090D
100	—	GD3100	GD3100D



### Type GDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40 °C	480 Vac Maximum, 250 Vdc 14 kAIC at 480 Vac Includes Line and Load Terminals	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	GDB2015	GDB3015
20	GDB2020	GDB3020
25	GDB2025	GDB3025
30	GDB2030	GDB3030
35	GDB2035	GDB3035
40	GDB2040	GDB3040
45	GDB2045	GDB3045
50	GDB2050	GDB3050
60	—	GDB3060
70	—	GDB3070
80	—	GDB3080
90	—	GDB3090
100	—	GDB3100

### Type GD Molded Case Switches

#### Type GD Molded Case Switches—Three-Pole

Maximum Continuous Ampere Rating at 40 °C	480 Vac Maximum, 250 Vdc Catalog Number (Includes Line and Load Terminals)
	60
60	GD3060KC <sup>①</sup>
100	GD3100K
100	GD3100KD <sup>②</sup>

#### Notes

<sup>①</sup> Includes line and load steel terminals.

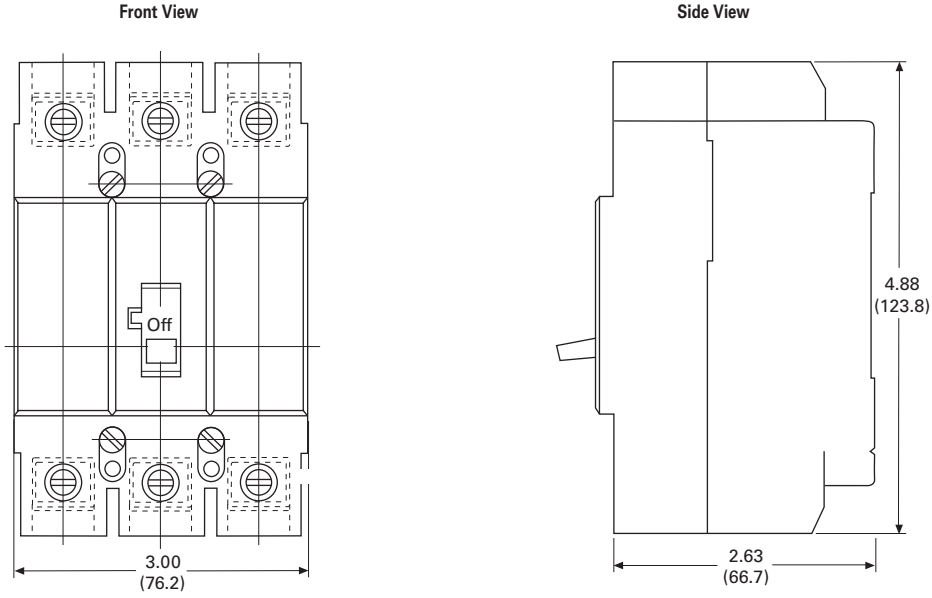
<sup>②</sup> Includes binding head screws and clamps 10–32 x 0.312.

Molded case switches may open above 1300 amperes.

**Dimensions**

Approximate Dimensions in Inches (mm)

**GD-Frame, Three-Pole**



Typical GHB

2



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### Types GHB and HGHB Bolt-On Panelboard Circuit Breakers (15–100 Amperes)

#### Standards and Certifications

These breakers meet the requirements of Federal Specification W-C-375b as follows:

- Type GHB, 120 and 240 V:
  - Single-pole: Class 11a
  - Two-, three-pole: Classes 10b, 11b, 12b, 14b, 15b
  - UL/CSA
- Type GHB, 277 and 480Y/277V:
  - Single-pole: Classes 12c, 13a
  - Two-, three-pole: Class 13b
  - Type HGHB 277V
  - Type GHQ 277V



## Product Selection

Typical GHB


**Type GHB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units** <sup>①</sup>

Continuous Ampere Rating at 40 °C	277/480 Vac Maximum, 125 Vdc Maximum <sup>②</sup>	277/480 Vac Maximum, 125/250 Vdc Maximum	277/480 Vac Maximum, 125/250 Vdc Maximum <sup>③</sup>
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
15	GHB1015 <sup>④⑤</sup>	GHB2015 <sup>④</sup>	GHB3015 <sup>④</sup>
20	GHB1020 <sup>④⑤</sup>	GHB2020 <sup>④</sup>	GHB3020 <sup>④</sup>
25	GHB1025	GHB2025	GHB3025
30	GHB1030	GHB2030	GHB3030
35	GHB1035	GHB2035	GHB3035
40	GHB1040	GHB2040	GHB3040
45	GHB1045	GHB2045	GHB3045
50	GHB1050	GHB2050	GHB3050
60	GHB1060	GHB2060	GHB3060
70	GHB1070	GHB2070	GHB3070
80	GHB1080	GHB2080	GHB3080
90	GHB1090	GHB2090	GHB3090
100	GHB1100	GHB2100	GHB3100

**Type HGHB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units**

Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc Maximum Single-Pole Catalog Number
	15
20	HGHB1020 <sup>⑥</sup>
25	HGHB1025
30	HGHB1030

**Notes**

- ① 480Y/277 V, circuit breakers (Type GHB) not suitable for three-phase delta (480 V).
- ② Single-pole breakers can be applied in DC systems from 15 through 70 amperes; 80 through 100 amperes devices are not suitable for DC application.
- ③ Use two outside poles.
- ④ Uses 0.190 (4.83) –32 screw type clamp terminals.
- ⑤ Add suffix HID for High Intensity Discharge (HID) applications. 15 and 20 ampere, single-pole are SWD rated.
- ⑥ 15 and 20 ampere, single-pole are SWD rated.

# 2.4

## Molded Case Circuit Breakers

### Series C

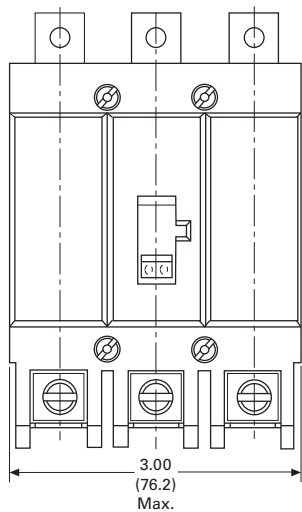
#### Dimensions

Approximate Dimensions in Inches (mm)

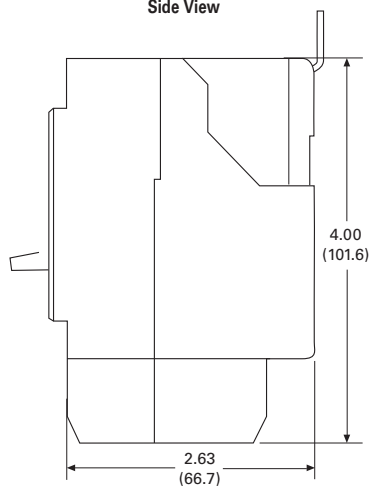
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#### GDB-Frame, Three-Pole

Front View



Side View



Single-Phase (requires two poles)



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**Type GHBGFEP Bolt-On Panelboard 30 mA Industrial Ground Fault Circuit Protectors (15–100 Amperes)**

**Product Description**

- 15–60 amperes, 277 V, 50/60 Hz
- Operational voltage 240 V to 305 V

**Standards and Certifications**

These circuit breakers meet the requirements of UL 489 and UL 1053.



**Product Selection**

**Type GHBGFEP Bolt-On Panelboard 30 mA Industrial Ground Fault Circuit Protectors with Non-Interchangeable Trip Units**

Continuous Ampere Rating at 40 °C	Single-Phase (Requires Two Poles) 277 Vac, 30 mA Catalog Number
15	GHBGFEP1015
20	GHBGFEP1020
30	GHBGFEP1030
40	GHBGFEP1040
50	GHBGFEP1050
60	GHBGFEP1060

**Technical Data and Specifications**

**Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (Symmetrical Amperes) 277 Vac (50/60 Hz)
GHBGFEP	1	14,000

# 2.4

## Molded Case Circuit Breakers

### Series C

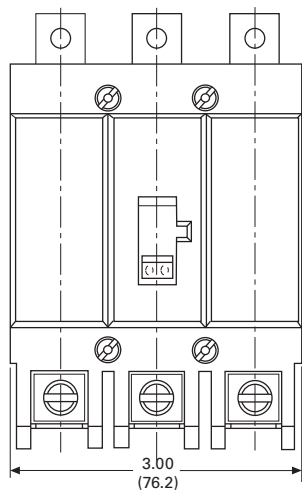
#### Dimensions

Approximate Dimensions in Inches (mm)

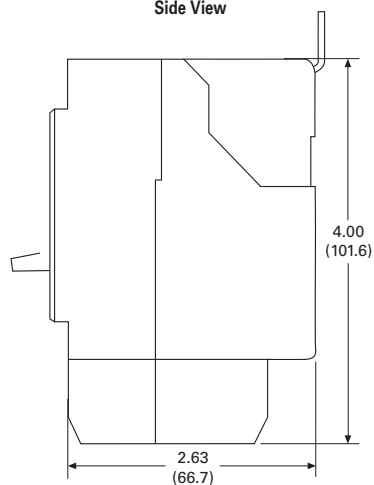
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#### GHB-Frame, Three-Pole

Front View



Side View



Typical GHC



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## Types GHC and HGHC Circuit Breakers (15–100 Amperes)

### Product Description

- 15–100 amperes
- 120, 240, 277, 480Y/277V, 50/60 Hz, 125, 125/250 Vdc
- Single-, two- and three-pole
- Cable in, cable out
- Does not include mounting hardware

### Standards and Certifications

These breakers meet the requirements of Federal Specification W-C-37b as follows:

- Type GHC, 277 and 480Y/277V:
  - Single-pole: Classes 12c, 13a
  - Two-, three-pole: Class 13b
- UL/CSA





## Product Selection

## 2

## Type GHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc Maximum <sup>①</sup>	480Y/277 Vac Maximum, 125/250 Vdc Maximum	480Y/277 Vac Maximum, 125/250 Vdc Maximum <sup>②</sup>
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
15	GHC1015 <sup>③④</sup>	GHC2015 <sup>③</sup>	GHC3015 <sup>③</sup>
20	GHC1020 <sup>③④</sup>	GHC2020 <sup>③</sup>	GHC3020 <sup>③</sup>
25	GHC1025	GHC2025	GHC3025
30	GHC1030	GHC2030	GHC3030
35	GHC1035	GHC2035	GHC3035
40	GHC1040	GHC2040	GHC3040
45	GHC1045	GHC2045	GHC3045
50	GHC1050	GHC2050	GHC3050
60	GHC1060	GHC2060	GHC3060
70	GHC1070	GHC2070	GHC3070
80	GHC1080	GHC2080	GHC3080
90	GHC1090	GHC2090	GHC3090
100	GHC1100	GHC2100	GHC3100

## Type HGHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc Maximum
	Single-Pole Catalog Number
15	HGHC1015 <sup>⑤</sup>
20	HGHC1020 <sup>⑤</sup>
25	HGHC1025
30	HGHC1030

**Notes**

- ① 15 through 70 ampere circuit breakers only.
- ② Single-pole breakers can be applied in DC systems from 15 through 70 ampere; 80 through 100 ampere devices are not suitable for DC application.
- ③ Uses 0.190–32 screw type clamp terminals.
- ④ Add suffix HID for High Intensity Discharge (HID) applications. 15 and 20 ampere, single-pole are SWD rated.
- ⑤ 15 and 20 ampere, single-pole are SWD rated.

Single-Phase (requires two-pole spaces)



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J-Frame (70–250 Amperes) . . . . .	V4-T2-257
K-Frame (70–400 Amperes) . . . . .	V4-T2-265
L-Frame (125–600 Amperes) . . . . .	V4-T2-289
M-Frame (300–800 Amperes) . . . . .	V4-T2-315
N-Frame (400–1200 Amperes) . . . . .	V4-T2-326
R-Frame (800–2500 Amperes) . . . . .	V4-T2-341
Motor Circuit Protectors (MCP) . . . . .	V4-T2-360
Motor Protection Circuit Breakers (MPCB) . . . . .	V4-T2-371
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	V4-T2-373
Current Limiting Circuit Breaker Module . . . . .	V4-T2-374
Internal Accessories . . . . .	V4-T2-377
External Accessories . . . . .	V4-T2-410

**Type GHCGFEP Cable-In/Cable-Out 30 mA Industrial Ground Fault Circuit Protectors (15–100 Amperes)**

**Product Description**

- 15–60 amperes, 277 V, 50/60 Hz
- Operational voltage 240–305 V

**Standards and Certifications**

These circuit breakers meet the requirements of UL 489 and UL 1053.



**Product Selection**

**Type GHCGFEP 30 mA Industrial Ground Fault Circuit Protectors with Non-Interchangeable Trip Units**

Continuous Ampere Rating at 40 °C	Single-Phase (Requires Two Poles) 277V, 30 mA	
		Catalog Number
15		GHCGFEP1015
20		GHCGFEP1020
30		GHCGFEP1030
40		GHCGFEP1040
50		GHCGFEP1050
60		GHCGFEP1060

**Technical Data and Specifications**

**Interrupting Capacity Ratings**

Circuit Breaker Type	Number of Poles	Interrupting Capacity (Symmetrical Amperes)
		277 Vac (50/60 Hz)
GHCGFEP	1	14,000

#### Special Purpose Circuit Breakers

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#### Contents

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Standards and Certifications . . . . .	V4-T2-221
Quick Reference . . . . .	V4-T2-222
G-Frame (15–100 Amperes) . . . . .	V4-T2-225
F-Frame (10–225 Amperes) . . . . .	V4-T2-239
J-Frame (70–250 Amperes) . . . . .	V4-T2-257
K-Frame (70–400 Amperes) . . . . .	V4-T2-265
L-Frame (125–600 Amperes) . . . . .	V4-T2-289
M-Frame (300–800 Amperes) . . . . .	V4-T2-315
N-Frame (400–1200 Amperes) . . . . .	V4-T2-326
R-Frame (800–2500 Amperes) . . . . .	V4-T2-341
Motor Circuit Protectors (MCP) . . . . .	V4-T2-360
Motor Protection Circuit Breakers (MPCB) . . . . .	V4-T2-371
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	V4-T2-373
Current Limiting Circuit Breaker Module . . . . .	V4-T2-374
Internal Accessories . . . . .	V4-T2-377
External Accessories . . . . .	V4-T2-410

### Special Purpose GHC Circuit Breakers (15–100 Amperes)

#### Product Description

Eaton’s Type GHC circuit breakers have binding head screw-type terminals on line and load side. These circuit breakers with screw-type terminals (0.190–32) will be marked “Special purpose breaker not for general use.” To order this special breaker, use the catalog number from the tables on this page.

#### Product Selection

#### Type GHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units

Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc Maximum ①	480Y/277 Vac Maximum, 125/250 Vdc Maximum	480Y/277 Vac Maximum, 125/250 Vdc Maximum ②
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
25	GHC1025D	GHC2025D	GHC3025D
30	GHC1030D	GHC2030D	GHC3030D
35	GHC1035D	GHC2035D	GHC3035D
40	GHC1040D	GHC2040D	GHC3040D
45	GHC1045D	GHC2045D	GHC3045D
50	GHC1050D	GHC2050D	GHC3050D
60	GHC1060D	GHC2060D	GHC3060D
70	GHC1070D	GHC2070D	GHC3070D
80	GHC1080D	GHC2080D	GHC3080D
90	GHC1090D	GHC2090D	GHC3090D
100	GHC1100D	GHC2100D	GHC3100D

#### Type GHB and GHC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units for HID Lighting Applications

Type	Continuous Ampere Rating at 40 °C	277 Vac Maximum Single-Pole Catalog Number
Cable-in	15	GHC1015HID
	20	GHC1020HID
Bolt-on	15	GHB1015HID
	20	GHB1020HID

#### Notes

- ① Single-pole breakers can be applied in DC systems from 15 through 70 amperes; 80 through 100 amperes devices are not suitable for DC application.
- ② Use two outside poles.

Typical F-Frame Breaker  
F-Frame Breaker with Electronic Trip Unit



## F-Frame (10–225 Amperes)

### Product Description

- All Eaton's F-Frame circuit breakers are HACR rated
- All circuit breakers 10 through 30 amperes are suitable for HID (high intensity discharge) use
- All F-Frame circuit breakers are suitable for reverse feed use

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Standards and Certifications . . . . .	<b>V4-T2-221</b>
Quick Reference . . . . .	<b>V4-T2-222</b>
G-Frame (15–100 Amperes) . . . . .	<b>V4-T2-225</b>
F-Frame (10–225 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-240</b>
Product Selection . . . . .	<b>V4-T2-242</b>
Accessories . . . . .	<b>V4-T2-253</b>
Technical Data and Specifications . . . . .	<b>V4-T2-254</b>
Dimensions and Weights . . . . .	<b>V4-T2-256</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-257</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-265</b>
L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-289</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-315</b>
N-Frame (400–1200 Amperes) . . . . .	<b>V4-T2-326</b>
R-Frame (800–2500 Amperes) . . . . .	<b>V4-T2-341</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-360</b>
Motor Protection Circuit Breakers (MPCB) . . . . .	<b>V4-T2-371</b>
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	<b>V4-T2-373</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-374</b>
Internal Accessories . . . . .	<b>V4-T2-377</b>
External Accessories . . . . .	<b>V4-T2-410</b>

# 2.4

## Molded Case Circuit Breakers

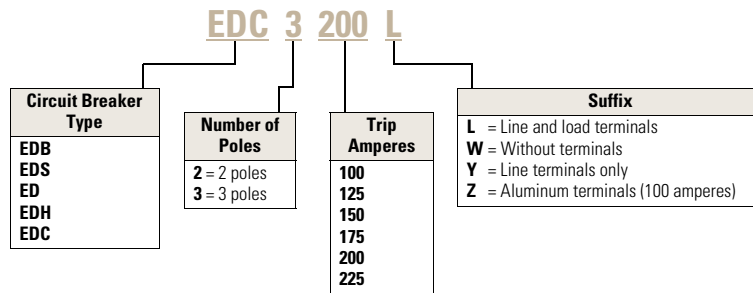
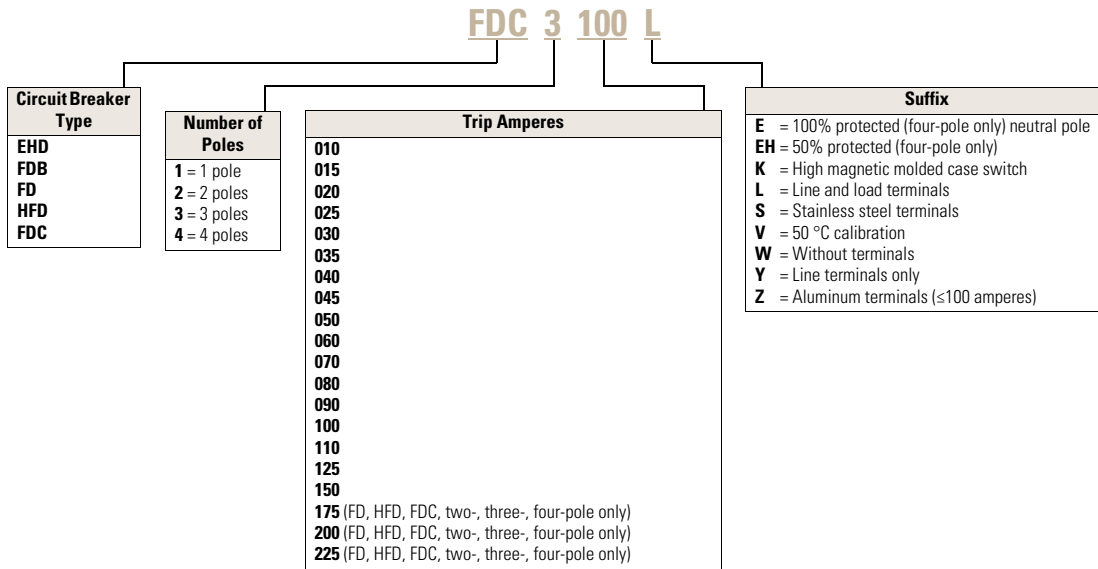
### Series C

2

#### Catalog Number Selection

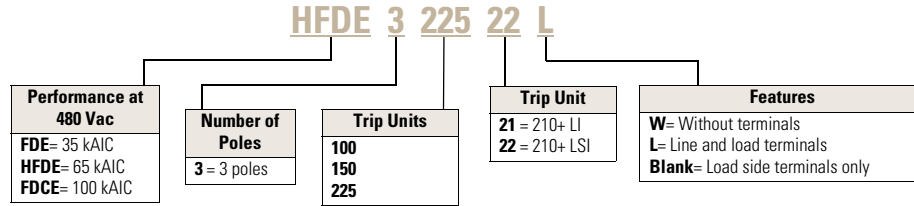
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### FD-Frame Circuit Breakers with Thermal-Magnetic Trip Unit Technology

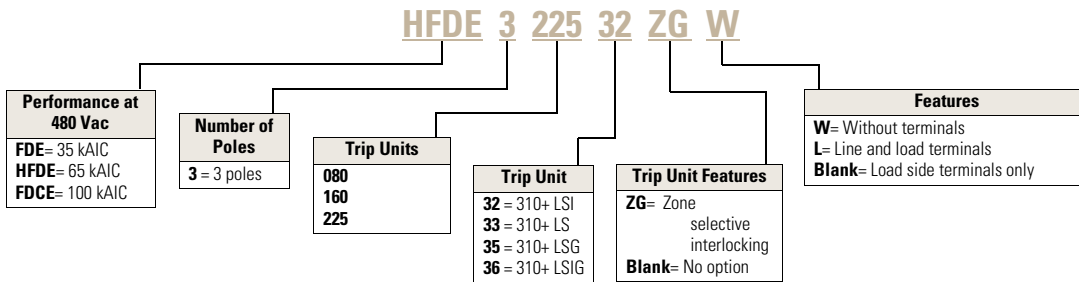


This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

### FD-Frame Circuit Breakers with 210+ Electronic Trip Unit Technology



### FD-Frame Circuit Breakers with 310+ Electronic Trip Unit Technology



## Product Selection

## 2

## Type ED Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40 °C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 65 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	ED2015	ED3015
20	ED2020	ED3020
25	ED2025	ED3025
30	ED2030	ED3030
35	ED2035	ED3035
40	ED2040	ED3040
50	ED2050	ED3050
60	ED2060	ED3060
100	ED2100	ED3100
125	ED2125	ED3125
150	ED2150	ED3150
175	ED2175	ED3175
200	ED2200	ED3200
225	ED2225	ED3225

## Type EDH Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40 °C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 100 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	—	—
20	—	—
25	—	—
30	—	—
35	—	—
40	—	—
50	—	—
60	—	—
100	EDH2100	EDH3100
125	EDH2125	EDH3125
150	EDH2150	EDH3150
175	EDH2175	EDH3175
200	EDH2200	EDH3200
225	EDH2225	EDH3225

### Type EDC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40 °C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 200 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
15	—	—
20	—	—
25	—	—
30	—	—
35	—	—
40	—	—
50	—	—
60	—	—
100	EDC2100	EDC3100
125	EDC2125	EDC3125
150	EDC2150	EDC3150
175	EDC2175	EDC3175
200	EDC2200	EDC3200
225	EDC2225	EDC3225

### Type EDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40 °C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 22 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
100	EDB2100	EDB3100
110	EDB2110	EDB3110
125	EDB2125	EDB3125
150	EDB2150	EDB3150
175	EDB2175	EDB3175
200	EDB2200	EDB3200
225	EDB2225	EDB3225



### Type EDS Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units Suitable for Reverse Feed

Maximum Continuous Ampere Rating at 40 °C	240 Vac Maximum, 125 Vdc (Includes Terminals on Load End Only) 42 kAIC at 240 Vac	
	Two-Pole Catalog Number	Three-Pole Catalog Number
100	EDS2100	EDS3100
110	EDS2110	EDS3110
125	EDS2125	EDS3125
150	EDS2150	EDS3150
175	EDS2175	EDS3175
200	EDS2200	EDS3200
225	EDS2225	EDS3225

### Type EHD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (Includes Terminals on Load End Only)

Maximum Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc 14 kAIC at 277 Vac Single-Pole	480 Vac Maximum, 250 Vdc 14 kAIC at 480 Vac Two-Pole	Three-Pole
	Catalog Number	Catalog Number	Catalog Number
10 <sup>①</sup>	EHD1010	EHD2010	EHD3010
15	EHD1015 <sup>②</sup>	EHD2015	EHD3015
20	EHD1020 <sup>②</sup>	EHD2020	EHD3020
25	EHD1025	EHD2025	EHD3025
30	EHD1030	EHD2030	EHD3030
35	EHD1035	EHD2035	EHD3035
40	EHD1040	EHD2040	EHD3040
45	EHD1045	EHD2045	EHD3045
50	EHD1050	EHD2050	EHD3050
60	EHD1060	EHD2060	EHD3060
70	EHD1070	EHD2070	EHD3070
80	EHD1080	EHD2080	EHD3080
90	EHD1090	EHD2090	EHD3090
100	EHD1100	EHD2100	EHD3100

#### Notes

- ① Not UL listed. 5 kAIC interrupting rating.
- ② UL listed for SWD applications, see NEC Article 240.83(d).

**Type FDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units  
(Includes Terminals on Load End Only)**

Maximum Continuous Ampere Rating at 40 °C	600 Vac Maximum, 250 Vdc 14 kAIC at 600 Vac		
	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
10 ①	FDB2010	FDB3010	FDB4010
15	FDB2015	FDB3015	FDB4015
20	FDB2020	FDB3020	FDB4020
25	FDB2025	FDB3025	FDB4025
30	FDB2030	FDB3030	FDB4030
35	FDB2035	FDB3035	FDB4035
40	FDB2040	FDB3040	FDB4040
45	FDB2045	FDB3045	FDB4045
50	FDB2050	FDB3050	FDB4050
60	FDB2060	FDB3060	FDB4060
70	FDB2070	FDB3070	FDB4070
80	FDB2080	FDB3080	FDB4080
90	FDB2090	FDB3090	FDB4090
100	FDB2100	FDB3100	FDB4100
110	FDB2110	FDB3110	FDB4110
125	FDB2125	FDB3125	FDB4125
150	FDB2150	FDB3150	FDB4150

**Note**

① Not UL listed. 5 kAIC interrupting rating.

**Type FD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units  
(Includes Terminals on Load End Only)**

2

Maximum Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc 35 kAIC at 277 Vac	600 Vac Maximum, 250 Vdc 35 kAIC at 480 Vac		
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
10 ①	FD1010	—	—	—
15	FD1015 ②	FD2015	FD3015	FD4015
20	FD1020 ②	FD2020	FD3020	FD4020
25	FD1025	FD2025	FD3025	FD4025
30	FD1030	FD2030	FD3030	FD4030
35	FD1035	FD2035	FD3035	FD4035
40	FD1040	FD2040	FD3040	FD4040
45	FD1045	FD2045	FD3045	FD4045
50	FD1050	FD2050	FD3050	FD4050
60	FD1060	FD2060	FD3060	FD4060
70	FD1070	FD2070	FD3070	FD4070
80	FD1080	FD2080	FD3080	FD4080
90	FD1090	FD2090	FD3090	FD4090
100	FD1100	FD2100	FD3100	FD4100
110	FD1110	FD2110	FD3110	FD4110
125	FD1125	FD2125	FD3125	FD4125
150	FD1150	FD2150	FD3150	FD4150
175	—	FD2175	FD3175	FD4175
200	—	FD2200	FD3200	FD4200
225	—	FD2225	FD3225	FD4225

**Notes**

① Not UL listed. 5 kAIC interrupting rating.

② UL listed for SWD applications, see NEC Article 240.83(d).

**Type HFD Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units  
(Includes Terminals on Load End Only)**

Maximum Continuous Ampere Rating at 40 °C	277 Vac Maximum, 125 Vdc 65 kAIC at 277 Vac	600 Vac Maximum, 250 Vdc 65 kAIC at 480 Vac		
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
15	HFD1015 ①	HFD2015	HFD3015	HFD4015
20	HFD1020 ①	HFD2020	HFD3020	HFD4020
25	HFD1025	HFD2025	HFD3025	HFD4025
30	HFD1030	HFD2030	HFD3030	HFD4030
35	HFD1035	HFD2035	HFD3035	HFD4035
40	HFD1040	HFD2040	HFD3040	HFD4040
45	HFD1045	HFD2045	HFD3045	HFD4045
50	HFD1050	HFD2050	HFD3050	HFD4050
60	HFD1060	HFD2060	HFD3060	HFD4060
70	HFD1070	HFD2070	HFD3070	HFD4070
80	HFD1080	HFD2080	HFD3080	HFD4080
90	HFD1090	HFD2090	HFD3090	HFD4090
100	HFD1100	HFD2100	HFD3100	HFD4100
110	HFD1110	HFD2110	HFD3110	HFD4110
125	HFD1125	HFD2125	HFD3125	HFD4125
150	HFD1150	HFD2150	HFD3150	HFD4150
175	—	HFD2175	HFD3175	HFD4175
200	—	HFD2200	HFD3200	HFD4200
225	—	HFD2225	HFD3225	HFD4225

**Note**

① UL listed for SWD applications, see NEC Article 240.83(d).

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## Molded Case Circuit Breakers

### Series C

#### Type FDC Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units (Includes Terminals on Load End Only)

2

Maximum Continuous Ampere Rating at 40 °C	600 Vac Maximum, 250 Vdc 100 kAIC at 480 Vac		
	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
15	FDC2015	FDC3015	FDC4015
20	FDC2020	FDC3020	FDC4020
25	FDC2025	FDC3025	FDC4025
30	FDC2030	FDC3030	FDC4030
35	FDC2035	FDC3035	FDC4035
40	FDC2040	FDC3040	FDC4040
45	FDC2045	FDC3045	FDC4045
50	FDC2050	FDC3050	FDC4050
60	FDC2060	FDC3060	FDC4060
70	FDC2070	FDC3070	FDC4070
80	FDC2080	FDC3080	FDC4080
90	FDC2090	FDC3090	FDC4090
100	FDC2100	FDC3100	FDC4100
110	FDC2110	FDC3110	FDC4110
125	FDC2125	FDC3125	FDC4125
150	FDC215	FDC3150	FDC4150
175	FDC2175	FDC3175	FDC4175
200	FDC2200	FDC3200	FDC4200
225	FDC2225	FDC3225	FDC4225

**Types FDE, HFDE and FDCE 310+ Electronic Circuit Breakers with Non-Interchangeable Trip Units**See 310+ adjustability specifications on **Page V4-T2-255**.

Maximum Ampere Rating	Digitrip RMS 310+ Trip Unit Only		LSG Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	LSIG Independently Adjustable Short Time Pickup and Ground Fault Protection	Neutral CT for LSG and LSIG Catalog Number
	Standard LS Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp Catalog Number	Optional LSI Independently Adjustable Short Time Pickup and Delay			
<b>35 kAIC at 480 Vac / 18 kAIC at 600 Vac</b>					
80	FDE308033	FDE308032	FDE308035	FDE308036	CTF080
160	FDE316033	FDE316032	FDE316035	FDE316036	CTF160
225	FDE322533	FDE322532	FDE322535	FDE322536	CTF225
<b>65 kAIC at 480 Vac / 25 kAIC at 600 Vac</b>					
80	HFDE308033	HFDE308032	HFDE308035	HFDE308036	CTF080
160	HFDE316033	HFDE316032	HFDE316035	HFDE316036	CTF160
225	HFDE322533	HFDE322532	HFDE322535	HFDE322536	CTF225
<b>100 kAIC at 480 Vac / 25 kAIC at 600 Vac</b>					
80	FDCE308033	FDCE308032	FDCE308035	FDCE308036	CTF080
160	FDCE316033	FDCE316032	FDCE316035	FDCE316036	CTF160
225	FDCE322533	FDCE322532	FDCE322535	FDCE322536	CTF225

**Types FDE, HFDE, and FDCE 210+ Electronic Circuit Breakers with Non-Interchangeable Trip Units**

Maximum Ampere Rating	Digitrip RMS 210+ Trip Unit Only	
	Standard LI Adjustable Instantaneous Catalog Number	Optional LSI Adjustable Short Time Pickup and Delay Catalog Number
<b>35 kAIC at 480 Vac / 18 kAIC at 600 Vac</b>		
100	FDE310021	FDE310022
150	FDE315021	①
225	FDE322521	FDE322522
<b>65 kAIC at 480 Vac / 25 kAIC at 600 Vac</b>		
100	HFDE310021	HFDE310022
150	HFDE315021	①
225	HFDE322521	HFDE322522

**210+ Trip Electronic Trip Units Amperage Settings**

Circuit Breaker Type	Frame	Ratings
FDE, HFDE	225	100, 110, 125, 150, 175, 200, 225
FDE, HFDE	150	70, 80, 90, 100, 110, 125, 150
FDE, HFDE	100	40, 50, 60, 70, 80, 90, 100

**FDE 310+ Electronic Breaker with Zone Selective Interlocking**

Ampere Rating	LSI w/ZSI Catalog Number	LSIG w/ZSI Catalog Number
<b>35 kAIC at 480 Vac / 18 kAIC at 600 Vac</b>		
80	FDE308032ZG	FDE308036ZG
160	FDE316032ZG	FDE316036ZG
225	FDE322532ZG	FDE322536ZG
<b>65 kAIC at 480 Vac / 25 kAIC at 600 Vac</b>		
80	HFDE308032ZG	HFDE308036ZG
160	HFDE316032ZG	HFDE316036ZG
225	HFDE322532ZG	HFDE322536ZG
<b>100 kAIC at 480 Vac / 25 kAIC at 600 Vac</b>		
80	FDCE308032ZG	FDCE308036ZG
160	FDCE316032ZG	FDCE316036ZG
225	FDCE322532ZG	FDCE322536ZG

**Digitrip 310+ Electronic Trip Units Amperage Settings**

Circuit Breaker Type	Frame	Ratings
FDE, HFDE, FDCE	225	100, 110, 125, 150, 160, 175, 200, 225
FDE, HFDE, FDCE	160	60, 70, 80, 90, 100, 125, 150, 160
FDE, HFDE, FDCE	80	15, 20, 30, 40, 50, 60, 70, 80

**Note**

① For 210+ trip unit, 150 A not available with LSI trip unit; entire range is covered by 100 A and 225 A frames.

**Molded Case Switches**

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

**Molded Case Switches**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker with Load Side Terminals Only		
	480 Vac Maximum, 250 Vdc Catalog Number	600 Vac Maximum, 250 Vdc Catalog Number	
<b>Two-Pole</b>			
100	EHD2100K	FD2100K	HFD2100K
150	—	FD2150K	HFD2150K
225	—	FD2225K	HFD2225K
<b>Three-Pole</b>			
100	EHD3100K	FD3100K	HFD3100K
150	—	FD3150K	HFD3150K
225	—	FD3225K	HFD3225K
<b>Four-Pole</b>			
100	—	FD4100K	HFD4100K
150	—	FD4150K	HFD4150K
225	—	FD4225K	HFD4225K

**Note**

Molded case switches will open above 1800 amperes.

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

Line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. Except as noted, terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B. Unless otherwise specified, F-Frame circuit breakers are factory equipped with load terminals only.

### Ordering Information

F-Frame circuit breakers and molded case switches have load terminals only as standard equipment. When standard line-end terminals (same as standard load-end terminals) are required, add Suffix **L** to the circuit breaker catalog number. When non-standard or optional line and/or load terminals are required, order by style number. Specify if factory installation is required.

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range	Metric Wire Range mm <sup>2</sup>	Package of Three Terminals Catalog Number
<b>Standard Pressure Type Terminals</b>					
20 (EHD)	Steel	Cu/Al	14–10	2.5–4	<b>3T20FB</b> ①
100	Steel	Cu/Al	14–1/0	2.5–50	<b>3T100FB</b>
225	Aluminum	Cu/Al	4–4/0	25–95	<b>3TA225FD</b>
<b>Optional Pressure Terminals</b>					
50	Aluminum	Cu/Al	14–4	2.5–25	<b>3TA50FB</b> ①
100	Aluminum	Cu/Al	14–1/0	2.5–50	<b>3TA100FD</b>
200	Stainless steel	Cu	4–4/0	25–95	<b>3T150FB</b>
225	Copper	Cu	4–4/0	25–95	<b>3T225FD</b>
225	Aluminum	Cu/Al	6–300 kcmil	16–150	<b>3TA225FDK3</b> ②
225	Aluminum	Cu/Al	6–300 kcmil	16–150	<b>3TA225FDK</b> ②③

#### Notes

① Not for use with ED, EDH, EDC breakers.

② Includes terminal shield kit. Adds approximately 3 inches (76.2) to breaker height. Available for use on three-pole breaker only.

③ Replacement use only.



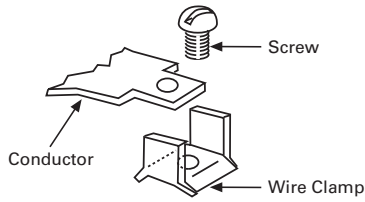
# 2.4

## Molded Case Circuit Breakers

### Series C

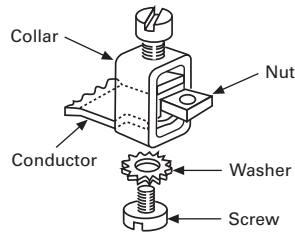
#### Line and Load Terminals

2



**3T20FB**

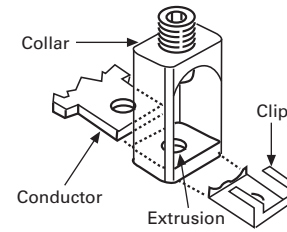
Assemble wire clamp to bottom of conductor as shown.



**3T100FB, 3T150FB**

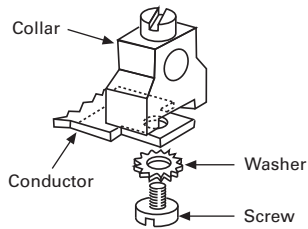
Insert collar enclosing conductor as shown. Locate nut on top of conductor and tighten securely with screw and washer.

**Caution:** Collar must surround conductor.



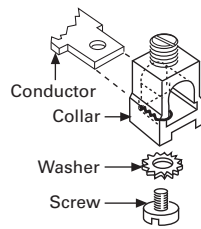
**3TA225FD**

Insert collar enclosing conductor and center on extrusion on collar. Install clip with legs on top of conductor and snap end around bottom of collar.



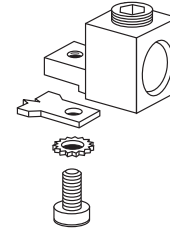
**3TA50FB**

Assemble collar on top of conductor as shown. Tighten securely with screw and washer.



**3TA100FD**

Collar slides onto conductor and is held in position by a screw and lockwasher.



**3TA225FDK3 (Up to 150 mm<sup>2</sup>)**

Assemble collar on top of conductor as shown. Tighten securely with screw and washer. Terminal shield must be used with this collar.

**Note:** For 185 mm<sup>2</sup>, use 3TA225FDK1. Same illustration for 3TA225FDK

## Accessories

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### Allowable Accessory Combinations

#### FD Frame Accessories

Description	Reference Page	Single-Pole			Two-Pole		Three-Pole <sup>①</sup>			Four-Pole			
		Center	Left	Right	Left	Right	Left	Center	Right	Left	Center	Right	Neutral
<b>Internal Accessories (Only one internal accessory per pole)</b>													
Alarm lockout switch (make only)	V4-T2-379	■											
Alarm lockout (Make/Break)	V4-T2-379		■		□		□		■				
Alarm lockout (2Make/2Break)	V4-T2-379		■		□		□		■				
Auxiliary switch (1A, 1B)	V4-T2-381		■		■		■		■				■
Auxiliary switch (2A, 2B)	V4-T2-381		■		■		■		■				■
Auxiliary switch and alarm switch combination	V4-T2-383		■		□		□		■				
Shunt trip—standard	V4-T2-385		■		■		■		■				■
Shunt trip—low energy	V4-T2-389		■		■		■		■				
Undervoltage release mechanism	V4-T2-391		■		■		■		■				
<b>External Accessories</b>													
End cap kit	V4-T2-414		●	●	●	●	●	●	●	●	●	●	●
Keeper nut	V4-T2-414	●	●	●	●	●	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-415	●	●	●	●	●	●	●	●	●	●	●	●
Multewire connectors	V4-T2-416	●	●	●	●	●	●	●	●	●	●	●	●
Rear fed terminals	V4-T2-416	●	●	●	●	●	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-416	●	●	●	●	●	●	●	●	●	●	●	●
Terminal shields	V4-T2-418	●	●	●	●	●	●	●	●	●	●	●	●
Terminal end covers	V4-T2-419				●	●	●						
Interphase barriers	V4-T2-419		●	●	●	●	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-420	■	■				■			■			
Snap-on padlockable handle lock hasp	V4-T2-420	■	■				■			■			
Padlockable handle lock hasp	V4-T2-421			■			□		□			□	
Cylinder lock	V4-T2-421						■						
Key interlock kit	V4-T2-422			■			□		□			□	
Sliding bar interlock—requires two breakers	V4-T2-423						●	●	●				
Walking beam interlock—requires two breakers	V4-T2-423						●	●	●	●	●	●	●
Electrical (solenoid and motor) operators	V4-T2-424						●	●	●	●	●	●	●
Plug-in adapters	V4-T2-425		●	●	●	●	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-427	●	●	●	●	●	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-428	●	●	●	●	●	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-508						●	●	●				
LFD current limiter	V4-T2-430						●	●	●				
IQ Energy Sentinel	V4-T2-430		●	●	●	●	●						
Cause of trip display	V4-T2-431						●		●				
Remote mount cause of trip display	V4-T2-431						●		●				
Cause of trip LED	V4-T2-431						●		●				
<b>Modifications (Refer to Eaton)</b>													
Special calibration	—	●	●	●	●	●	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Note

- ① Internal accessories are listed with Underwriters Laboratories (UL) for factory installation. They are not listed with UL for field installation.

## Technical Data and Specifications

2

### UL 489 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)				Volts DC <sup>①</sup>	
		Volts AC (50/60 Hz)				125	250 <sup>②③</sup>
		240	277	480	600		
EDB	2, 3	22	—	—	—	10	—
EDS	2, 3	42	—	—	—	10	—
ED	2, 3	65	—	—	—	10	—
EDH	2, 3	100	—	—	—	10	—
EDC	2, 3	200	—	—	—	10	—
EHD	1	—	4	—	—	10	—
	2, 3	18	—	14	—	—	10
FDB	2, 3, 4	18	—	14	14	—	10
FD	1	—	35	—	—	10	—
	2, 3, 4	65	—	35	18	—	10
FDE <sup>④</sup>	3	65	—	35	18	—	—
HFD	1	—	65	—	—	10	—
	2, 3, 4	100	—	65	25	—	22
HFDE <sup>④</sup>	3	100	—	65	25	—	—
FDC <sup>⑤</sup>	2, 3, 4	200	—	100	35	—	22
FDCE <sup>④⑤⑥</sup>	3	200	—	100	25	—	—

### IEC 157-1 (P1) Interrupting Capacity Ratings (P1)

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)				Volts DC <sup>①</sup>	
		Volts AC (50/60 Hz)				125	250 <sup>②③</sup>
		220, 240	380, 415	440	500		
EDB	2, 3	22	—	—	—	10	—
EDS	2, 3	42	—	—	—	10	—
ED	2, 3	65	—	—	—	10	—
EDH	2, 3	100	—	—	—	10	—
EDC	2, 3	200	—	—	—	10	—
EHD	1	—	14	—	—	10	—
	2, 3	18	—	14	—	—	10
FDB	2, 3, 4	18	14	14	14	—	10
FD	1	35	—	—	—	10	—
	2, 3, 4	65	35	35	18	—	10
HFD	1	65	—	—	—	10	—
	2, 3, 4	100	65	65	25	—	22
FDC	2, 3, 4	200	100	100	35	—	22

### 210+ and 310+ Electronic Trip Unit Accessories

Description	210+	310+	Catalog number
Electronic portable test kit	■	■	MTST230V
Trip unit tamper protection wire seal	■	■	5108A03H01
External neutral sensor (80 A) <sup>⑦</sup>		■	CTF080
External neutral sensor (160 A) <sup>⑦</sup>		■	CTF160
External neutral sensor (225 A) <sup>⑦</sup>		■	CTF225
Compact external neutral sensor (80 A) <sup>⑦</sup>		■	CTFD080
Compact external neutral sensor (160 A) <sup>⑦</sup>		■	CTFD160
Compact external neutral sensor (225 A) <sup>⑦</sup>		■	CTFD225
Breaker-mount cause-of-trip indication		■	TRIP-LED
Breaker-mount ammeter module		■	DIGIVIEW
Remote-mount ammeter module		■	DIGIEWR06

### UL 489 Current Limiting Data

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
FDC	240 V/200 kA	41.4	1.41
FDC	480 V/100 kA	38.9	2.50
FDC	600 V/35 kA	29.0	3.00

#### Notes

- ① DC ratings apply to substantially non-inductive circuits.
- ② Two-pole circuit breaker, or two poles of three-pole circuit breaker.
- ③ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ④ Electronics available on three-pole only, no DC rating for FDE, HFDE, FDCE.
- ⑤ Current limiting.
- ⑥ Check with Eaton for availability.
- ⑦ Neutral sensor required for four-wire systems if neutral protection is desired; sold separately.

## FDE 210+ and 310+ Specifications

Description	Digitrip RMS 210+	Digitrip RMS 310+
<b>Breaker type</b>		
Frame designation	FD	FD
Frames available	100 A, 150 A, 225 A	80 A, 160 A, 225 A
Continuous current range (A)	40–225 A	15–225 A
Ground fault pickup (A)	N/A	16–225 A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100	35, 65, 100
<b>Protection</b>		
Ordering options	LI, LSI	LS, LSI, LSG, LSIG
Arclash Reduction Maintenance System™ (or Maintenance Mode)	No	No
Interchangeable trip unit	No	No
High load alarm (suffix B20)	No	No
Ground fault alarm with trip (suffix B21)	No	No
Ground fault alarm, no trip (suffix B22)	No	No
Zone selective interlocking (suffix ZG)	No	LSI, LSIG
Cause of trip indication	No	Yes
Thru-cover accessories	No	No
Test kit available	Yes	Yes

## FDE 210+ Adjustability Specifications

210+ settings		FD Frame		
		100 A	150 A	225 A
$I_r$ = continuous current or long delay pickup (amperes) (all 210+)	$I_r$			
	A	40	70	100
	B	50	80	110
	C	60	90	125
	D	70	100	150
	E	80	110	175
	F	90	125	200
	G (= $I_n$ )	100	150	225
	$I_i$ (x $I_n$ ) = Instantaneous pickup (210+ LI version)	$I_i$	100	150
J–2x		200	300	450
K–2.5x		250	375	565
L–3x		300	450	675
M–3.5x		350	525	790
N–4x		400	600	900
O–5x		500	750	1125
P–6x		600	900	1350
Q–8x		800	1200	1800
R–10x		1000	1500	2250
S–12x ①		1200	1800	2400
Fixed instantaneous override (all 210+)		2400	2400	2400
"Isd (x Ir) / tsd = SD profile" ② (210+ LSI version)	$I_{sd} / t_{sd}$	100	150	225
	J	2x / 150	N/A	2x / 150
	K	2x / 300	N/A	2x / 300
	L	2x / $I^2t$	N/A	2x / $I^2t$
	M	4x / Inst	N/A	4x / Inst
	N	4x / 150	N/A	4x / 150
	O	4x / $I^2t$	N/A	4x / $I^2t$
	P	6x / Inst	N/A	6x / Inst
	Q	6x / 300	N/A	6x / 300
	R	10x / 150	N/A	10x / 150
	S	10x / 300	N/A	10x / 300

## FDE 310+ Adjustability Specifications

310+ Settings		FD Frame		
		80 A	160 A	225 A
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$			
	A	15	60	100
	B	20	70	110
	C	30	80	125
	D	40	90	150
	E	50	100	160
	F	60	125	175
	G	70	150	200
	H (= $I_n$ )	80	160	225
$t_r$ = long delay time (seconds) (All 310+)	Position 1	2	2	2
	Position 2	4	4	4
	Position 3	7	7	7
	Position 4	10	10	10
	Position 5	12	12	12
	Position 6	15	15	15
	Position 7	20	20	20
	Position 8	24	24	24
	$I_{sd}$ (x $I_r$ ) = short delay pickup (All 310+)	Position 1	2x	2x
Position 2		3x	3x	3x
Position 3		4x	4x	4x
Position 4		5x	5x	5x
Position 5		6x	6x	6x
Position 6		7x	7x	7x
Position 7		8x	8x	8x
Position 8		10x	10x	10x
Position 9		12x	12x	12x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS, LSG)	Fixed	67 at10x	67 at10x	67 at10x
	Position 1	Inst	Inst	Inst
	Position 2	120	120	120
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG)	Position 3	300	300	300
	Position 1	16	32	45
	Position 2	24	48	67
$I_g$ = ground fault pickup (amperes) (LSG, LSIG)	Position 3	32	64	90
	Position 4	48	96	135
	Position 5	64	128	180
	Position 6	80	160	225
	Position 1	Inst	Inst	Inst
	Position 2	120	120	120
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG)	Position 3	300	300	300
	Independently Adjustable Instantaneous ( $I_i$ ) setting ①			
Maintenance Mode pickup ( $2.5 \times I_n$ ) (amperes) ②				

## Notes

- ① Not available for FD. Independently adjustable  $I_i$  setting available in LG, NG and RG ALSI and ALSIG trip units.
- ② Maintenance Mode not available for FD frames. It is available for KD, LD, MDL, LG, NG and RG.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

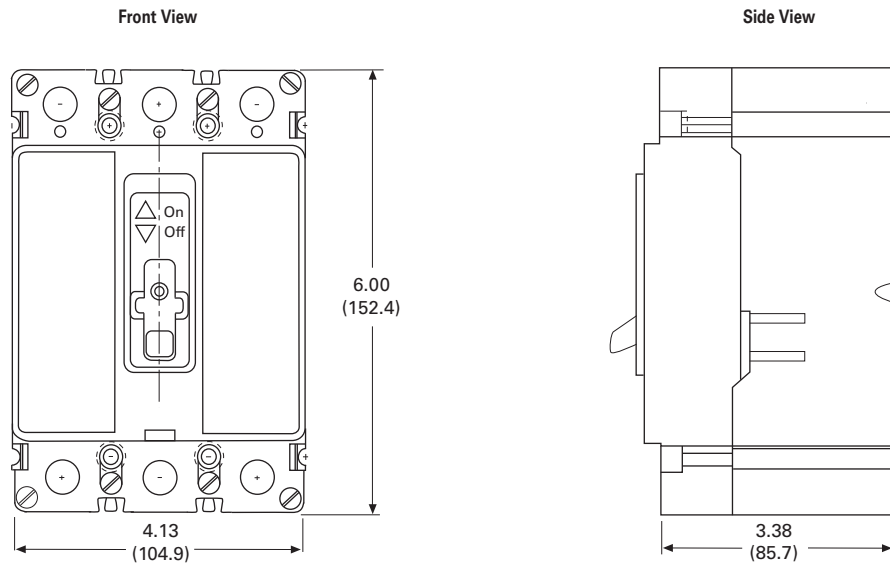
Approximate Dimensions in Inches (mm)

2

#### FD Frame

Number of Poles	Width	Height	Depth
1	1.38 (35.1)	6.00 (152.4)	3.38 (86.0)
2	2.75 (70.0)	6.00 (152.4)	3.38 (86.0)
3	4.13 (105.0)	6.00 (152.4)	3.38 (86.0)
4	5.50 (139.7)	6.00 (152.4)	3.38 (86.0)

#### FD Frame, Three-Pole



Approximate Shipping Weight Lbs (kg)

#### FD Frame

Breaker Type	Number of Poles			
	1	2	3	4
ED, EDB, EDS, EDH, EDC	—	3 (1.4)	4.5 (2.0)	—
EHD, FDB, FD, HFD, FDC	2 (0.9)	3 (1.4)	4.5 (2.0)	6 (2.7)
FDE, HFDE, FDCE	—	—	4.5 (2.0)	—

Typical J-Frame Breaker



## Contents

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External Accessories . . . . .	V4-T2-410

## J-Frame (70–250 Amperes)

### Product Description

- All Eaton's J-Frame circuit breakers are HACR rated
- J-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- J-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

# 2.4

## Molded Case Circuit Breakers

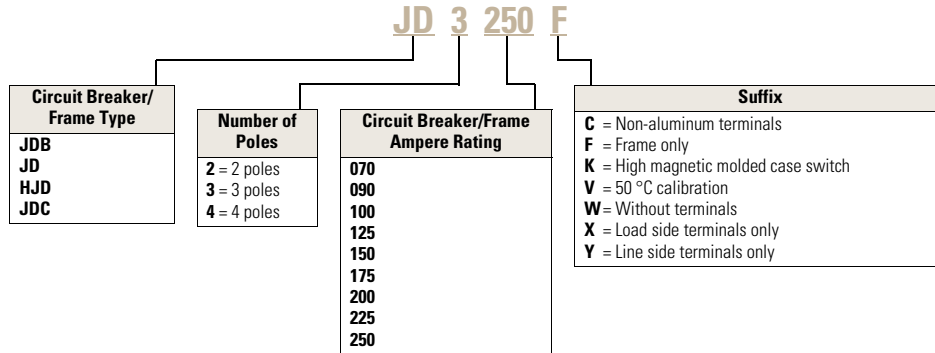
### Series C

#### Catalog Number Selection

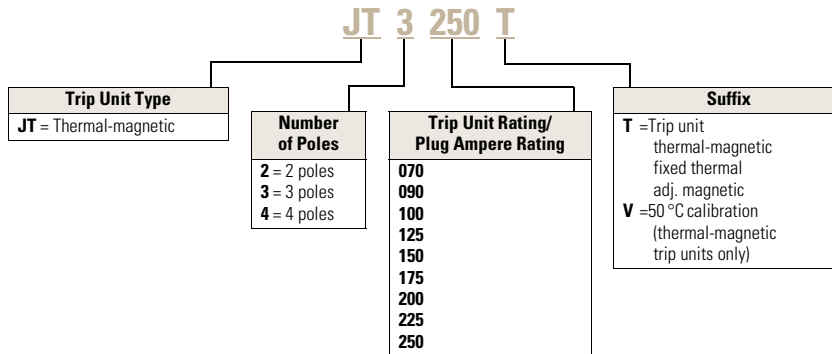
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### Circuit Breaker/Frame



#### Trip Unit



## Product Selection

## Types JD, HJD and JDC Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40 °C	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Thermal-Magnetic Trip Unit Only ①	Standard Terminals Only
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	See Page V4-T2-261 for Optional Terminals  Catalog Number
<b>Two-Pole</b>					
70	JD2070	HJD2070	JDC2070	JT2070T	TA250KB ②
90	JD2090	HJD2090	JDC2090	JT2090T	
100	JD2100	HJD2100	JDC2100	JT2100T	
125	JD2125	HJD2125	JDC2125	JT2125T	
150	JD2150	HJD2150	JDC2150	JT2150T	
175	JD2175	HJD2175	JDC2175	JT2175T	
200	JD2200	HJD2200	JDC2200	JT2200T	
225	JD2225	HJD2225	JDC2225	JT2225T	
250	JD2250	HJD2250	JDC2250	JT2250T	
<b>Three-Pole</b>					
70	JD3070	HJD3070	JDC3070	JT3070T	TA250KB ②
90	JD3090	HJD3090	JDC3090	JT3090T	
100	JD3100	HJD3100	JDC3100	JT3100T	
125	JD3125	HJD3125	JDC3125	JT3125T	
150	JD3150	HJD3150	JDC3150	JT3150T	
175	JD3175	HJD3175	JDC3175	JT3175T	
200	JD3200	HJD3200	JDC3200	JT3200T	
225	JD3225	HJD3225	JDC3225	JT3225T	
250	JD3250	HJD3250	JDC3250	JT3250T	
<b>Four-Pole ③④</b>					
125	JD4125	HJD4125	JDC4125	JT3125T	TA250KB ②
150	JD4150	HJD4150	JDC4150	JT3150T	
175	JD4175	HJD4175	JDC4175	JT3175T	
200	JD4200	HJD4200	JDC4200	JT3200T	
225	JD4225	HJD4225	JDC4225	JT3225T	
250	JD4250	HJD4250	JDC4250	JT3250T	

## Notes

- ① Magnetic trip adjustable 5–10 times continuous ampere rating.
- ② Individually packed.
- ③ Fully rated neutral pole with no protection.
- ④ Neutral is in right pole.



#### Types JD, HJD and JDC Thermal-Magnetic Circuit Breakers – Frame Only

Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Catalog Number
<b>Two-Pole</b>		
JD2250F	HJD2250F	JDC2250F
<b>Three-Pole</b>		
JD3250F	HJD3250F	JDC3250F
<b>Four-Pole</b>		
JD4250F	HJD4250F	JDC4250F

#### Type JDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Thermal-Magnetic Trip Units Suitable for Reverse Feed Application

Maximum Continuous Ampere Rating at 40 °C	600 Vac Rated, 250 Vdc Complete Circuit Breaker	
	Without Line and Load Terminals Catalog Number	With Standard Line and Load Terminals Only Catalog Number
<b>Two-Pole</b>		
70	JDB2070W	JDB2070
90	JDB2090W	JDB2090
100	JDB2100W	JDB2100
125	JDB2125W	JDB2125
150	JDB2150W	JDB2150
175	JDB2175W	JDB2175
200	JDB2200W	JDB2200
225	JDB2225W	JDB2225
250	JDB2250W	JDB2250
<b>Three-Pole</b>		
70	JDB3070W	JDB3070
90	JDB3090W	JDB3090
100	JDB3100W	JDB3100
125	JDB3125W	JDB3125
150	JDB3150W	JDB3150
175	JDB3175W	JDB3175
200	JDB3200W	JDB3200
225	JDB3225W	JDB3225
250	JDB3250W	JDB3250

#### Molded Case Switches

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

#### Molded Case Switches

Maximum Continuous Ampere Rating at 40 °C	600 Vac Maximum, 250 Vdc Complete Circuit Breaker Only Without Line and Load Terminals		Standard Terminals Only
	Catalog Number	Suitable for Reverse Feed Use Catalog Number	See Page V4-T2-261 for Optional Terminals Catalog Number
<b>Two-Pole</b>			
250	JD2250KW	JDB2250KW	TA250KB ①
	HJD2250KW	HJDB2250KW	—
<b>Three-Pole</b>			
250	JD3250KW	JDB3250KW	TA250KB ①
	HJD3250KW	HJDB3250KW	—
<b>Four-Pole</b>			
250	JD4250KW	JDB4250KW	TA250KB ①
	HJD4250KW	HJDB4250KW	—

#### Notes

① Individually packed.

Molded case switches may open above 2500 amperes.

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

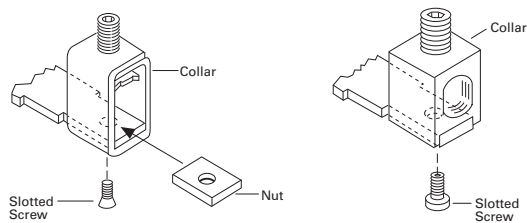
Eaton's line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B and CSA Standard C22.2 No. 65, or Electrical Bulletin 1165.

Unless otherwise specified, J-Frame circuit breaker line and load terminals are shipped separately for field installation.

The bottom of the standard TA250KB terminal contains a recess that is positioned over the J-Frame circuit breaker terminal conductor.

### Ordering Information

J-Frame circuit breakers use Cu/Al terminals as standard. When optional copper-only terminals are required, order by catalog number. Specify if factory installation is required.



T250KB Terminal

TA250KB Terminal (Standard)

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ No. Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>					
250	Aluminum	Cu/Al	4–350 kcmil	25–185	TA250KB
<b>Optional Cu Pressure Terminals</b>					
250	Stainless Steel	Cu	4–350 kcmil	25–185	T250KB

## Accessories

2

**Allowable Accessory Combinations**

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

## JD Frame Accessories

Description	Reference Page	Two-, Three-Pole			Four-Pole			Neutral
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>								
Alarm lockout (Make/Break)	V4-T2-379	☐		☐	☐		☐	
Auxiliary switch (1A, 1B)	V4-T2-381	■		■	■		■	
Auxiliary switch (2A, 2B)	V4-T2-381	■		■	■		■	
Auxiliary switch and alarm switch combination	V4-T2-383	☐		☐	☐		☐	
Shunt trip—standard	V4-T2-386	■		■	■		■	
Shunt trip—low energy	V4-T2-389	■		■	■		■	
Undervoltage release mechanism	V4-T2-393	■		■	■		■	
<b>External Accessories</b>								
End cap kit	V4-T2-414	●	●	●	●	●	●	●
Plug nut	V4-T2-415	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-415	●	●	●	●	●	●	●
Multiwire connectors	V4-T2-416	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-417	●	●	●	●	●	●	●
Terminal shields	V4-T2-418	●	●	●	●	●	●	●
Interphase barriers	V4-T2-419	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-420		■			■		
Padlockable handle block	V4-T2-420		■			■		
Padlockable handle lock hasp	V4-T2-421	☐		☐	☐		☐	
Cylinder lock	V4-T2-421	☐		☐				
Key interlock kit	V4-T2-422	☐		☐	☐		☐	
Sliding bar interlock—requires two breakers	V4-T2-423	●	●	●				
Electrical (solenoid) operator	V4-T2-425	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-425	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-427	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-428	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-508	●	●	●	●	●	●	●
Handle extension	V4-T2-522	●	●	●	●	●	●	●
IQ Energy Sentinel	V4-T2-430	●	●	●				
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- ☐ May be mounted on left or right pole—not both
- Accessory available/modification available

## Technical Data and Specifications

### UL 489 Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)				
		Volts AC (50/60 Hz)			Volts DC	
		240	480	600	125	250 <sup>①②</sup>
JDB	2, 3	65	35	18	—	10
JD	2, 3, 4	65	35	18	—	10
HJD	2, 3, 4	100	65	25	—	22
JDC <sup>③</sup>	2, 3, 4	200	100	35	—	22

### IEC 157-1 (P1) Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)					
		Volts AC (50/60 Hz)			Volts DC		
		240	380	415	600	125	250 <sup>①②</sup>
JD	2, 3, 4	65	35	35	—	—	10
HJD	2, 3, 4	100	65	65	—	—	22
JDC	2, 3, 4	200	100	100	—	—	22

### UL 489 Current Limiting Data

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
JDC	240 V/200 kA	42.6	1.36
JDC	480 V/100 kA	40.0	3.00
JDC	600 V/35 kA	31.9	3.10

#### Notes

- ① Two-pole circuit breaker or two outside poles of three-pole circuit breaker.
- ② Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ③ Current limiting.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

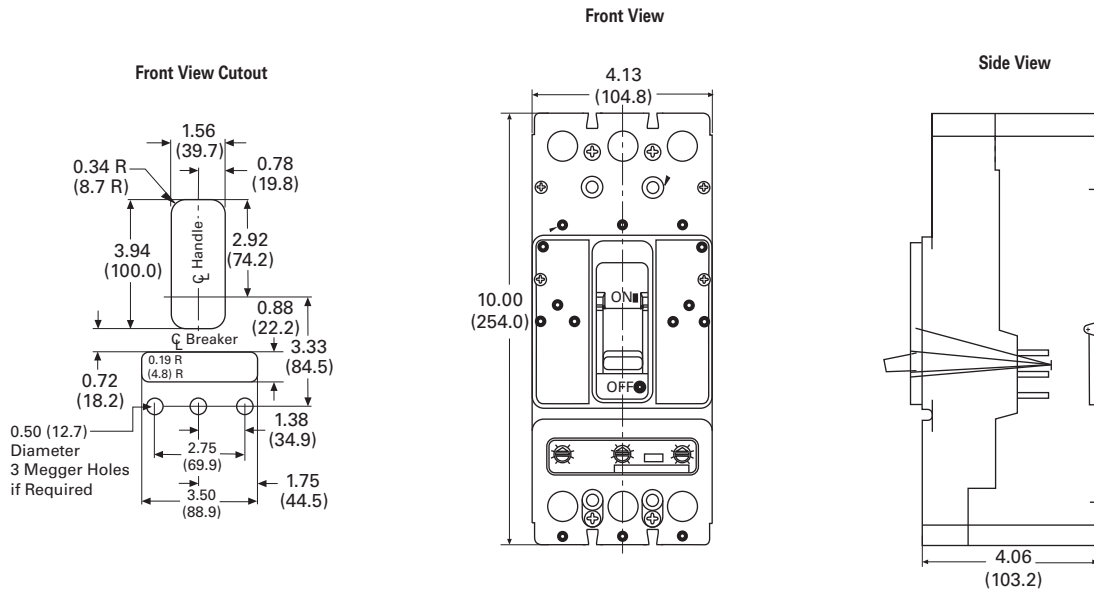
Approximate Dimensions in Inches (mm)

2

#### JD Frame

Number of Poles	Width	Height	Depth
2, 3	4.13 (105.0)	10.00 (254.0)	4.06 (104.1)
4	5.50 (139.7)	10.00 (254.0)	4.06 (104.1)

#### JD-Frame, Three-Pole



Approximate Shipping Weight in Lbs (kg)

#### JD Frame

Breaker Type	Complete Breaker			Frame Only			Trip Unit		
	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole
JDB	11.25 (5.1)	12.50 (5.7)	—	—	—	—	—	—	—
JD	11.25 (5.1)	12.50 (5.7)	13.25 (6.0)	9.00 (4.1)	10.00 (4.5)	10.50 (4.8)	2.00 (0.9)	2.00 (0.9)	2.25 (1.0)
HJD	11.25 (5.1)	12.50 (5.7)	13.25 (6.0)	9.00 (4.1)	10.00 (4.5)	10.50 (4.8)	2.00 (0.9)	2.00 (0.9)	2.25 (1.0)
JDC	12.25 (5.6)	13.50 (6.1)	14.25 (6.5)	10.00 (4.5)	11.00 (5.0)	11.50 (5.2)	2.00 (0.9)	2.00 (0.9)	2.25 (1.0)

Typical K-Frame Circuit Breaker



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External Accessories . . . . .	V4-T2-410

## K-Frame (70–400 Amperes)

### Product Description

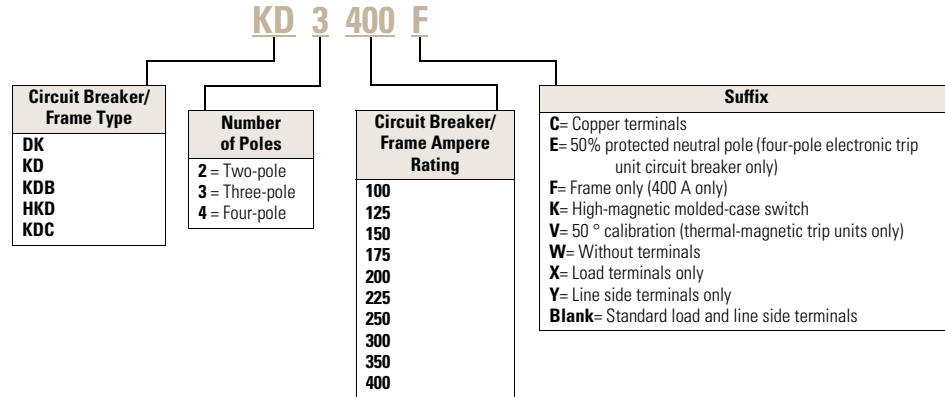
- All Eaton K-Frame circuit breakers are HACR rated
- K-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- K-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

### Catalog Number Selection

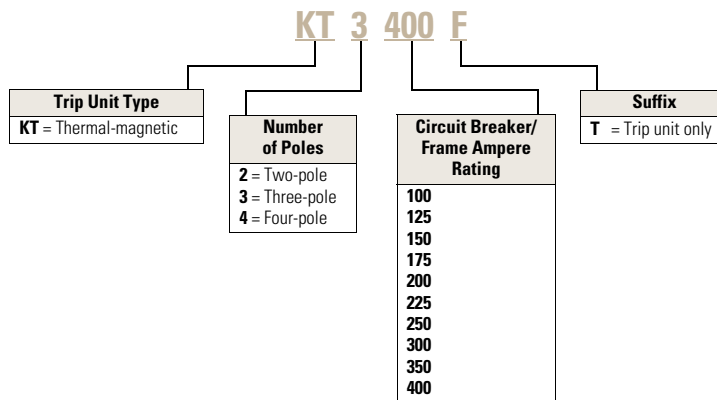
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### K-Frame with Thermal-Magnetic Trip Unit Technology

#### Thermal-Magnetic Breakers and Frames ①



#### Thermal-Magnetic Trip Unit ①



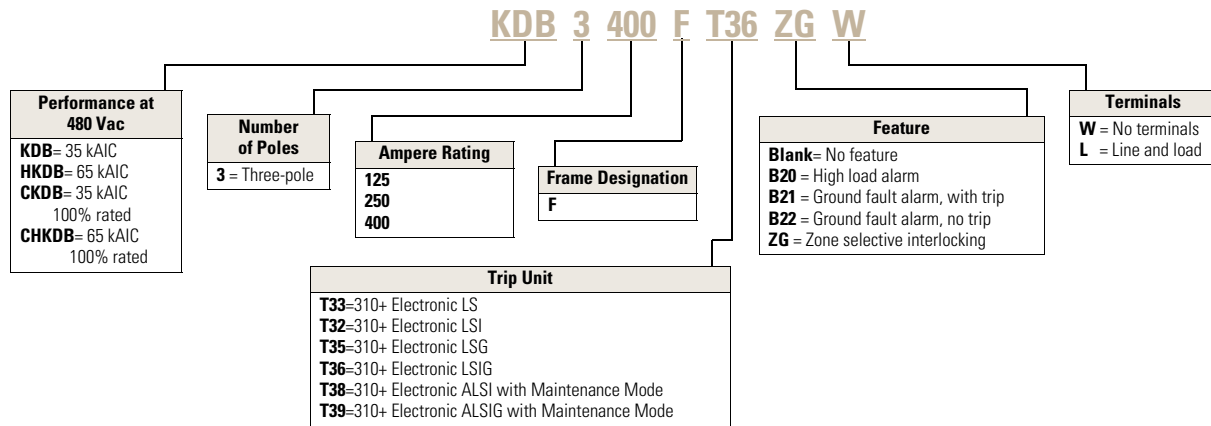
#### Notes

① Frames are the same for thermal-magnetic or 310+ electronic trip units, e.g., **KD3400F** or **HKD3400F**.

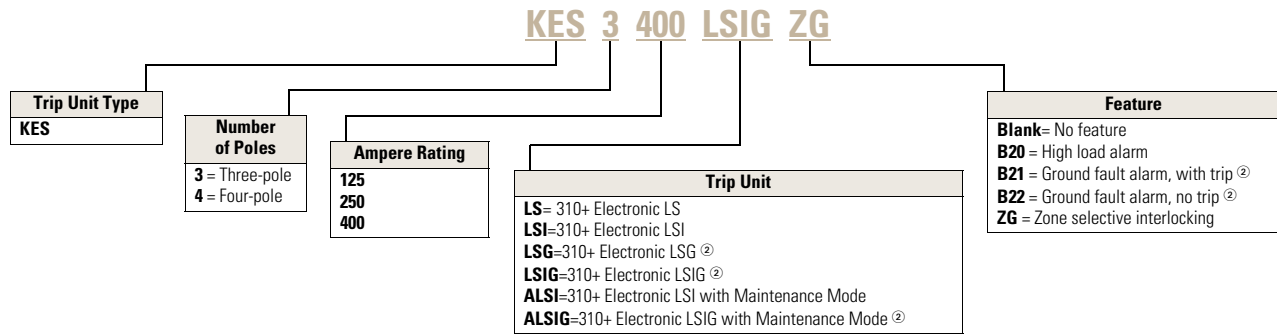
Ampere rating available with electronic trip unit only.

**K-Frame with 310+ Electronic Trip Unit Technology** ①

**310+ Circuit Breakers** ②

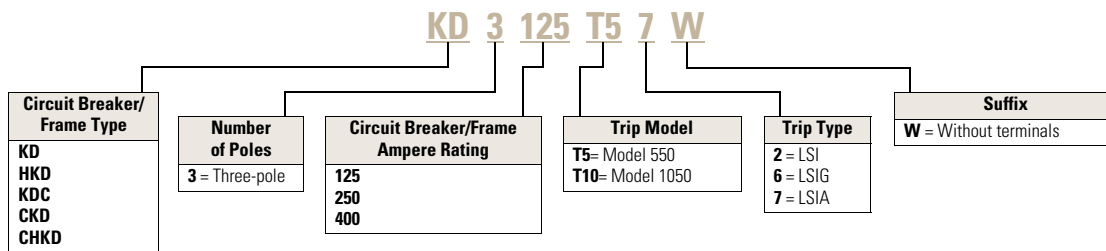


**310+ Electronic Trip Units** ③



**K-Frame with OPTIM Trip Unit Technology**

**OPTIM Circuit Breakers**



**Notes**

- ① Cannot combine 'B2X' suffixes with 'B2X' suffixes.
- ② Not available in four-pole configurations.
- ③ Frames are the same for thermal-magnetic or 310+ electronic trip units, e.g., **KD3400F**, **HKD3400F**, etc.



### Product Selection

2

#### Types KD, HKD and KDC Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40 °C	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals ①	Thermal-Magnetic Trip Unit Only ①	Standard Terminals Only
	Catalog Number	Catalog Number	Catalog Number	For Use with Standard or High or Ultra High Interrupting Frames Catalog Number	See Page V4-T2-283 for Optional Terminals Catalog Number
<b>Two-Pole</b>					
100	KD2100	HKD2100	KDC2100	KT2100T	TA300K ②
125	KD2125	HKD2125	KDC2125	KT2125T	TA300K ②
150	KD2150	HKD2150	KDC2150	KT2150T	TA300K ②
175	KD2175	HKD2175	KDC2175	KT2175T	TA300K ②
200	KD2200	HKD2200	KDC2200	KT2200T	TA300K ②
225	KD2225	HKD2225	KDC2225	KT2225T	TA300K ②
250	KD2250	HKD2250	KDC2250	KT2250T	TA350K ②
300	KD2300	HKD2300	KDC2300	KT2300T	TA350K ②
350	KD2350	HKD2350	KDC2350	KT2350T	TA350K ②
400	KD2400	HKD2400	KDC2400	KT2400T	2TA400K ③
<b>Three-Pole</b>					
100	KD3100	HKD3100	KDC3100	KT3100T	TA300K ②
125	KD3125	HKD3125	KDC3125	KT3125T	TA300K ②
150	KD3150	HKD3150	KDC3150	KT3150T	TA300K ②
175	KD3175	HKD3175	KDC3175	KT3175T	TA300K ②
200	KD3200	HKD3200	KDC3200	KT3200T	TA300K ②
225	KD3225	HKD3225	KDC3225	KT3225T	TA300K ②
250	KD3250	HKD3250	KDC3250	KT3250T	TA350K ②
300	KD3300	HKD3300	KDC3300	KT3300T	TA350K ②
350	KD3350	HKD3350	KDC3350	KT3350T	TA350K ②
400	KD3400	HKD3400	KDC3400	KT3400T	3TA400K ③
<b>Four-Pole</b>					
100	KD4100	HKD4100	KDC4100	KT3100T	TA300K ②
125	KD4125	HKD4125	KDC4125	KT3125T	TA300K ②
175	KD4175	HKD4175	KDC4175	KT3175T	TA300K ②
200	KD4200	HKD4200	KDC4200	KT3200T	TA300K ②
225	KD4225	HKD4225	KDC4225	KT3225T	TA300K ②
250	KD4250	HKD4250	KDC4250	KT3250T	TA350K ②
300	KD4300	HKD4300	KDC4300	KT3300T	TA350K ②
350	KD4350	HKD4350	KDC4350	KT3350T	TA350K ②
400	KD4400	HKD4400	KDC4400	KT3400T	4TA400K ③

#### Notes

- ① Magnetic trip adjustable 5–10 times continuous ampere rating.
- ② Individually packed.
- ③ 2TA400K, 3TA400K and 4TA400K terminal kits contain one terminal for each pole and one terminal cover.

## Types KD, HKD and KDC Thermal-Magnetic Circuit Breakers—Frame Only

Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac
Catalog Number	Catalog Number	Catalog Number
<b>Two-Pole</b>		
KD2400F	HKD2400F	KDC2400F
<b>Three-Pole</b>		
KD3400F	HKD3400F	KDC3400F
<b>Four-Pole</b>		
KD4400F	HKD4400F	KDC4400F

## Types KD, HKD and KDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units

Order as individual components: breaker frame, trip unit and terminals. See 310+ adjustability specifications on [Page V4-T2-286](#).

## Types KD, HKD and KDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units—Three-Pole

Max. Cont. Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip RMS 310+ Trip Unit Only <sup>①</sup>				Neutral CT for LSG and LSIG <sup>②③</sup>	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Standard LS	Options LSI	LSG	LSIG		
125	KD3400F	HKD3400F	KDC3400F	KES3125LS	KES3125LSI	KES3125LSG	KES3125LSIG	LGFC125	See <a href="#">Page V4-T2-283</a>
250	KD3400F	HKD3400F	KDC3400F	KES3250LS	KES3250LSI	KES3250LSG	KES3250LSIG	LGFC250	
400	KD3400F	HKD3400F	KDC3400F	KES3400LS	KES3400LSI	KES3400LSG	KES3400LSIG	LGFC400	

Types KD, HKD and KDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units—Four-Pole <sup>④⑤</sup>

Max. Cont. Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip RMS 310+ Trip Unit Only <sup>①</sup>				Neutral CT for LSG and LSIG <sup>②③</sup>	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Standard LS	Options LSI	LSG	LSIG		
125	KD4400F	HKD4400F	KDC4400F	KES4125LS	KES4125LSI	—	—	—	See <a href="#">Page V4-T2-283</a>
250	KD4400F	HKD4400F	KDC4400F	KES4250LS	KES4250LSI	—	—	—	
400	KD4400F	HKD4400F	KDC4400F	KES4400LS	KES4400LSI	—	—	—	

## Notes

- ① For AC use only.
- ② Required for four-wire systems if neutral protection is desired.
- ③ Included with LSG and LSIG trip units.
- ④ Trip unit includes protected neutral pole. Use corresponding three-pole trip unit if protected neutral pole is not required.
- ⑤ Fully rated neutral pole protection is standard. For 50% rated protection on neutral pole, add Suffix E to four-pole trip unit catalog number.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### Type KDB with Digitrip 310+ Non-Interchangeable Trip Unit Suitable for Reverse Feed

See 310+ adjustability specifications on [Page V4-T2-286](#).

2

Factory Assembled Circuit Breaker Consisting of Frame and Trip Unit Less Terminals <sup>①</sup>							
Maximum Continuous Ampere Rating at 40 °C	Number of Poles	Standard LS	Optional LSI	LSG	LSIG	Neutral CT for LSG and LSIG <sup>②③</sup>	Terminal Information
		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp Catalog Number	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
125	3	KDB3125FT33W	KDB3125FT32W	KDB3125FT35W	KDB3125FT36W	LGFACT125	See Page V4-T2-284
250	3	KDB3250FT33W	KDB3250FT32W	KDB3250FT35W	KDB3250FT36W	LGFACT250	
400	3	KDB3400FT33W	KDB3400FT32W	KDB3400FT35W	KDB3400FT36W	LGFACT400	

#### Type HKDB with Digitrip 310+ Non-Interchangeable Trip Unit Suitable for Reverse Feed

See 310+ adjustability specifications on [Page V4-T2-286](#).

Factory Assembled Circuit Breaker Consisting of Frame and Trip Unit Less Terminals <sup>①</sup>							
Maximum Continuous Ampere Rating at 40 °C	Number of Poles	Standard LS	Optional LSI	LSG	LSIG	Neutral CT for LSG and LSIG <sup>②③</sup>	Terminal Information
		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp Catalog Number	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
125	3	HKDB3125FT33W	HKDB3125FT32W	HKDB3125FT35W	HKDB3125FT36W	LGFACT125	See Page V4-T2-284
250	3	HKDB3250FT33W	HKDB3250FT32W	HKDB3250FT35W	HKDB3250FT36W	LGFACT250	
400	3	HKDB3400FT33W	HKDB3400FT32W	HKDB3400FT35W	HKDB3400FT36W	LGFACT400	

#### 100% Rated Types CKD and CHKD Electronic Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at the 75 °C ampacity. All 100% rated circuit breakers have electronic trip units.

#### 100% Rated Types CKD and CHKD Electronic Circuit Breakers—Three-Pole

See 310+ adjustability specifications on [Page V4-T2-286](#).

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip RMS 310+ Trip Unit Only		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Delay and Ground Fault Protection	Neutral CT for LSG and LSIG <sup>②③</sup>	Terminal Information
	Standard Interrupting Capacity	High Interrupting Capacity	Standard	Options				
	35 kAIC at 480 Vac Catalog Number	65 kAIC at 480 Vac	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay				
125	CKD3400F	CHKD3400F	KES3125LS	KES3125LSI	KES3125LSG	KES3125LSIG	LGFACT125	See Page V4-T2-283
250	CKD3400F	CHKD3400F	KES3250LS	KES3250LSI	KES3250LSG	KES3250LSIG	LGFACT250	
400	CKD3400F	CHKD3400F	KES3400LS	KES3400LSI	KES3400LSG	KES3400LSIG	LGFACT400	

#### Notes

- ① For AC use only.
- ② Required for four-wire systems if neutral protection is desired.
- ③ Included with LSG and LSIG trip units.

**Types DK and KDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units**

Suitable for reverse feed application.

**Types DK and KDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units**

Maximum Continuous Ampere Rating at 40 °C	240 Vac Rated, 250 Vdc			600 Vac Rated, 250 Vdc	
	Complete Circuit Breaker Without Line and Load Terminals Catalog Number	With Line Terminals Only Catalog Number	With Standard Line and Load Terminals Only Catalog Number	Complete Circuit Breaker Without Line and Load Terminals Catalog Number	With Standard Line and Load Terminals Catalog Number
<b>Two-Pole</b>					
100	—	—	—	KDB2100W	KDB2100
125	—	—	—	KDB2125W	KDB2125
150	—	—	—	KDB2150W	KDB2150
175	—	—	—	KDB2175W	KDB2175
200	—	—	—	KDB2200W	KDB2200
225	—	—	—	KDB2225W	KDB2225
250	DK2250W	DK2250Y	DK2250	KDB2250W	KDB2250
300	DK2300W	DK2300Y	DK2300	KDB2300W	KDB2300
350	DK2350W	DK2350Y	DK2350	KDB2350W	KDB2350
400	DK2400W	DK2400Y	DK2400	KDB2400W	KDB2400
<b>Three-Pole</b>					
100	—	—	—	KDB3100W	KDB3100
125	—	—	—	KDB3125W	KDB3125
150	—	—	—	KDB3150W	KDB3150
175	—	—	—	KDB3175W	KDB3175
200	—	—	—	KDB3200W	KDB3200
225	—	—	—	KDB3225W	KDB3225
250	DK3250W	DK3250Y	DK3250	KDB3250W	KDB3250
300	DK3300W	DK3300Y	DK3300	KDB3300W	KDB3300
350	DK3350W	DK3350Y	DK3350	KDB3350W	KDB3350
400	DK3400W	DK3400Y	DK3400	KDB3400W	KDB3400

#### Molded Case Switches

Eaton’s molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

#### Molded Case Switches

Maximum Continuous Ampere Rating at 40 °C	240 Vac Maximum, 250 Vdc	600 Vac Maximum, 250 Vdc	600 Vac Maximum, 250 Vdc
	Complete Circuit Breaker with Standard Line and Load Terminals Catalog Number	Complete Circuit Breaker with Standard Line and Load Terminals Catalog Number	Complete Circuit Breaker with Standard Line and Load Terminals. Suitable for Reverse Feed Use Catalog Number
<b>Two-Pole</b>			
400	DK2400K	KD2400K	KDB2400K
	—	HKD2400K	HKDB2400K
<b>Three-Pole</b>			
400	DK3400K	KD3400K	KDB3400K
	—	HKD3400K	HKDB3400K
<b>Four-Pole</b>			
400	—	KD4400K	KDB4400K
	—	HKD4400K	HKDB4400K

**Note**

Molded case switches may open above 4000 amperes.

**Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>					
125	KD3125T52W	KD3125T56W	KD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	KD3250T52W	KD3250T56W	KD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
				250	ORPK025A250
400	KD3400T52W	KD3400T56W	KD3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) OPTIM 550 <sup>②</sup>				
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	HKD3125T52W	HKD3125T56W	HKD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	HKD3250T52W	HKD3250T56W	HKD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
				250	ORPK025A250
400	HKD3400T52W	HKD3400T56W	HKD3400T57W	200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

## Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) OPTIM 550 ②				
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>					
125	KDC3125T52W	KDC3125T56W	KDC3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	KDC3250T52W	KDC3250T56W	KDC3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
400	KDC3400T52W	KDC3400T56W	KDC3400T57W	250	ORPK025A250
				200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.



# 2.4

## Molded Case Circuit Breakers

### Series C

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

2

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>				
125	KD3125T106W	KD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	KD3250T106W	KD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
			250	ORPK025A250
400	KD3400T106W	KD3400T107W	200	ORPK40A200
			225	ORPK40A22
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

#### Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Factory sealed.

## Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	HKD3125T106W	HKD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	HKD3250T106W	HKD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
400	HKD3400T106W	HKD3400T107W	250	ORPK025A250
			200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.  
 ② Factory sealed.

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>L – Adjustable Long Delay Pickup (I<sub>r</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) ①</b> <b>S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)</b> <b>I – Adjustable Instantaneous Pickup</b> <b>G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)</b> <b>A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)</b> OPTIM 1050 ②			
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>				
125	KDC3125T106W	KDC3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	KDC3250T106W	KDC3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
400	KDC3400T106W	KDC3400T107W	250	ORPK025A250
			200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Factory sealed.

**100% Rated Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**100% Rated Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug****Circuit Breaker Frame Only****L** – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) <sup>①</sup>**S** – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)**I** – Adjustable Instantaneous Pickup**G** – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)**A** – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)**OPTIM 550** <sup>②</sup>**Digitrip OPTIM Rating Plug Only**Maximum  
Continuous  
Ampere  
Rating  
at 40 °C**LSI**Catalog  
Number**LSIG**Catalog  
Number**LSIA**Catalog  
NumberAmpere  
Rating**Fixed Rating Plug**Catalog  
Number**Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac**

Maximum Continuous Ampere Rating at 40 °C	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
125	<b>CKD3125T52W</b>	<b>CKD3125T56W</b>	<b>CKD3125T57W</b>	70	<b>ORPK125A70</b>
				90	<b>ORPK125A90</b>
				100	<b>ORPK125A100</b>
				110	<b>ORPK125A110</b>
				125	<b>ORPK125A125</b>
250	<b>CKD3250T52W</b>	<b>CKD3250T56W</b>	<b>CKD3250T57W</b>	125	<b>ORPK025A125</b>
				150	<b>ORPK025A150</b>
				175	<b>ORPK025A175</b>
				200	<b>ORPK025A200</b>
				225	<b>ORPK025A225</b>
				250	<b>ORPK025A250</b>
400	<b>CKD3400T52W</b>	<b>CKD3400T56W</b>	<b>CKD3400T57W</b>	200	<b>ORPK40A200</b>
				225	<b>ORPK40A225</b>
				250	<b>ORPK40A250</b>
				300	<b>ORPK40A300</b>
				350	<b>ORPK40A350</b>
				400	<b>ORPK40A400</b>

**Notes**<sup>①</sup> Long delay  $I^4t$  response selection limits short delay time to flat response.<sup>②</sup> Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number (refer to **Page V4-T2-397**).

#### 100% Rated Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) OPTIM 550 <sup>②</sup>				
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	CHKD3125T52W	CHKD3125T56W	CHKD3125T57W	70	ORPK125A70
				90	ORPK125A90
				100	ORPK125A100
				110	ORPK125A110
				125	ORPK125A125
250	CHKD3250T52W	CHKD3250T56W	CHKD3250T57W	125	ORPK025A125
				150	ORPK025A150
				175	ORPK025A175
				200	ORPK025A200
				225	ORPK025A225
400	CHKD3400T52W	CHKD3400T56W	CHKD3400T57W	250	ORPK025A250
				200	ORPK40A200
				225	ORPK40A225
				250	ORPK40A250
				300	ORPK40A300
				350	ORPK40A350
				400	ORPK40A400

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

**100% Rated Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

**100% Rated Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>				
125	CKD3125T106W	CKD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	CKD3250T106W	CKD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
400	CKD3400T106W	CKD3400T107W	250	ORPK025A250
			200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Factory sealed.

#### 100% Rated Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>L – Adjustable Long Delay Pickup (<math>I_L</math>) with Adjustable Long Delay Time (<math>I^2t</math> or <math>I^4t</math> Response) ①</b> <b>S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (<math>I^2t</math> or Flat Response)</b> <b>I – Adjustable Instantaneous Pickup</b> <b>G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (<math>I^2t</math> or Flat Response)</b> <b>A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (<math>I^2t</math> or Flat Response)</b> <b>OPTIM 1050 ②</b>			
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	CHKD3125T106W	CHKD3125T107W	70	ORPK125A70
			90	ORPK125A90
			100	ORPK125A100
			110	ORPK125A110
			125	ORPK125A125
250	CHKD3250T106W	CHKD3250T107W	125	ORPK025A125
			150	ORPK025A150
			175	ORPK025A175
			200	ORPK025A200
			225	ORPK025A225
400	CHKD3400T106W	CHKD3400T107W	250	ORPK025A250
			200	ORPK40A200
			225	ORPK40A225
			250	ORPK40A250
			300	ORPK40A300
			350	ORPK40A350
			400	ORPK40A400

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Factory sealed.

**Accessories Selection Guide and Ordering Guide**

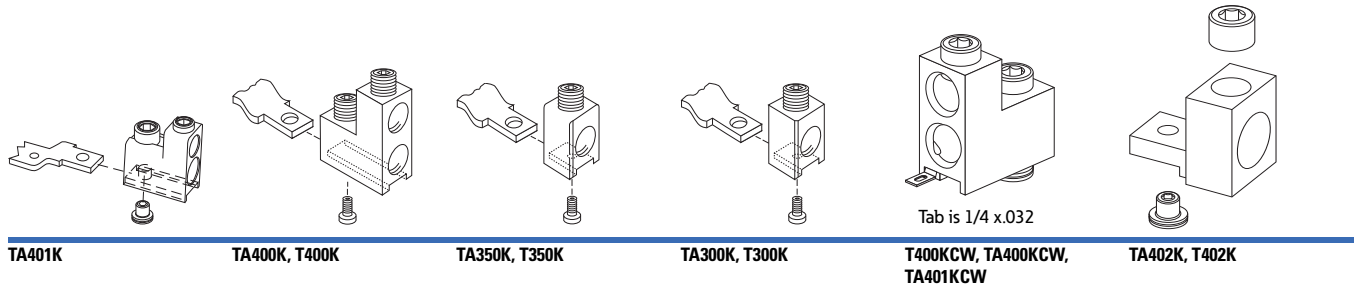
**Line and Load Terminals**

Eaton’s line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards

UL 486A and UL 486B and CSA Standard C22.2 No. 65, or Electrical Bulletin 1165. Unless otherwise specified, K-Frame circuit breaker line and load terminals are shipped separately for field installation.

**Ordering Information**

K-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.



**Line and Load Terminals**

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/No. Conductors	Metric Wire Range mm <sup>2</sup>	Terminal	Terminals with Control Wire Termination
					Catalog Number	Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>						
225	Aluminum	Cu/Al	3–350 (1)	35–185	<b>TA300K</b> ①	—
400	Aluminum	Cu/Al	250–500 (1)	120–240	<b>TA350K</b> ①	—
400	Aluminum	Cu/Al	3/0–250 (2)	95–120	<b>2TA400K</b> ②③	<b>2TA400KCW</b> ②③
400	Aluminum	Cu/Al	3/0–250 (2)	95–120	<b>3TA400K</b> ②④	<b>3TA400KCW</b> ②④
400	Aluminum	Cu/Al	3/0–250 (2)	95–120	<b>4TA400K</b> ⑤⑥	<b>4TA400KCW</b> ⑤⑥
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>						
225	Copper	Cu	3–350 (1)	35–185	<b>T300K</b> ①	—
400	Copper	Cu	250–500 (1)	120–240	<b>T350K</b> ①	—
400	Copper	Cu	3/0–250 (2)	95–120	<b>2T400K</b> ③	<b>2T400KCW</b> ②③
					<b>3T400K</b> ④	<b>3T400KCW</b> ②④
					<b>4T400K</b> ⑤	<b>4T400KCW</b> ⑤⑥
400	Aluminum	Cu/Al	2/0–250 (2) or 2/0–500 (1)	70–120	<b>2TA401K</b> ②③	<b>2TA401KCW</b> ②③
				70–240	<b>3TA401K</b> ②④	<b>3TA401KCW</b> ②④
				70–240	<b>4TA401K</b> ⑤⑥	<b>4TA401KCW</b> ⑤⑥
400	Aluminum	Cu/Al	500–750 (1)	300–400	<b>2TA402K</b> ②③	—
					<b>3TA402K</b> ②④	—
					<b>4TA402K</b> ⑤⑥	—
400	Copper	Cu	500–750 (1)	—	<b>2T402K</b> ②③	—
					<b>3T402K</b> ②④	—
					<b>4T402K</b> ⑤⑥	—

**Notes**

- ① Individually packed.
- ② Terminal kits contain one terminal for each pole and one terminal cover.
- ③ Two-pole kit.
- ④ Three-pole kit.
- ⑤ Four-pole kit.
- ⑥ Terminal kits contain one terminal for each pole and three interphase barriers.



### Accessories

#### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

#### KD Frame Accessories

Description	Reference Page	Two-Pole ①		Three-Pole			Four-Pole			Neutral
		Left	Right	Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>										
Alarm lockout (Make/Break)	V4-T2-380		■	□		□		■		
Alarm lockout (2Make/2Break)	V4-T2-380			□		□		■		
Auxiliary switch (1A, 1B)	V4-T2-382		■	■		■		■		■
Auxiliary switch (2A, 2B)	V4-T2-382			■		■		■		■
Auxiliary switch (3A, 3B)	V4-T2-382			■		■		■		■
Auxiliary switch and alarm switch combination	V4-T2-383		□			□		□		□
Shunt trip—standard ②	V4-T2-386		■	■		■		■		■
Shunt trip—low energy ②	V4-T2-389			■		■		■		
Undervoltage release mechanism ②	V4-T2-394		■	■		■		■		
PowerNet or zone interlock kit (OPTIM 550)	V4-T2-397					■				
<b>External Accessories</b>										
End cap kit	V4-T2-414	●	●	●	●	●	●	●	●	●
Keeper nut	V4-T2-414	●	●	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-415	●	●	●	●	●	●	●	●	●
Terminal adapter	V4-T2-415	●	●	●	●	●	●	●	●	●
Multiwire connectors	V4-T2-416	●	●	●	●	●	●	●	●	●
Rear fed terminals	V4-T2-416	●	●	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-417	●	●	●	●	●	●	●	●	●
Terminal shields	V4-T2-419	●	●	●	●	●	●	●	●	●
Interphase barriers	V4-T2-419	●	●	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-420	■			■			■		
Padlockable handle block	V4-T2-420				■					
Padlockable handle lock hasp	V4-T2-421		■	□		□		□		□
Cylinder lock	V4-T2-421	□	□	□		□				
Key Interlock kit	V4-T2-422	■	□	□		□		□		□
Sliding bar interlock—requires two breakers	V4-T2-423			●	●	●				
Walking beam interlock—requires two breakers	V4-T2-423			●	●	●		●	●	●
Electrical (solenoid) operator	V4-T2-424			●	●	●		●	●	●
Plug-in adapters	V4-T2-425	●	●	●	●	●		●	●	●
Rear connecting studs	V4-T2-427	●	●	●	●	●		●	●	●
Panelboard connecting straps	V4-T2-428	●	●	●	●	●		●	●	●
Handle mechanisms	V4-T2-508	●	●	●	●	●		●	●	●
Handle extension	V4-T2-522	●	●	●	●	●		●	●	●
IQ Energy Sentinel	V4-T2-430			●	●	●		●	●	●
Solid-state (electronic) portable test kit	V4-T2-430	●	●	●	●	●		●	●	●
<b>OPTIM System Components Three Poles</b>										
Breaker interface module (BIM)	V4-T2-431									
Digitrip OPTIMizer	V4-T2-431									
Auxiliary power module	V4-T2-431									
<b>Modifications (Refer to Eaton)</b>										
Special calibration	—	●	●	●	●	●		●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●		●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●		●	●	●
Marine/naval application	—	●	●	●	●	●		●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Notes

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Shunt trip and UVR cannot be mounted in right poles on KES or OPTIM trip units. Standard internal accessories cannot be mounted in right pole on any K-Frame OPTIM trip units. Special OPTIM ground fault and zone interlock accessories are available for field installation in the right pole of K-Frame 550 OPTIM trip units. Factory installed 2a/2b and bell/aux are available for factory installation. K-Frame breakers equipped with OPTIM 1050 trip units include aux-bell alarm in the right pole.

## 310+ Electronic Trip Unit Accessories

Description	Catalog Number
Electronic portable test kit	MTST230V <sup>①</sup>
Trip unit tamper protection wire seal	5108A03H01
External neutral sensor, 400 A	LGFACT400 <sup>②</sup>
External neutral sensor, 250 A	LGFACT250 <sup>②</sup>
External neutral sensor, 125 A	LGFACT125 <sup>②</sup>
Breaker-mount cause-of-trip indication	TRIP-LED
Breaker-mount ammeter module	DIGIVIEW
Remote-mount ammeter module	DIGIVIEWR06 <sup>③</sup>

## Technical Data and Specifications

## NEMA/UL 489/CSA Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles <sup>④</sup>	Interrupting Capacity (kA Symmetrical Amperes)					Volts DC 250 <sup>⑤⑥</sup>
		Volts AC (50/60 Hz)					
		240	277	480	600		
DK	2, 3	65	—	—	—	10	
KDB	2, 3, 4	65	—	35	25	10	
KD	2, 3, 4	65	—	35	25	10	
HKD, HKDB	2, 3, 4	100	—	65	35	22	
KDC <sup>⑦</sup>	2, 3, 4	200	—	100	65	22	
CKD	3	65	—	35	25	—	
CHKD	3	100	—	65	35	—	

## IEC 157-1 (P1) Interrupting Capacity Ratings

Circuit Breaker Type	Number of Poles <sup>④</sup>	Interrupting Capacity (kA Symmetrical Amperes)					Volts DC 250 <sup>⑤⑥</sup>
		Volts AC (50/60 Hz)					
		240	380	415	440	500	
DK	2, 3	65	—	—	—	—	10
KDB	2, 3, 4	65	40	40	—	—	10
KD	2, 3, 4	65	40	40	—	—	10
HKD, HKDB	2, 3, 4	100	65	65	—	—	22
KDC	2, 3, 4	200	100	100	—	—	22

## UL 489 Current Limiting Data

Frame	Circuit	I <sub>p</sub> (kA)	I <sup>2</sup> T (10 <sup>6</sup> A <sup>2</sup> S)
KDC	240 V/200 kA	56.00	2.30
KDC	480 V/100 kA	53.30	5.60
KDC	600 V/50 kA	43.40	5.40

## Notes

- ① MTST230V applies to 100–230 Vac.
- ② Included with all LD LSG and LSIG trip units and breakers.
- ③ Includes 6 ft cable for remote mounting; NEMA 3R rated.
- ④ Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ⑤ Two-pole circuit breaker or two outside poles of three-pole circuit breaker.
- ⑥ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds minimum at 22 kA.
- ⑦ Current limiting.

### 310+ Specifications

Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame	K
Frames available	125 A, 250 A, 400 A
Continuous current range (A)	55–400 A
Ground fault pickup (A)	50–400 A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG, ALSI, ALSIG
Arcflash Reduction Maintenance System	Remote enabled on ALSI, ALSIG
Interchangeable trip unit	Yes
High load alarm, trip (suffix B20) ①	Yes
Ground fault alarm with trip (suffix B21) ①	LSG, LSIG, ALSIG
Ground fault alarm, no trip (suffix B22)	LSG, LSIG, ALSIG
Zone selective interlock (suffix ZG) ①	LSI, LSIG, ALSI, ALSIG
Cause of trip indication	Yes (via TRIP-LED or DIGVIEW)
Thru-cover accessories	No

### 310+ Adjustability Specifications

310+ Settings	K-Frame			
	125A	250 A	400 A	
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r \setminus I_n$			
	A (=I <sub>r</sub> )	55	100	160
	B (=I <sub>r</sub> )	60	125	200
	C (=I <sub>r</sub> )	70	150	225
	D (=I <sub>r</sub> )	80	160	250
	E (=I <sub>r</sub> )	90	175	300
	F (=I <sub>r</sub> )	100	200	315
	G (=I <sub>r</sub> )	110	225	350
	H (=I <sub>r</sub> =I <sub>n</sub> )	125	250	400
$t_r$ = long delay time (seconds) (All 310+)				
	2	2	2	2
	4	4	4	4
	7	7	7	7
	10	10	10	10
	12	12	12	12
	15	15	15	15
	20	20	20	20
	24	24	24	24
$I_{sd}$ (x I <sub>r</sub> ) = short delay pickup (amperes) (All 310+)				
	Position 1	2	2x	2x
	Position 2	3	3x	3x
	Position 3	4	4x	4x
	Position 4	5	5x	5x
	Position 5	6	6x	6x
	Position 6	7	7x	7x
	Position 7	8	8x	8x
	Position 8	10	10x	10x
	Position 9	12	12x	12x
$t_{sd}$ = short delay time I <sup>2</sup> t (milliseconds) (LS and LSG)	Fixed	67 @10x		
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG, ALSI, ALSIG)				
	Position 1	Inst		
	Position 2	120		
	Position 3	300		
$I_g$ (x I <sub>n</sub> ) = ground fault pickup (amperes) (LSG, LSIG, ALSIG)				
	Position 1	25	50	80
	Position 2	37.5	75	120
	Position 3	50	100	160
	Position 4	75	150	240
	Position 5	100	200	320
	Position 6	125	250	400
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG, ALSIG)				
	Position 1	Inst		
	Position 2	120		
	Position 3	300		
Independently adjustable Instantaneous (I <sub>i</sub> ) setting ②				
Maintenance Mode pickup (2.5 x I <sub>n</sub> ) (amperes) (310+ with Maintenance Mode—ALSI and ALSIG)	Fixed	312	625	1000

#### Notes

① B2x suffixes cannot be combined with B2x suffixes.

② Not available for KD. Independently adjustable I<sub>i</sub> setting available in LG, NG and RG ALSI and ALSIG trip units.

## Specifications

Trip Unit Type	Digitrip OPTIM 550	Digitrip OPTIM 1050
rms sensing	Yes	Yes
<b>Breaker Type</b>		
Frame	K	K
Ampere range	125–400 A	125–400 A
Interrupting rating at 480 volts	35, 65, 100 (kA)	35, 65, 100 (kA)
<b>Protection</b>		
Ordering options	LSI, LSI(A), LSIG	LSI(A), LSIG
Fixed rated plug ( $I_n$ )	Yes	Yes
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	No	No
Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds
Long delay time $I^4t$	1–5 seconds	1–5 seconds
Long delay thermal memory	Yes	Yes
High load alarm	0.5–1.0 x $I_r$	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>		
Short delay pickup	150–800% x ( $I_r$ )	150–800% x ( $I_r$ )
Short delay time $I^2t$	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes <sup>①</sup>	Yes
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	200–800% x ( $I_n$ )	200–800% x ( $I_n$ )
Discriminator	Yes	Yes
Instantaneous override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	20–100% x ( $I_g$ )	20–100% x ( $I_g$ )
Ground fault pickup	20–100% x ( $I_g$ )	20–100% x ( $I_g$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes <sup>①</sup>	Yes
Ground fault thermal memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	Yes	Yes
Magnitude of trip information	Yes	Yes
Remote signal contact—ground alarm	Yes <sup>①</sup>	Yes
Local auxiliary and bell alarm contact	Optional	Included
<b>System Monitoring</b>		
Digital display	Yes <sup>②</sup>	Yes <sup>②</sup>
Current	Yes	Yes
Power and energy	No	Yes
Power quality—harmonics	No	Yes
Power factor	No	Yes
<b>Communications</b>		
PowerNet	Yes <sup>③</sup>	Yes
<b>Testing</b>		
Testing method	OPTIMizer, BIM, PowerNet	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_g$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Notes**

- ① Zone interlock kit.
- ② By OPTIMizer/BIM.
- ③ Eaton's PowerNet kit.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

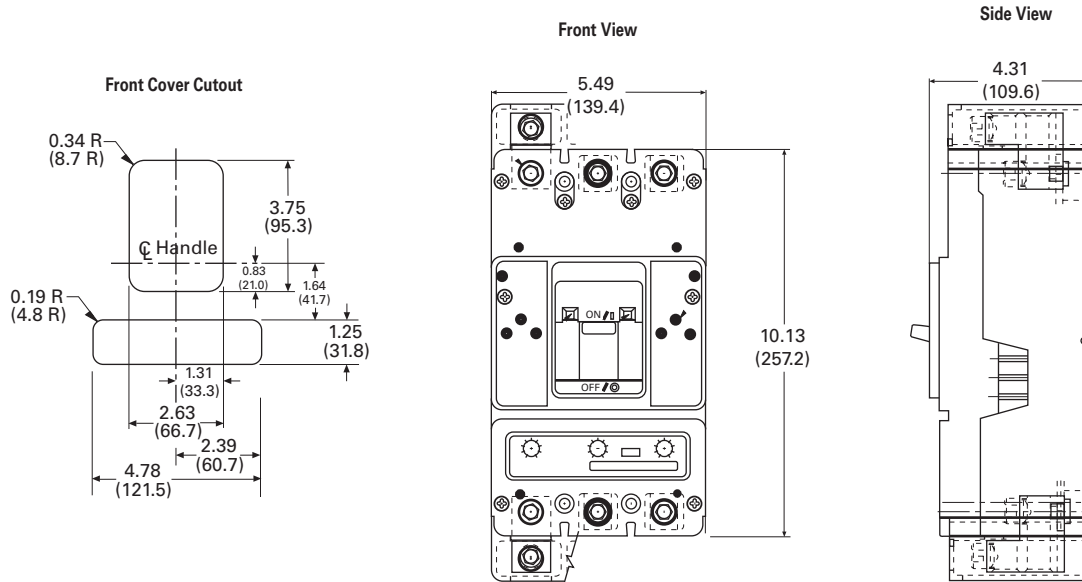
Approximate Dimensions in Inches (mm)

2

#### KD Frame

Number of Poles	Width	Height	Depth
2, 3	5.50 (149.7)	10.13 (257.3)	4.10 (104.1)
4	7.22 (183.4)	10.13 (257.3)	4.10 (104.1)

#### KD-Frame, Two- and Three-Pole



Approximate Shipping Weight, Lbs (kg)

#### KD Frame

Breaker Type	Complete Breaker		Frame Only		Trip Unit ①	
	Two-Pole	Three-Pole	Two-Pole	Three-Pole	Two-Pole	Three-Pole
DK	10.0 (4.5)	11.5 (5.2)	—	—	—	—
KDB	10.0 (4.5)	11.5 (5.2)	—	—	—	—
KD	10.0 (4.5)	11.5 (5.2)	7.5 (3.4)	8.5 (3.9)	1.5 (0.7)	1.5 (0.7)
HKD, HKDB	10.0 (4.5)	11.5 (5.2)	7.5 (3.4)	8.5 (3.9)	1.5 (0.7)	1.5 (0.7)
KDC	10.0 (4.5)	11.5 (5.2)	7.5 (3.4)	8.5 (3.9)	1.5 (0.7)	1.5 (0.7)

#### Note

① Weights shown are for thermal-magnetic trip units. Three-pole electronic trip units weigh 2.5 lbs (1.1 kg).

Typical L-Frame Circuit Breaker



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### Description

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Standards and Certifications . . . . .	<b>V4-T2-221</b>
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G-Frame (15–100 Amperes) . . . . .	<b>V4-T2-225</b>
F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-239</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-257</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-265</b>
L-Frame (125–600 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-290</b>
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M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-315</b>
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Type ELC Current Limiter Attachment (Size 0–4) . . . . .	<b>V4-T2-373</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-374</b>
Internal Accessories . . . . .	<b>V4-T2-377</b>
External Accessories . . . . .	<b>V4-T2-410</b>

## L-Frame (125–600 Amperes)

### Product Description

- All Eaton L-Frame circuit breakers are HACR rated
- L-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- L-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

### Standards and Certifications

- CE marked



# 2.4

## Molded Case Circuit Breakers

### Series C

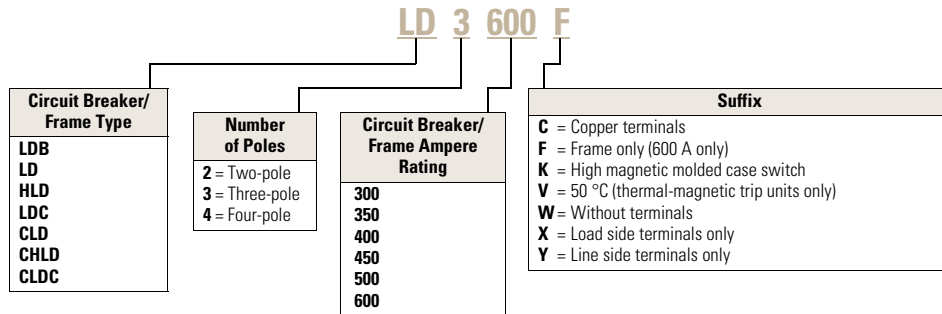
2

#### Catalog Number Selection

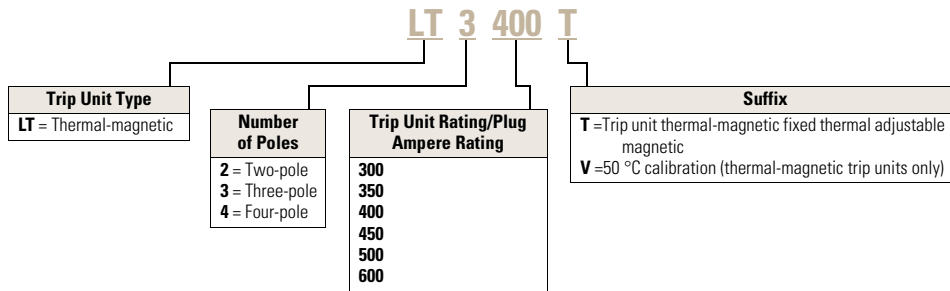
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### LD-Frame with Thermal-Magnetic Trip Unit Technology

##### Thermal-Magnetic Breakers and Frame ①



##### Thermal-Magnetic Trip Unit ①

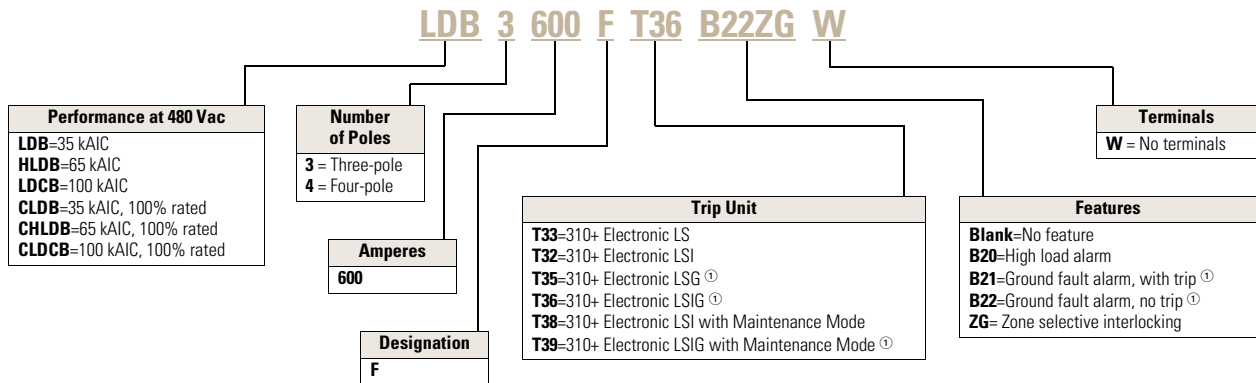


#### Note

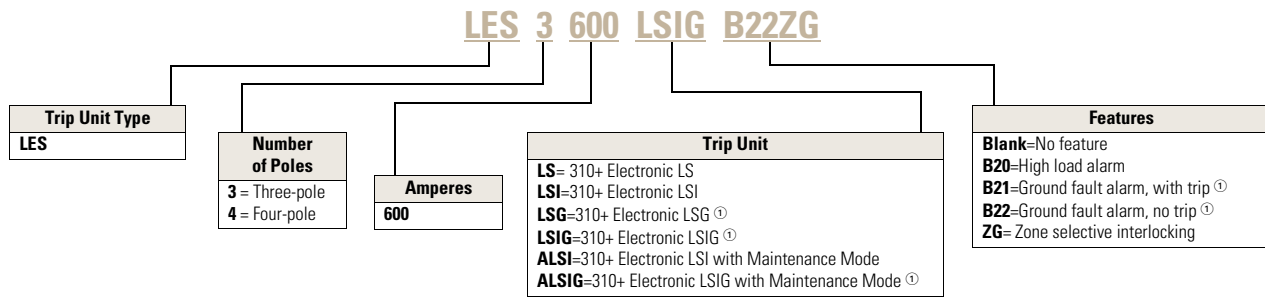
① Frames are the same for thermal-magnetic or 310+ electronic trip units, e.g., **LD3600F**, **HLD3600F**, etc.

**LD-Frame with 310+ Electronic Trip Unit Technology**

**310+ Circuit Breakers**

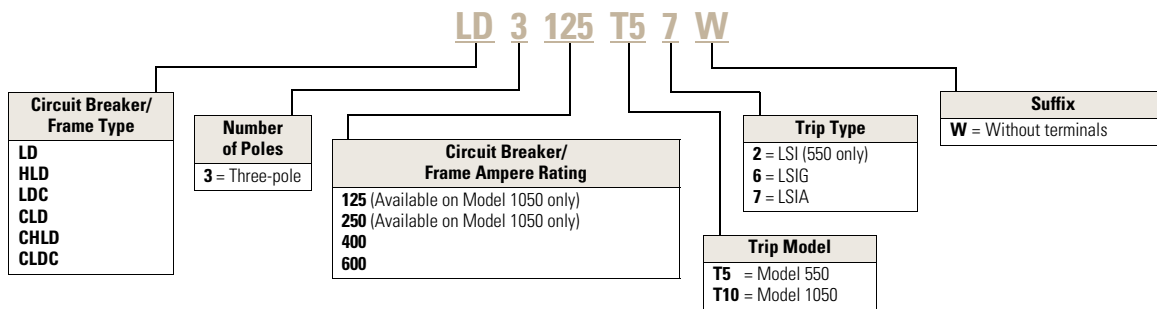


**310+ Electronic Trip Units ②**



**LD-Frame with OPTIM Electronic Trip Unit Technology**

**OPTIM Circuit Breakers**



**Notes**

- ① Not available in four-pole configurations.
- ② Frames are the same for thermal-magnetic or 310+ electronic trip units, e.g., LD3600F, HLD3600F, etc.



## Product Selection

2

## Types LD, HLD and LDC Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units

Maximum Continuous Ampere Rating at 40 °C ①	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Thermal-Magnetic Trip Unit Only	Standard Terminals Only
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	For Use with Standard or High or Ultra High Interrupting Frames Catalog Number	See Page V4-T2-307 for Optional Terminals Catalog Number
<b>Two-Pole</b>					
300	LD2300	HLD2300	LDC2300	LT2300T	TA602LD ②
350	LD2350	HLD2350	LDC2350	LT2350T	TA602LD ②
400	LD2400	HLD2400	LDC2400	LT2400T	TA602LD ②
450	LD2450	HLD2450	LDC2450	LT2450T	TA602LD ②
500	LD2500	HLD2500	LDC2500	LT2500T	TA602LD ②
600	LD2600	HLD2600	LDC2600	LT2600T	2TA603LDK ③
<b>Three-Pole</b>					
300	LD3300	HLD3300	LDC3300	LT3300T	TA602LD ②
350	LD3350	HLD3350	LDC3350	LT3350T	TA602LD ②
400	LD3400	HLD3400	LDC3400	LT3400T	TA602LD ②
450	LD3450	HLD3450	LDC3450	LT3450T	TA602LD ②
500	LD3500	HLD3500	LDC3500	LT3500T	TA602LD ②
600	LD3600	HLD3600	LDC3600	LT3600T	3TA603LDK ③
<b>Four-Pole ④</b>					
300	LD4300	HLD4300	LDC4300	LT4300T	TA602LD ②
350	LD4350	HLD4350	LDC4350	LT4350T	TA602LD ②
400	LD4400	HLD4400	LDC4400	LT4400T	TA602LD ②
450	LD4450	HLD4450	LDC4450	LT4450T	TA602LD ②
500	LD4500	HLD4500	LDC4500	LT4500T	TA602LD ②
600	LD4600	HLD4600	LDC4600	LT4600T	4TA603LDK ③

## Types LD, HLD and LDC Thermal-Magnetic Circuit Breakers—Frame Only

Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac Catalog Number	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac Catalog Number
<b>Two-Pole</b>		
LD2600F	HLD2600F	LDC2600F
<b>Three-Pole</b>		
LD3600F	HLD3600F	LDC3600F
<b>Four-Pole</b>		
LD4600F	HLD4600F	LDC4600F

## Notes

- ① Magnetic trip range 5–10 times continuous ampere rating.
- ② Individually packed.
- ③ Terminal kits contain one terminal for each pole and one terminal cover.
- ④ Neutral is in right pole.

**Types LD, HLD and LDC Electronic Circuit Breakers with Interchangeable Trip Units**

Order as individual components: breaker frame, trip unit and terminals. See 310+ adjustability specifications on **Page V4-T2-286**.

**Types LD, HLD and LDC Electronic Circuit Breakers with Interchangeable 310+ Trip Units**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip RMS 310+ Trip Unit Only ①				Neutral CT for LSG and LSI ②③	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Standard LS	Optional LSI	LSG	LSIG		
				Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
<b>Three-Pole</b>									
600	LD3600F	HLD3600F	LDC3600F	LES3600LS	LES3600LSI	LES3600LSG	LES3600LSIG	LGFACT600	See Page V4-T2-284
<b>Four-Pole ④</b>									
600	LD4600F	HLD4600F	LDC4600F	LES4600LS	LES4600LSI	—	—	—	See Page V4-T2-284

**Types LDB, HLDB and LDCB Electronic Circuit Breakers with Non-Interchangeable 310+ Electronic Trip Units Suitable for Reverse Feed**

See 310+ adjustability specifications on **Page V4-T2-286**.

**Circuit Breaker Frame Including Digitrip RMS 310+ Electronic Trip Unit Less Terminals  
Types LDB, HLDB and LDCB with Digitrip 310+ Non-Interchangeable Trip Units**

Maximum Continuous Ampere Rating at 40 °C	Number of Poles	Factory Assembled Circuit Breaker Consisting of Frame and Trip Unit Less Terminals ①				Neutral CT for LSG and LSI ②③	Terminal Information
		Standard LS	Optional LSI	LSG	LSIG		
		Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp Catalog Number	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
600	3	LDB3600FT33W	LDB3600FT32W	LDB3600FT35W	LDB3600FT36W	LGFACT600	See Page V4-T2-284
600	3	HLDB3600FT33W	HLDB3600FT32W	HLDB3600FT35W	HLDB3600FT36W		
600	3	LDCB3600FT33W	LDCB3600FT32W	LDCB3600FT35W	LDCB3600FT36W		

**100% Rated Types CLD, CHLD and CLDC Electronic Circuit Breakers with Interchangeable Trip Units**

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at the 75 °C ampacity. All 100% rated circuit breakers have electronic trip units. Order as individual components: breaker frame, trip unit and terminals. See 310+ adjustability specifications on **Page V4-T2-286**.

**100% Rated Types CLD, CHLD and CLDC Electronic Circuit Breakers with 310+ Interchangeable Trip Units**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip RMS 310+ Trip Unit Only				Neutral CT for LSG and LSI ②③	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac Catalog Number	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac	Standard LS	Optional LSI	LSG	LSIG		
				Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
<b>Three-Pole</b>									
600	CLD3600F	CHLD3600F	CLDC3600F	LES3600LS	LES3600LSI	LES3600LSG	LES3600LSIG	LGFACT600	See Page V4-T2-284

**Notes**

- ① For AC use only.
- ② Required for four-wire systems if neutral protection is desired.
- ③ Included with LSG and LSI trip units.
- ④ Neutral is in right pole.

#### Type LDB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units <sup>①</sup>

Maximum Continuous Ampere Rating	600 Vac Rated, 250 Vdc Complete Circuit Breaker	
	Without Line and Load Terminals Catalog Number	With Standard Line and Load Terminals Only Catalog Number
<b>Two-Pole</b>		
300	LDB2300W	LDB2300
350	LDB2350W	LDB2350
400	LDB2400W	LDB2400
450	LDB2450W	LDB2450
500	LDB2500W	LDB2500
600	LDB2600W	LDB2600
<b>Three-Pole</b>		
300	LDB3300W	LDB3300
350	LDB3350W	LDB3350
400	LDB3400W	LDB3400
450	LDB3450W	LDB3450
500	LDB3500W	LDB3500
600	LDB3600W	LDB3600

#### Molded Case Switches

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

#### Molded Case Switches

Maximum Continuous Ampere Rating at 40 °C	600 Vac Maximum, 250 Vdc Circuit Breaker Only without Line and Load Terminals	
	Catalog Number	Standard Terminals Only See Page V4-T2-307 for Optional Terminals Catalog Number
<b>Two-Pole</b>		
600	LD2600WK	2TA603LDK
600	LDB2600WK <sup>①</sup>	2TA603LDK
600	HLD2600WK	2TA603LDK
<b>Three-Pole</b>		
600	LD3600WK	3TA603LDK
600	LDB3600WK <sup>①</sup>	3TA603LDK
600	HLD3600WK	3TA603LDK
<b>Four-Pole</b>		
600	LD4600WK	4TA603LDK
600	LDB4600WK <sup>①</sup>	4TA603LDK
600	HLD4600WK	4TA603LDK

#### Notes

<sup>①</sup> Factory sealed—suitable for reverse feed application.

Molded case switch will trip above 6000 amperes.

**Digitrip OPTIM Electronic Circuit Breaker with Interchangeable Rating Plug**

Order as individual components: Breaker Frame (which includes Trip Unit), Rating Plug, Terminals.

**Digitrip OPTIM 550 Electronic Circuit Breaker with Interchangeable Rating Plug**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>					
125	LD3125T52W	LD3125T56W	LD3125T57W	—	ORPL125A070
				—	ORPL125A090
				—	ORPL125A100
				—	ORPL125A110
				—	ORPL125A125
250	LD3250T52W	LD3250T56W	LD3250T57W	—	ORPL025A125
				—	ORPL025A150
				—	ORPL025A175
				—	ORPL025A200
				—	ORPL025A225
400	LD3400T52W	LD3400T56W	LD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	LD3600T52W	LD3600T56W	LD3600T57W	400	ORPL40A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
600	ORPL60A600				

**Notes**① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### Digitrip OPTIM 550 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) OPTIM 550 <sup>②</sup>				
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	HLD3125T52W	HLD3125T56W	HLD3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A110
				125	ORPL125A125
250	HLD3250T52W	HLD3250T56W	HLD3250T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
400	HLD3400T52W	HLD3400T56W	HLD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	HLD3600T52W	HLD3600T56W	HLD3600T57W	400	ORPL60A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

## Digitrip OPTIM 550 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup ( $I_t$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$ or Flat Response)				
	OPTIM 550 <sup>②</sup>				
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>					
125	LDC3125T52W	LDC3125T56W	LDC3125T57W	—	ORPL125A070
				—	ORPL125A090
				—	ORPL125A100
				—	ORPL125A110
				—	ORPL125A125
250	LDC3250T52W	LDC3250T56W	LDC3250T57W	—	ORPL025A125
				—	ORPL025A150
				—	ORPL025A175
				—	ORPL025A200
				—	ORPL025A225
400	LDC3400T52W	LDC3400T56W	LDC3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	LDC3600T52W	LDC3600T56W	LDC3600T57W	400	ORPL40A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

**Notes**

<sup>①</sup> Long delay  $I^4t$  response selection limits short delay time to flat response.

<sup>②</sup> Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### Digitrip OPTIM Electronic Circuit Breaker with Interchangeable Rating Plug

Order as individual components: Breaker Frame (which includes Trip Unit), Rating Plug, Terminals.

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#### Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug

##### Circuit Breaker Frame Only

**L** – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①

**S** – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)

**I** – Adjustable Instantaneous Pickup

**G** – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

**A** – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

OPTIM 1050 ②③

##### Digitrip OPTIM Rating Plug Only

Maximum  
Continuous  
Ampere  
Rating  
at 40 °C

LSIG

Catalog  
Number

LSIA

Catalog  
Number

Ampere  
Rating

Fixed Rating Plug  
Catalog  
Number

#### Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac

Maximum Continuous Ampere Rating at 40 °C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number			
125	LD3125T106W	LD3125T107W	70	ORPL125A070			
			90	ORPL125A090			
			100	ORPL125A100			
			110	ORPL125A110			
			125	ORPL125A125			
250	LD3250T106W	LD3250T107W	125	ORPL025A125			
			150	ORPL025A150			
			175	ORPL025A175			
			200	ORPL025A200			
			225	ORPL025A225			
			250	ORPL025A250			
			400	LD3400T106W	LD3400T107W	200	ORPL40A200
225	ORPL40A225						
250	ORPL40A250						
300	ORPL40A300						
350	ORPL40A350						
400	ORPL40A400						
600	LD3600T106W	LD3600T107W				300	ORPL60A300
						350	ORPL60A350
			400	ORPL60A400			
			500	ORPL60A500			
			500	ORPL60A500			
			600	ORPL60A600			

#### Notes

① Long delay  $I^4t$  response selection limits short delay time to flat response.

② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.

③ Factory sealed.

## Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	HLD3125T106W	HLD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	HLD3250T106W	HLD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
400	HLD3400T106W	HLD3400T107W	250	ORPL025A250
			200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
600	HLD3600T106W	HLD3600T107W	350	ORPL40A350
			400	ORPL40A400
			300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.  
 ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.  
 ③ Factory sealed.



#### Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>L – Adjustable Long Delay Pickup (<math>I_L</math>) with Adjustable Long Delay Time (<math>I^2t</math> or <math>I^4t</math> Response) ①</b> <b>S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (<math>I^2t</math> or Flat Response)</b> <b>I – Adjustable Instantaneous Pickup</b> <b>G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (<math>I^2t</math> or Flat Response)</b> <b>A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (<math>I^2t</math> or Flat Response)</b> <b>OPTIM 1050 ②③</b>			
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>				
125	LDC3125T106W	LDC3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	LDC3250T106W	LDC3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
400	LDC3400T106W	LDC3400T107W	250	ORPL025A250
			200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
600	LDC3600T106W	LDC3600T107W	350	ORPL40A350
			400	ORPL40A400
			300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

**100% Rated Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plug**

Order as individual components: Breaker Frame (which includes Trip Unit), Rating Plug, Terminals.

**100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plug****Circuit Breaker Frame Only****L** – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$  or  $I^4t$  Response) ①**S** – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$  or Flat Response)**I** – Adjustable Instantaneous Pickup**G** – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)**A** – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$  or Flat Response)

OPTIM 550 ②

**Digitrip OPTIM Rating Plug Only**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac</b>					
125	CLD3125T52W	CLD3125T56W	CLD3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A110
				125	ORPL125A125
250	CLD3250T52W	CLD3250T56W	CLD3250T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
				250	ORPL025A250
400	CLD3400T52W	CLD3400T56W	CLD3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
				400	ORPL40A400
600	CLD3600T52W	CLD3600T56W	CLD3600T57W	300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

**Notes**① Long delay  $I^4t$  response selection limits short delay time to flat response.② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>OPTIM 550</b> <sup>②</sup> L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response)				
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
125	CHLD3125T52W	CHLD3125T56W	CHLD3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A125
				125	ORPL125A125
250	CHLD3250T52W	CHLD3250T56W	CHLD3250T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
400	CHLD3400T52W	CHLD3400T56W	CHLD3400T57W	250	ORPL025A250
				200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				350	ORPL40A350
600	CHLD3600T52W	CHLD3600T56W	CHLD3600T57W	400	ORPL40A400
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

## 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>L</b> – Adjustable Long Delay Pickup (I <sub>t</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① <b>S</b> – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) <b>I</b> – Adjustable Instantaneous Pickup <b>G</b> – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) <b>A</b> – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I <sup>2</sup> t or Flat Response) OPTIM 550 ②				
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>					
125	CLDC3125T52W	CLDC3125T56W	CLDC3125T57W	70	ORPL125A070
				90	ORPL125A090
				100	ORPL125A100
				110	ORPL125A110
				125	ORPL125A125
250	CLDC3250T52W	CLDC3250T56W	CLDC3250T57W	125	ORPL025A125
				150	ORPL025A150
				175	ORPL025A175
				200	ORPL025A200
				225	ORPL025A225
400	CLDC3400T52W	CLDC3400T56W	CLDC3400T57W	200	ORPL40A200
				225	ORPL40A225
				250	ORPL40A250
				300	ORPL40A300
				350	ORPL40A350
600	CLDC3600T52W	CLDC3600T56W	CLDC3600T57W	400	ORPL40A400
				500	ORPL60A500
				300	ORPL60A300
				350	ORPL60A350
				400	ORPL60A400
				500	ORPL60A500
				600	ORPL60A600

**Notes**① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### 100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plug

**Circuit Breaker Frame Only**

- L – Adjustable Long Delay Pickup (I<sub>l</sub>) with Adjustable Long Delay Time (I<sup>2</sup>t or I<sup>4</sup>t Response) ①
- S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)
- I – Adjustable Instantaneous Pickup
- G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)
- A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time (I<sup>2</sup>t or Flat Response)

**Digitrip OPTIM Rating Plug Only**

Maximum  
Continuous  
Ampere  
Rating  
at 40 °C

LSIG

Catalog  
Number

LSIA

Catalog  
Number

Ampere  
Rating

Fixed Rating Plug

Catalog  
Number

Three-Pole Standard Interrupting Capacity 600 Vac Rated 35 kAIC at 480 Vac				
Maximum Continuous Ampere Rating at 40 °C	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
125	CLD3125T106W	CLD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	CLD3250T106W	CLD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
400	CLD3400T106W	CLD3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
			400	ORPL40A400
			600	ORPL60A600
600	CLD3600T106W	CLD3600T107W	300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

## 100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	OPTIM 1050 <sup>②③</sup>			
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup>			
	S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response)			
	I – Adjustable Instantaneous Pickup			
	G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$ or Flat Response)			
	A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$ or Flat Response)			
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
125	CHLD3125T106W	CHLD3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	CHLD3250T106W	CHLD3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
			250	ORPL025A250
400	CHLD3400T106W	CHLD3400T107W	200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
			350	ORPL40A350
			400	ORPL40A400
600	CHLD3600T106W	CHLD3600T107W	300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.  
 ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.  
 ③ Factory sealed.

#### 100% Rated Digitrip OPTIM 1050 Electronic Circuit Breaker with Interchangeable Rating Plug, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>OPTIM 1050</b> <sup>②③</sup> <b>L</b> – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup> <b>S</b> – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) <b>I</b> – Adjustable Instantaneous Pickup <b>G</b> – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time ( $I^2t$ or Flat Response) <b>A</b> – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time ( $I^2t$ or Flat Response)				
<b>Three-Pole Ultra High Interrupting Capacity Current Limiting 600 Vac Rated 100 kAIC at 480 Vac</b>				
125	CLDC3125T106W	CLDC3125T107W	70	ORPL125A070
			90	ORPL125A090
			100	ORPL125A100
			110	ORPL125A110
			125	ORPL125A125
250	CLDC3250T106W	CLDC3250T107W	125	ORPL025A125
			150	ORPL025A150
			175	ORPL025A175
			200	ORPL025A200
			225	ORPL025A225
400	CLDC3400T106W	CLDC3400T107W	250	ORPL025A250
			200	ORPL40A200
			225	ORPL40A225
			250	ORPL40A250
			300	ORPL40A300
600	CLDC3600T106W	CLDC3600T107W	350	ORPL40A350
			400	ORPL40A400
			300	ORPL60A300
			350	ORPL60A350
			400	ORPL60A400
			500	ORPL60A500
			600	ORPL60A600

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell alarm switch supplied with breaker as standard.
- ③ Factory sealed.

**Accessories Selection Guide and Ordering Information**

**Line and Load Terminals**

Eaton’s line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B and CSA Standard C22.2 No. 65M. Unless otherwise specified,

L-Frame circuit breaker line and load terminals are shipped separately for field installation.

The wire connecting terminal is secured with two pan-head, slotted screws and lockwashers that can be checked for the correct torque loading or retightened from the front of the circuit

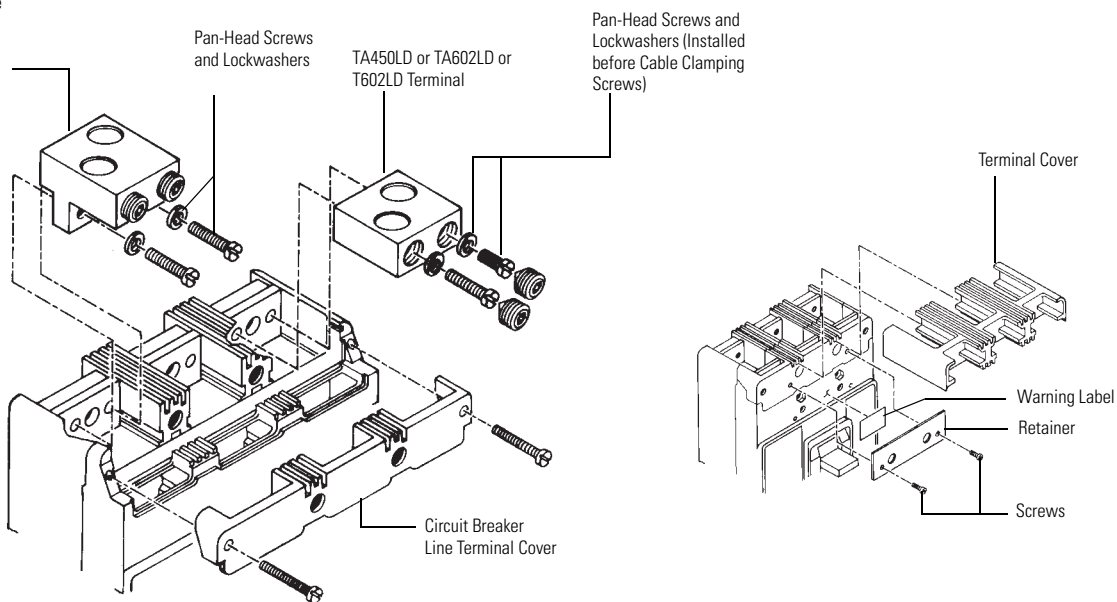
breaker before installation of the conductors. (Applies to all styles.) The circuit breaker line/load terminal conductors are positioned in the conducting holes in the wire connecting terminal and are secured with recessed socket screws that are tightened to the correct torque loading from the front of the circuit breaker.

**Ordering Information**

L-Frame circuit breakers use Cu/Al terminals as standard. When optional copper terminals are required, order by catalog Number. Specify if factory installation is required.

**Terminals**

TA401LD or TA603LD Terminal (Step-Type Terminal Requires Terminal Cover and Warning Label. See Inset.)



**Line and Load Terminals**

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/Number of Conductors	Metric Wire Range mm <sup>2</sup>	Terminal Poles	Catalog Number	Terminals with Control Wire Termination Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>							
400	Aluminum	Cu/Al	4/0–600 (1)	120–300	Two-pole kit ①	2TA401LDK	—
400	Aluminum	Cu/Al	4/0–600 (1)	120–300	Three-pole kit ①	3TA401LDK	—
400	Aluminum	Cu/Al	4/0–600 (1)	120–300	Four-pole kit ①	4TA401LDK	—
450	Aluminum	Cu/Al	4–4/0 (2)	25–95	②	TA450LD	—
500	Aluminum	Cu/Al	3/0–350 (2)	95–150	②	TA602LD	TA602LDCW
600	Aluminum	Cu/Al	400–500 (2)	185–240	Two-pole kit ①	2TA603LDK	2TA603LDKCW
600	Aluminum	Cu/Al	400–500 (2)	185–240	Three-pole kit ①	3TA603LDK	3TA603LDKCW
600	Aluminum	Cu/Al	400–500 (2)	185–240	Four-pole kit ①	4TA603LDK	4TA603LDKCW
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>							
600	Copper	Cu	250–350 (2)	120–250	②	T602LD	T602LDCW

**Notes**

- ① Terminal kits contain one terminal for each pole and one terminal cover.
- ② Individually packed.



## Accessories

2

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### LD Frame Accessories

Description	Reference Page	Two-Pole <sup>①</sup> , Three-Pole			Four-Pole			Neutral <sup>②</sup>
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole) <sup>③</sup></b>								
Alarm lockout (Make/Break)	V4-T2-380	■		■	■			■
Alarm lockout (2Make/2Break)	V4-T2-380	■		■	■			■
Auxiliary switch (1A, 1B)	V4-T2-382	■		■	■			■
Auxiliary switch (2A, 2B)	V4-T2-382	■		■	■			■
Auxiliary switch (3A, 3B)	V4-T2-382	■		■	■			■
Auxiliary switch (1A, 1B) and alarm switch combination	V4-T2-384	■		■	■			■
Auxiliary switch (2A, 2B) and alarm switch combination	V4-T2-384	■		■	■			■
Shunt trip—standard <sup>④</sup>	V4-T2-386	■		■	■			■
Shunt trip—low energy <sup>④</sup>	V4-T2-389	■		■	■			■
Undervoltage release mechanism <sup>④</sup>	V4-T2-395	■		■	■			■
Eaton PowerNet communications kit (OPTIM 550)	V4-T2-397			■				
<b>External Accessories</b>								
End cap kit	V4-T2-414	●	●	●	●	●	●	●
Control wire terminal kit	V4-T2-415	●	●	●	●	●	●	●
Base mounting hardware	V4-T2-417	●	●	●	●	●	●	●
Terminal shields	V4-T2-419	●	●	●	●	●	●	●
Interphase barriers	V4-T2-419	●	●	●	●	●	●	●
Non-padlockable handle block	V4-T2-420		■			■		
Padlockable handle lock hasp	V4-T2-421	□		□	□			□
Key interlock kit	V4-T2-422	□		□	□			□
Sliding bar interlock—requires two breakers	V4-T2-423	●	●	●				
Walking beam interlock—requires two breakers	V4-T2-423	●	●	●	●	●	●	●
Electrical (motor) operator	V4-T2-424	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-426	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-427	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-428	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-508	●	●	●	●	●	●	●
Handle extension	V4-T2-522	●	●	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-430	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Notes

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Refer to Eaton for appropriate neutral pole accessory combinations.
- ③ OPTIM model 1050 is factory sealed and does not have the right pole space available for accessories.
- ④ Shunt trip and UVR cannot be mounted in right poles on LES or OPTIM trip units. Standard non-tripping internal accessories can be mounted in the left or right poles of LES and 550 OPTIM trip units.

## LD Frame Accessories, continued

Description	Reference Page	Two-Pole <sup>①</sup> , Three-Pole			Four-Pole			Neutral <sup>②</sup>
		Left	Center	Right	Left	Center	Right	
<b>OPTIM System Components Three Poles</b>								
Ground fault alarm unit	V4-T2-430							
Potential transformer module	V4-T2-430							
Breaker interface module (BIM)	V4-T2-431							
Digitrip OPTIMizer	V4-T2-431							
Auxiliary power module	V4-T2-431							
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

**Legend**

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

## 310+ Electronic Trip Unit Accessories

Description	Catalog Number
Electronic portable test kit	MTST230V <sup>③</sup>
Trip unit tamper protection wire seal	5108A03H01
External neutral sensor	LGFACT600 <sup>④</sup>
Breaker-mount cause-of-trip indication	TRIP-LED
Breaker-mount ammeter module	DIGIVIEW
Remote-mount ammeter module	DIGIVIEWR06 <sup>⑤</sup>

**Notes**

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.
- ② Refer to Eaton for appropriate neutral pole accessory combinations.
- ③ MTST230V applies to 100–230 Vac.
- ④ Included with all LD LSG and LSG trip units and breakers.
- ⑤ Includes 6 ft cable for remote mounting; NEMA 3R rated.

## Technical Data and Specifications

2

UL 489 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA rms Symmetrical Amperes)					
		Volts AC (50/60 Hz)				Volts DC	
		240	277	480	600	125	250 <sup>②③</sup>
LDB	2, 3	65	—	35	25	—	22
LD	2, 3, 4	65	—	35	25	—	22
CLD <sup>④</sup>	2, 3, 4	65	—	35	25	—	—
HLD, HLDB	2, 3, 4	100	—	65	35	—	25
CHLD <sup>④</sup>	2, 3, 4	100	—	65	35	—	—
LDC, LDCB <sup>⑤</sup>	2, 3, 4	200	—	100	50	—	30
CLDC <sup>④⑤</sup>	2, 3, 4	200	—	100	50	—	—

IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)							
		Volts AC (50/60 Hz)				Volts DC			
		240		415		690		250 <sup>②③</sup>	
		$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$	$I_{cu}$	$I_{cs}$
LDB	2, 3	85	85	45	45	20	10	20	10
LD	2, 3, 4	85	85	45	45	20	10	20	10
CLD <sup>④</sup>	2, 3, 4	85	85	45	45	20	10	—	—
HLD, HLDB	2, 3, 4	100	100	70	70	25	13	20	10
CHLD <sup>④</sup>	2, 3, 4	100	100	70	70	25	13	—	—
LDC, LDCB	2, 3, 4	200	100	100	75	35	18	20	10
CLDC <sup>④</sup>	2, 3, 4	200	100	100	75	35	18	—	—

## UL 489 Current Limiting Data

Frame	Circuit	$I_p$ (kA)	$I^2T$ ( $10^6 A^2S$ )
LDC	240 V/200 kA	64.80	6.80
LDC	480 V/100 kA	66.90	9.33
LDC	600 V/50 kA	54.30	8.92

## Notes

- ① Utilization Category A circuit breakers.
- ② L/R = 8 milliseconds minimum.
- ③ Two-pole circuit breaker or two poles of three-pole circuit breaker. Incorporating thermal-magnetic trip unit only.
- ④ 100% rated breakers.
- ⑤ Current limiting.

## 310+ Specifications

Description	Specification
Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame designation	LD
Frames available	600 A
Continuous current range (A)	250–600 A
Ground fault pickup (A)	120–600 A
Interrupting capacities at 480 Vac (kAIC)	35, 65, 100
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG, ALSI, ALSIG
Arcflash Reduction Maintenance System (or Maintenance Mode)	Remote enabled on ALSI, ALSIG
Interchangeable trip unit	Yes
High load alarm (suffix B20) ①	Yes
Ground fault alarm with trip (suffix B21) ①	LSG, LSIG, ALSIG
Ground fault alarm, no trip (suffix B22) ①	LSG, LSIG, ALSIG
Zone selective interlocking (suffix ZG)	LSI, LSIG, ALSI, ALSIG
Cause of trip indication	Yes (via TRIP-LED or DIGIVIEW)
Thru-cover accessories	No

## 310+ Adjustability Specifications

Description	LD Frame Specification	
310+ settings	600 A	
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$	
	A	250
	B	300
	C	315
	D	350
	E	400
	F	450
	G	500
	H (= $I_n$ )	600
$t_r$ = long delay time (seconds) (All 310+)		
	2	2
	4	4
	7	7
	10	10
	12	12
	15	15
	20	20
	24	24
$I_{sd}$ (x $I_r$ ) = short delay pickup (All 310+)		
	Position 1	2x
	Position 2	3x
	Position 3	4x
	Position 4	5x
	Position 5	6x
	Position 6	7x
	Position 7	8x
	Position 8	8x
	Position 9	8x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS and LSG)	Fixed	67 @10x
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG, ALSI, ALSIG)		
	Position 1	Inst
	Position 2	120
	Position 3	300
$I_g$ (x $I_n$ ) = ground fault pickup (amperes) (LSG, LSIG, ALSIG)		
	Position 1	120
	Position 2	180
	Position 3	240
	Position 4	360
	Position 5	480
	Position 6	600
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG, ALSIG)		
	Position 1	Inst
	Position 2	120
	Position 3	300
Independently adjustable Instantaneous (Ii) setting	②	
Maintenance Mode pickup (2.5 x $I_n$ ) (amperes) (310+ with Maintenance Mode—ALSI and ALSIG)	Fixed	1500

**Notes**

① B2x suffixes cannot be combined with B2x suffixes.

② Not available for LD. Independently adjustable Ii setting available in LG, NG, and RG ALSI and ALSIG trip units.

## Digitrip OPTIM Specifications

Trip Unit Type	Digitrip OPTIM 550	Digitrip OPTIM 1050
rms sensing	Yes	Yes
<b>Breaker Type</b>		
Frame	L	L
Ampere range	200–600 A	200–600 A
Interrupting rating at 480 volts	35, 65, 100 (kA)	35, 65, 100 (kA)
<b>Protection</b>		
Ordering options	LSI, LSI(A), LSIG	LSI(A), LSIG
Fixed rated plug ( $I_n$ )	Yes	Yes
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	No	No
Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds
Long delay time $I^4t$	1–5 seconds	1–5 seconds
Long delay thermal memory	Yes	Yes
High load alarm	0.5–1.0 x $I_r$	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>		
Short delay pickup	150–800% x ( $I_r$ )	150–800% x ( $I_r$ )
Short delay time $I^2t$	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes ①	Yes
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	200–800% x ( $I_n$ )	200–800% x ( $I_n$ )
Discriminator	Yes	Yes
Instantaneous override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	20–100% x ( $I_g$ )	20–100% x ( $I_g$ )
Ground fault pickup	20–100% x ( $I_g$ )	20–100% x ( $I_g$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes ①	Yes
Ground fault thermal memory	Yes	Yes

**Legend**

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_g$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Note**

① Zone interlock kit.

**Digitrip OPTIM Specifications, continued**

<b>Trip Unit Type</b>	<b>Digitrip OPTIM 550</b>	<b>Digitrip OPTIM 1050</b>
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	Yes	Yes
Magnitude of trip information	Yes	Yes
Remote signal contact—ground alarm	Yes <sup>①</sup>	Yes
Local auxiliary and bell alarm contact	Optional	Included
<b>System Monitoring</b>		
Digital display	Yes <sup>②</sup>	Yes <sup>②</sup>
Current	Yes	Yes
Power and energy	No	Yes
Power quality—harmonics	No	Yes
Power factor	No	Yes
<b>Communications</b>		
PowerNet	Yes <sup>③</sup>	Yes
<b>Testing</b>		
Testing method	OPTIMizer, BIM, PowerNet	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Notes**

- ① Zone interlock kit.  
 ② By OPTIMizer/BIM.  
 ③ Eaton's PowerNet kit.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

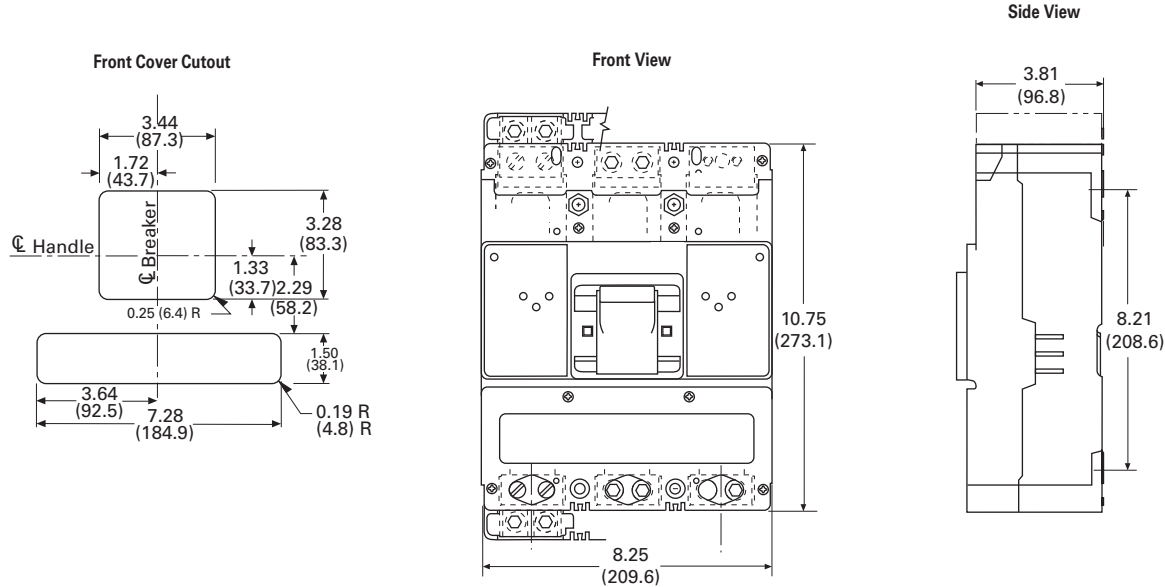
Dimensions in Inches (mm)

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#### LD Frame

Number of Poles	Width	Height	Depth
2, 3	8.25 (209.6)	10.75 (273.1)	4.06 (103.1)
4	11.00 (279.4)	10.75 (273.1)	4.06 (103.1)

#### LD-Frame, Two- and Three-Pole



Approximate Shipping Weight, Lbs (kg)

#### LD Frame

Breaker Type	Complete Breaker			Frame Only			Trip Unit		
	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole	Two-Pole	Three-Pole	Four-Pole
LD, HLD, LDC	18 (8.2)	20 (9.1)	25 (11.3)	14 (6.4)	15 (6.8)	20 (9.1)	3 (1.4)	4 (1.8)	5 (2.3)
LDB	18 (8.2)	20 (9.1)	25 (11.3)	—	—	—	—	—	—

Typical M-Frame Circuit Breaker



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## M-Frame (300–800 Amperes)

### Product Description

- All Eaton M-Frame circuit breakers are HACR rated
- MDL-Frame circuit breakers are available as individual components (frame, trip unit, terminals), or factory assembled complete breakers
- MDLB, HMDLB-Frame circuit breakers with non-interchangeable trip units are suitable for reverse feed use

### Standards and Certifications

- CE marked





# 2.4

## Molded Case Circuit Breakers

Series C

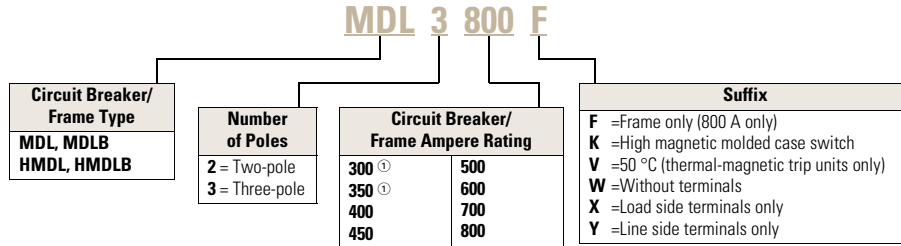
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### Catalog Number Selection

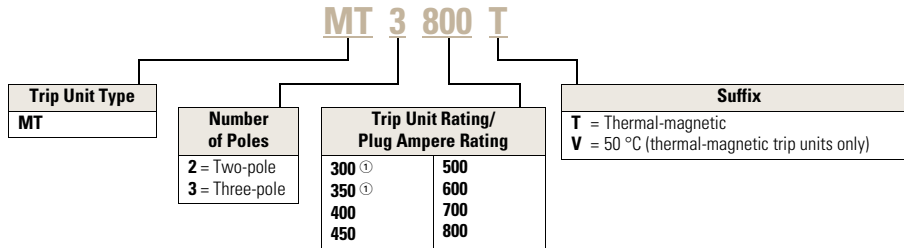
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### MDL Frame with Thermal-Magnetic Trip Unit Technology

##### Thermal-Magnetic Breakers and Frame ①

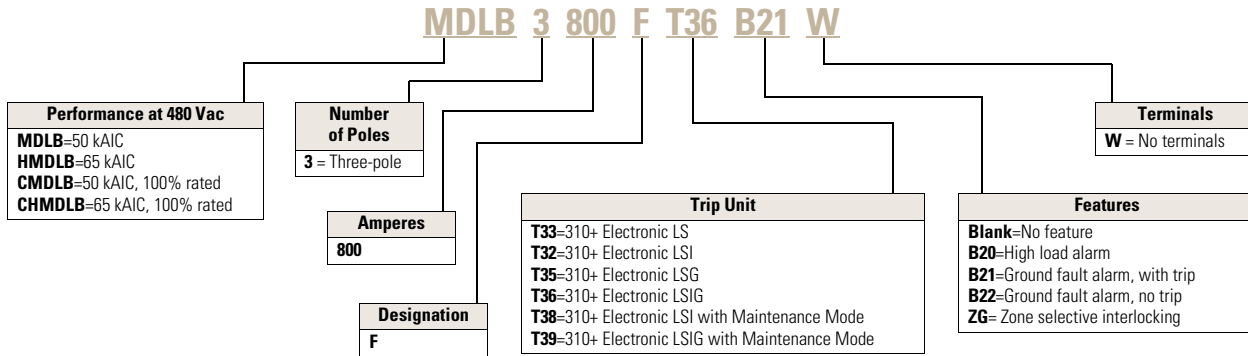


##### Thermal-Magnetic Trip Unit ①

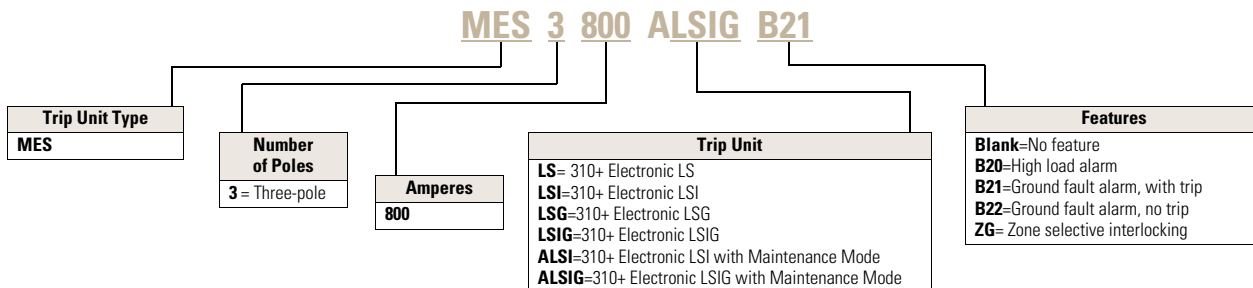


#### MDL Frame with 310+ Electronic Trip Unit Technology

##### 310+ Circuit Breaker



##### 310+ Electronic Trip Unit ①



**Note**

① Frames are the same for thermal-magnetic or 310+ electronic trip units, e.g., MDL3800F, HMDL3800F, etc.

## Product Selection

## Types MDL and HMDL Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units—Two-Pole

Maximum Continuous Ampere Rating at 40 °C	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac		High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac		Thermal-Magnetic Trip Unit Only	Standard Terminals Only <sup>①</sup>  See Page V4-T2-321 for Optional Terminals Catalog Number
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		For Use with Standard or High or Ultra High Interrupting Frames  Magnetic Trip Range is 5–10 Up Through 600 A; 4–8 on 700 and 800 A x Continuous Ampere Rating Catalog Number	
	Catalog Number	Frame Only Catalog Number	Catalog Number	Frame Only Catalog Number		
300	MDL2300	MDL2800F	HMDL2300	HMDL2800F	MT2300T	TA700MA1
350	MDL2350		HMDL2350		MT2350T	TA700MA1
400	MDL2400		HMDL2400		MT2400T	TA700MA1
450	MDL2450		HMDL2450		MT2450T	TA700MA1
500	MDL2500		HMDL2500		MT2500T	TA700MA1
600	MDL2600		HMDL2600		MT2600T	TA700MA1
700	MDL2700		HMDL2700		MT2700T	TA700MA1
800	MDL2800		HMDL2800		MT2800T	TA800MA2

## Types MDL and HMDL Thermal-Magnetic Circuit Breakers with Interchangeable Trip Units—Three-Pole

Maximum Continuous Ampere Rating at 40 °C	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac		High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac		Thermal-Magnetic Trip Unit Only	Standard Terminals Only <sup>①</sup>  See Page V4-T2-321 for Optional Terminals Catalog Number
	Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals		For Use with Standard or High or Ultra High Interrupting Frames  Magnetic Trip Range is 5–10 Up Through 600 A; 4–8 on 700 and 800 A x Continuous Ampere Rating Catalog Number	
	Catalog Number	Frame Only Catalog Number	Catalog Number	Frame Only Catalog Number		
300	MDL3300	MDL3800F	HMDL3300	HMDL3800F	MT3300T	TA700MA1
350	MDL3350		HMDL3350		MT3400T	TA700MA1
400	MDL3400		HMDL3400		MT3400T	TA700MA1
450	MDL3450		HMDL3450		MT3450T	TA700MA1
500	MDL3500		HMDL3500		MT3500T	TA700MA1
600	MDL3600		HMDL3600		MT3600T	TA700MA1
700	MDL3700		HMDL3700		MT3700T	TA700MA1
800	MDL3800		HMDL3800		MT3800T	TA800MA2

**Note**

<sup>①</sup> Two terminals are required per pole.

## Types MDLB and HMDLB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units—Two-Pole ①

Maximum Continuous Ampere Rating at 40 °C	Standard Interrupting Capacity	High Interrupting Capacity	Standard Terminals Only ②
	600 Vac Rated 50 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	600 Vac Rated 65 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	See Page V4-T2-321 for Optional Terminals Catalog Number
300	MDLB2300	HMDLB2300	TA700MA1
350	MDLB2350	HMDLB2350	TA700MA1
400	MDLB2400	HMDLB2400	TA700MA1
450	MDLB2450	HMDLB2450	TA700MA1
500	MDLB2500	HMDLB2500	TA700MA1
600	MDLB2600	HMDLB2600	TA700MA1
700	MDLB2700	HMDLB2700	TA700MA1
800	MDLB2800	HMDLB2800	TA800MA2

## Types MDLB and HMDLB Thermal-Magnetic Circuit Breakers with Non-Interchangeable Trip Units—Three-Pole ①

Maximum Continuous Ampere Rating at 40 °C	Standard Interrupting Capacity	High Interrupting Capacity	Standard Terminals Only ②
	600 Vac Rated 50 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	600 Vac Rated 65 kAIC at 480 Vac Factory Assembled Circuit Consisting of Frame, Trip Unit and Terminals Catalog Number	See Page V4-T2-321 for Optional Terminals Catalog Number
300	MDLB3300	HMDLB3300	TA700MA1
350	MDLB3350	HMDLB3350	TA700MA1
400	MDLB3400	HMDLB3400	TA700MA1
450	MDLB3450	HMDLB3450	TA700MA1
500	MDLB3500	HMDLB3500	TA700MA1
600	MDLB3600	HMDLB3600	TA700MA1
700	MDLB3700	HMDLB3700	TA700MA1
800	MDLB3800	HMDLB3800	TA800MA2

**Notes**

① Factory sealed for reverse feed application.

② Two terminals are required per pole.

**Types MDL and HMDL Electronic Circuit Breakers with Interchangeable Trip Units**

Order as Individual Components: breaker frame, trip unit and terminals.  
See 310+ adjustability specifications on **Page V4-T2-324**.

**Types MDL and HMDL Electronic Circuit Breakers with Interchangeable 310+ Trip Units—Three-Pole**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip RMS 310+ Trip Unit Only ①				Neutral CT for LSG and LSI <sup>②③</sup>	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Standard LS	Optional LSI	LSG	LSIG		
			Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
Catalog Number	Catalog Number	Catalog Number	Catalog Number			Catalog Number		
800	MDL3800F	HMDL3800F	MES3800LS	MES3800LSI	MES3800LSG	MES3800LSIG	LGFACT600	See Page V4-T2-322

**Types MDLB and HMDLB Electronic Circuit Breakers with Non-Interchangeable 310+ Trip Units ④**

Maximum Continuous Ampere Rating at 40 °C	Factory-Assembled Circuit Breaker Consisting of Frame and Trip Unit Less Terminals					Neutral CT for LSG and LSI <sup>②③</sup>
	LS	LSI	LSG	LSIG		
	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection	Catalog Number	
Catalog Number					Catalog Number	
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>						
800	MDLB3800FT33W	MDLB3800FT32W	MDLB3800FT35W	MDLB3800FT36W	LGFACT600	
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>						
800	HMDLB3800FT33W	HMDLB3800FT32W	HMDLB3800FT35W	HMDLB3800FT36W	LGFACT600	

**100% Rated Types CMDL and CHMDL Electronic Circuit Breakers with Interchangeable Trip Units**

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at the 75 °C ampacity. All 100% rated circuit breakers have electronic trip units. Order as individual components: breaker frame, trip unit and terminals. See 310+ adjustability specifications on **Page V4-T2-324**.

**100% Rated Types CMDL and CHMDL Electronic Circuit Breakers with Interchangeable 310+ Trip Units—Three-Pole**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip RMS 310+ Trip Unit Only ①				Neutral CT for LSG and LSI <sup>②③</sup>	Terminal Information
	Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac	High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac	Standard LS	Options LSI	LSG	LSIG		
			Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay Ramp	Independently Adjustable Short Time Pickup and Delay	Adjustable Short Time Pickup with I <sup>2</sup> t Short Delay and Ground Fault Protection	Independently Adjustable Short Time Pickup and Ground Fault Protection		
Catalog Number	Catalog Number	Catalog Number	Catalog Number			Catalog Number		
800	CMDL3800F	CHMDL3800F	MES3800LS	MES3800LSI	MES3800LSG	MES3800LSIG	LGFACT600	See Page V4-T2-322

**Notes**

- ① For AC use only.
- ② Required for four-wire systems if neutral protection is desired.
- ③ Included with LSG and LSI<sup>②</sup> trip units or breakers.
- ④ Factory sealed, suitable for reverse feed application. CMDLB and CHMDLB are also available.

**Molded Case Switches**

Eaton's molded case switches are used as compact switches in applications requiring high current switching capabilities. Molded case switches are constructed of circuit breaker

components and are of the high instantaneous automatic type. Molded case switches are listed in accordance with Underwriters Laboratories Standard UL 489.

**Molded Case Switches**

<b>Maximum Continuous Ampere Rating at 40 °C</b>	<b>600 Vac Maximum, 250 Vdc Circuit Breaker Only without Line and Load Terminals Catalog Number</b>
<b>Two-Pole</b>	
800	<b>MDL2800WK</b>
	<b>MDLB2800WK</b> ①
	<b>HMDL2800WK</b>
<b>Three-Pole</b>	
800	<b>MDL3800WK</b>
	<b>MDLB3800WK</b> ①
	<b>HMDL3800WK</b>

**Notes**

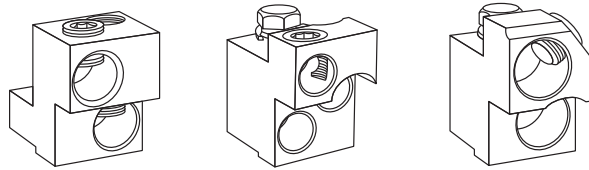
① MDLB and HMDLB are suitable for reverse feed applications.

Molded case switch may trip above 6000 amperes.

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

M-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.



TA700MA1

TA800MA2

TA801MA

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/No. Conductors	Terminal Catalog Number	Terminals with Control Wire Termination Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>					
700	Aluminum	Cu/Al	1–500 kcmil (2)	TA700MA1	TA700MA1CWT
800 std.	Aluminum	Cu/Al	3/0–400 kcmil (3)	TA800MA2	TA800MA2CWT
800	Aluminum	Cu/Al	500–750 kcmil (2)	TA801MA	TA801MACWT
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>					
600	Copper	Cu	2/0–500 kcmil (2)	T600MA1	—
800	Copper	Cu	3/0–300 kcmil (3)	T800MA1	—

## Accessories

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### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### MD Frame Accessories

Description	Reference Page	Two-Pole <sup>①</sup>		Three-Pole		
		Left	Right	Left	Center	Right
<b>Internal Accessories (Only One Internal Accessory Per Pole)</b>						
Alarm lockout (Make/Break)	V4-T2-380	■	■	■		■
Alarm lockout (2Make/2Break)	V4-T2-380	■	■	■		■
Auxiliary switch (1A, 1B)	V4-T2-382	■	■	■		■
Auxiliary switch (2A, 2B)	V4-T2-382	■	■	■		■
Auxiliary switch (3A, 3B)	V4-T2-382	■	■	■		■
Auxiliary switch (1A, 1B) and alarm switch combination	V4-T2-384	■	■	■		■
Auxiliary switch (2A, 2B) and alarm switch combination	V4-T2-384	■	■	■		■
Shunt trip—standard <sup>②</sup>	V4-T2-387	■	■	■		■
Shunt trip—low energy <sup>②</sup>	V4-T2-389	■	■	■		■
Undervoltage release mechanism <sup>②</sup>	V4-T2-395	■	■	■		■
<b>External Accessories</b>						
Rear fed terminals	V4-T2-416	●	●	●	●	●
Base mounting hardware	V4-T2-417				●	
Terminal shields	V4-T2-419				●	
Interphase barriers	V4-T2-419				●	
Non-padlockable handle block	V4-T2-420				■	
Padlockable handle lock hasp	V4-T2-421	□		□		□
Key interlock kit	V4-T2-422	□		□		□
Sliding bar interlock—requires two breakers	V4-T2-423	●	●	●	●	●
Walking beam interlock—requires two breakers	V4-T2-423	●	●	●	●	●
Electrical (motor) operator	V4-T2-424	●	●	●	●	●
Plug-in adapters	V4-T2-426	●	●	●	●	●
Rear connecting studs	V4-T2-427	●	●	●	●	●
Panelboard connecting straps	V4-T2-428	●	●	●	●	●
Handle mechanisms	V4-T2-508	●	●	●	●	●
Handle extension	V4-T2-522	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-430	●	●	●	●	●
<b>Modifications (Refer to Eaton)</b>						
Special calibration	—	●	●	●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Notes

- ① Two-pole breaker supplied in three-pole frame. Current carrying parts omitted from center pole.  
 ② Shunt trip and UVR cannot be mounted in right poles on MES trip units.

## 310+ Electronic Trip Unit Accessories

Description	Catalog Number
Electronic portable test kit	MTST230V ①
Trip unit tamper protection wire seal	5108A03H01
External neutral sensor	LGFACT600 ②
Breaker-mount cause-of-trip indication	TRIP-LED
Breaker-mount ammeter module	DIGIVIEW
Remote-mount ammeter module	DIGIVIEWR06 ③

## Technical Data and Specifications

## UL 489/CSA Interrupting Capacity Ratings ④

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			Volts DC ⑤⑥
		Volts AC (50/60 Hz)			
		240	480	600	250
MDL, MDLB	2, 3	65	50	25	22
CMDL	2, 3	65	50	25	—
HMDL, HMDLB	2, 3	100	65	35	25
CHMDL	2, 3	100	65	35	—

## IEC 947-2 Interrupting Capacity Ratings ④

Circuit Breaker Type	Number of Poles	Interrupting Capacity rms (kA Symmetrical Amperes) $I_{cu} \neq I_{cs}$			Volts DC ⑤⑥
		Volts AC (50/60 Hz)			
		240	415	690	250
MDL, MDLB	2, 3	65/65	50/50	20/10	20/10
CMDL	2, 3	65/65	50/50	20/10	—
HMDL, HMDLB	2, 3	100/100	70/50	25/13	20/10
CHMDL	2, 3	100/100	70/50	25/13	—

## Notes

- ① MTST230V applies to 100–230 Vac.
- ② Included with all LD LSG and LSG trip units and breakers.
- ③ Includes 6 ft cable for remote mounting; NEMA 3R rated.
- ④ Utilization Category A circuit breakers.
- ⑤ Two-pole or two poles of three-pole circuit breaker. Thermal-magnetic trip units only, MDL, HMDL breakers with electronic trip unit are not DC rated.
- ⑥ Time constant is 3 milliseconds minimum at 10 kA and 8 milliseconds at 22 kA.



## 310+ Specifications

Description	Specification
Trip Unit Type	Digitrip RMS 310+
<b>Breaker Type</b>	
Frame designation	MDL
Frames available	800 A
Continuous current range (A)	320–800 A
Ground fault pickup (A)	160–800 A
Interrupting capacities at 480 Vac (kAIC)	50, 65
100% rated	Yes
<b>Protection</b>	
Ordering options	LS, LSI, LSG, LSIG, ALSI, ALSIG
Arcflash Reduction Maintenance System (or Maintenance Mode)	Remote enabled on ALSI, ALSIG
Interchangeable trip unit	Yes
High load alarm (suffix B20) ①	Yes
Ground fault alarm with trip (suffix B21) ①	LSG, LSIG, ALSIG
Ground fault alarm, no trip (suffix B22) ①	LSG, LSIG, ALSIG
Zone selective interlocking (suffix ZG)	LSI, LSIG, ALSI, ALSIG
Cause of trip indication	Yes (via TRIP-LED or DIGIVIEW)
Thru-cover accessories	No

## 310+ Adjustability Specifications

Description	MDL Frame Specification	
310+ settings	800 A	
$I_r$ = continuous current or long delay pickup (amperes) (All 310+)	$I_r$	
	A	320
	B	400
	C	450
	D	500
	E	600
	F	630
	G	700
	H (= $I_n$ )	800
$t_r$ = long delay time (seconds) (All 310+)	2	2
	4	4
	7	7
	10	10
	12	12
	15	15
	20	20
	24	24
$I_{sd}$ (x $I_r$ ) = short delay pickup (All 310+)	Position 1	2x
	Position 2	3x
	Position 3	4x
	Position 4	5x
	Position 5	6x
	Position 6	7x
	Position 7	8x
	Position 8	8x
	Position 9	8x
$t_{sd}$ = short delay time $I^2t$ (milliseconds) (LS and LSG)	Fixed	67 @10x
$t_{sd}$ = short delay time flat (milliseconds) (LSI, LSIG, ALSI, ALSIG)	Position 1	Inst
	Position 2	120
	Position 3	300
$I_g$ (x $I_n$ ) = ground fault pickup (amperes) (310+ w/ ground fault)	Position 1	160
	Position 2	240
	Position 3	320
	Position 4	480
	Position 5	640
	Position 6	800
$t_g$ = ground fault delay time (milliseconds) (LSG, LSIG, ALSIG)	Position 1	Inst
	Position 2	120
	Position 3	300
Independently adjustable Instantaneous (li) setting	②	
Maintenance Mode pickup (2.5 x $I_n$ ) (amperes) (310+ with Maintenance Mode—ALSI and ALSIG)	Fixed	2000

**Notes**

- ① B2x suffixes cannot be combined with B2x suffixes.  
 ② Not available for MDL. Independently adjustable li setting available in LG, NG, and RG ALSI and ALSIG trip units.

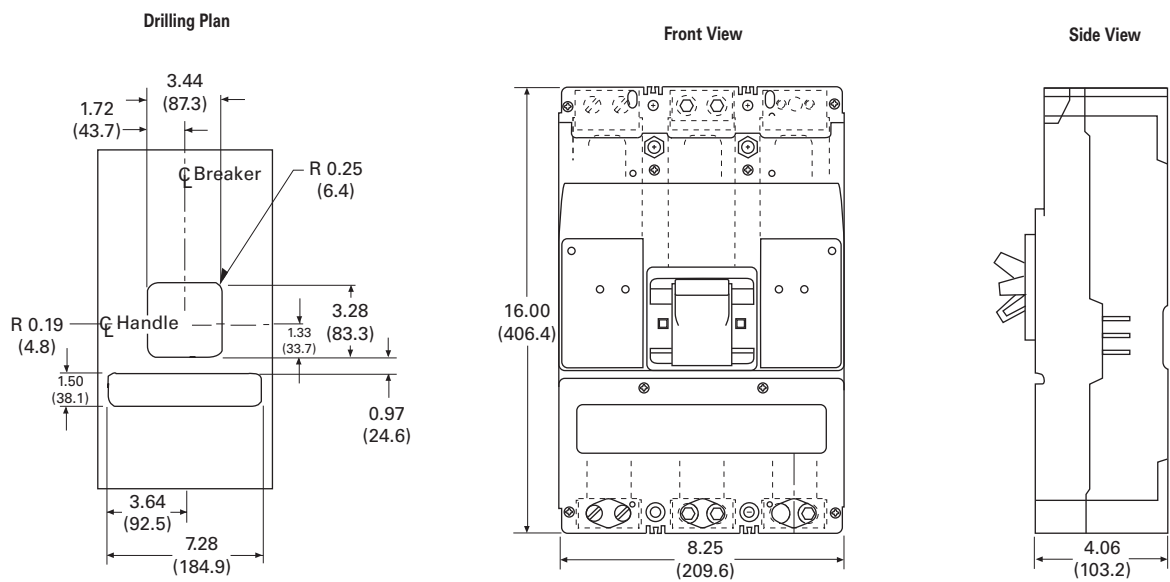
**Dimensions and Weights**

Dimensions in Inches (mm)

**MD Frame**

Number of Poles	Width	Height	Depth
2, 3	8.25 (209.6)	16.00 (406.4)	4.06 (103.1)

**MDL-Frame, Two- and Three-Pole**



Approximate Shipping Weight, Lbs (kg)

**MD Frame**

Breaker Type	Complete Breaker		Frame Only		Trip Unit ①	
	Two-Pole	Three-Pole	Two-Pole	Three-Pole	Two-Pole	Three-Pole
MDL, HMDL (T/M T.U.)	26.5 (12.0)	29.0 (13.2)	24.5 (11.1)	26.0 (11.8)	2.5 (1.1)	3.0 (1.4)
MDL, HMDL (Elec. T.U.)	—	30.0 (13.6)	—	26.0 (11.8)	—	4.0 (1.8)

**Note**

① Thermal-magnetic only.

Typical N-Frame Breaker

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Quick Reference . . . . .	<b>V4-T2-222</b>
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F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-239</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-257</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-265</b>
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N-Frame (400–1200 Amperes)	
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Internal Accessories . . . . .	<b>V4-T2-377</b>
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### N-Frame (400–1200 Amperes)

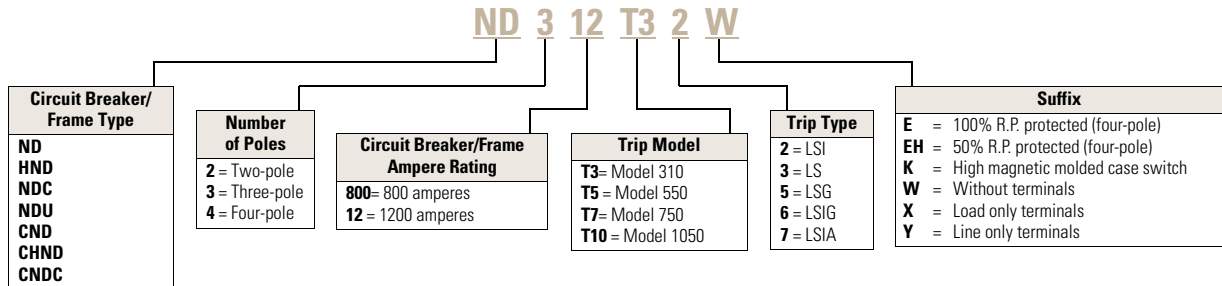
#### Product Description

- All Eaton N-Frame circuit breakers are suitable for reverse feed use
- All N-Frame circuit breakers are HACR rated

**Catalog Number Selection**

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

**Circuit Breaker/Frame**



# 2.4

## Molded Case Circuit Breakers

### Series C

#### Product Selection

2

#### Digitrip OPTIM Electronic Circuit Breakers with Interchangeable Rating Plugs

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

#### Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) OPTIM 550 <sup>②</sup>					
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>					
800	ND3800T52W	ND3800T56W	ND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
1200	ND312T52W	ND312T56W	ND312T57W	800	ORPN80A800
				600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
800	HND3800T52W	HND3800T56W	HND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
1200	HND312T52W	HND312T56W	HND312T57W	800	ORPN80A800
				600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

#### Notes

<sup>①</sup> Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

<sup>②</sup> Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

## Digitrip OPTIM 550 Electronic Circuit Breakers with Interchangeable Rating Plugs, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) OPTIM 550 ②				
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>					
800	NDC3800T52W	NDC3800T56W	NDC3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200	NDC312T52W	NDC312T56W	NDC312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

**Notes**

① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.

② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.

#### Digitrip OPTIM 1050 Electronic Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	L– Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) <sup>①</sup> S– Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I– Adjustable Instantaneous Pickup G– Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response) A– Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response) OPTIM 1050 <sup>②③</sup>			
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>				
800	ND3800T106W	ND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	ND312T106W	ND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
800	HND3800T106W	HND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	HND312T106W	HND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
800	NDC3800T106W	NDC3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	NDC312T106W	NDC312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② One Form C auxiliary switch and one Form C bell (trip) alarm switch supplied with breaker as standard.
- ③ Factory sealed.

### 100% Rated Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plugs

Order as individual components: breaker frame (which includes trip unit), rating plug, terminals.

### 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) ① S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response) OPTIM 550 ②					
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>					
800	CND3800T52W	CND3800T56W	CND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200 ③	CND312T52W	CND312T56W	CND312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>					
800	CHND3800T52W	CHND3800T56W	CHND3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200 ③	CHND312T52W	CHND312T56W	CHND312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

#### Notes

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.
- ③ Includes conductor extension kit, which increases breaker length 3.75 on each end. Terminal ordered separate.



#### 100% Rated Digitrip OPTIM 550 Circuit Breakers with Interchangeable Rating Plugs, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only			Digitrip OPTIM Rating Plug Only	
	LSI Catalog Number	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>OPTIM 550</b> <sup>②</sup> L – Adjustable Long Delay Pickup (I <sub>l</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)				
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>					
800	CNDC3800T52W	CNDC3800T56W	CNDC3800T57W	400	ORPN80A400
				450	ORPN80A450
				500	ORPN80A500
				550	ORPN80A550
				600	ORPN80A600
				700	ORPN80A700
				800	ORPN80A800
1200 <sup>③</sup>	CNDC312T52W	CNDC312T56W	CNDC312T57W	600	ORPN12A600
				700	ORPN12A700
				800	ORPN12A800
				1000	ORPN12A100
				1200	ORPN12A120

**Notes**

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② Zone interlocking, PowerNet, or both features can be added at the factory by adding suffixes **ZG**, **PN** or **ZGP** respectively to above catalog number.
- ③ Includes conductor extension kit, which increases breaker length 3.75 on each end. Terminal ordered separate.

## 100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>OPTIM 1050</b> ②③				
<b>L</b> – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time ( $I^2t$ or $I^4t$ Response) ①				
<b>S</b> – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response)				
<b>I</b> – Adjustable Instantaneous Pickup				
<b>G</b> – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)				
<b>A</b> – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)				
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 50 kAIC at 480 Vac</b>				
800	CND3800T106W	CND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	CND312T106W	CND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
800	CHND3800T106W	CHND3800T107W	400	ORPN80A400
			450	ORPN80A450
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	CHND312T106W	CHND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120

**Notes**

- ① Long delay  $I^4t$  response selection limits short delay time to flat response.  
 ② One Form C auxiliary switch one Form C bell (trip) alarm switch supplied with breaker as standard.  
 ③ Factory sealed.

#### 100% Rated Digitrip OPTIM 1050 Circuit Breakers with Interchangeable Rating Plugs, continued

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIG Catalog Number	LSIA Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
	<b>OPTIM 1050</b> <sup>②③</sup> L – Adjustable Long Delay Pickup (I <sub>L</sub> ) with Adjustable Long Delay Time (I <sup>2</sup> t or I <sup>4</sup> t Response) <sup>①</sup> S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response) A – Adjustable Ground Fault Alarm with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)			
<b>Three-Pole Ultra High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
800	CND3800T106W	CND3800T107W	400	ORPN80A400
			450	ORPN80A450
			500	ORPN80A500
			550	ORPN80A550
			600	ORPN80A600
			700	ORPN80A700
			800	ORPN80A800
1200	CND312T106W <sup>④</sup>	CND312T107W	600	ORPN12A600
			700	ORPN12A700
			800	ORPN12A800
			1000	ORPN12A100
			1200	ORPN12A120

#### Type ND Molded Case Switches

#### Type ND High Instantaneous (K)

Continuous Ampere Rating at 40 °C	Three-Pole Catalog Number	Four-Pole <sup>⑤</sup> Catalog Number
800	ND3800WK	ND4800WK
	HND3800WK	HND4800WK
1200	ND312WK	ND412WK
	HND312WK	HND412WK

#### Notes

- ① Long delay I<sup>4</sup>t response selection limits short delay time to flat response.
- ② One Form C auxiliary switch one Form C bell (trip) alarm switch supplied with breaker as standard.
- ③ Factory sealed.
- ④ Includes conductor extension kit, which increases breaker length 3.75 on each end. Terminal ordered separate.
- ⑤ Neutral is in right pole.

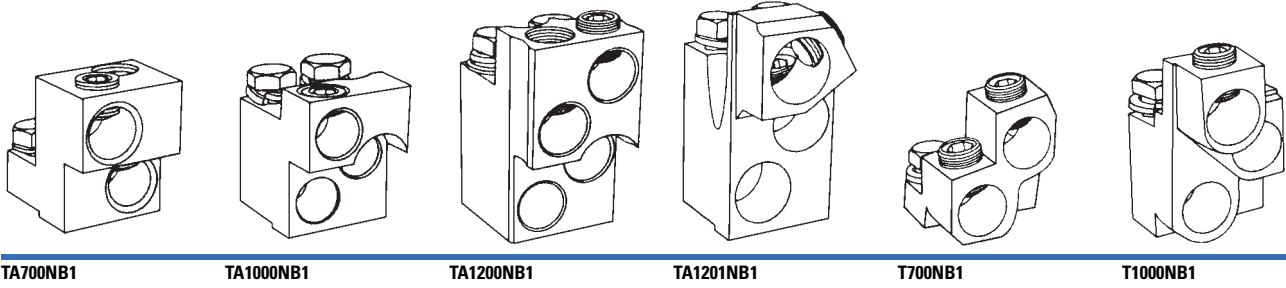
Molded case switch will trip above 14,000 amperes.

For UL listed, series tested molded case switch application data, refer to Eaton.

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals—Ordering Information

N-Frame circuit breakers use Cu/Al terminals as standard. When optional copper or Cu/Al terminals are required, order by catalog number. Specify if factory installation is required.



### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range/ No. Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Standard Cu/Al Pressure Terminals</b>					
700	Aluminum	Cu/Al	1–500 kcmil (2)	50–240	<b>TA700NB1</b>
1000	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185	<b>TA1000NB1</b> ①
1200	Aluminum	Cu/Al	4/0–500 kcmil (4)	120–240	<b>TA1200NB1</b> ①
1200	Aluminum	Cu/Al	500–750 kcmil (3)	300–400	<b>TA1201NB1</b> ②
<b>Optional Copper and Cu/Al Pressure Type Terminals</b>					
700	Copper	Cu	2/0–500 kcmil (2)	70–240	<b>T700NB1</b>
1000	Copper	Cu	3/0–500 kcmil (3)	95–240	<b>T1000NB1</b>
1200	Copper	Cu	3/0–400 kcmil (4)	95–185	<b>T1200NB3</b>

#### Notes

① Terminal rating is AL9CU.

② Terminal rating is AL7CU.

### Accessories

#### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

#### ND Frame Accessories

Description	Reference Page	Three-Pole			Four-Pole			Neutral
		Left	Center	Right	Left	Center	Right	
<b>Internal Accessories (Only One Internal Accessory Per Pole) ①</b>								
Alarm lockout (Make/Break)	V4-T2-380	■		■	■		■	
Alarm lockout (2Make/2Break)	V4-T2-380	■		■	■		■	
Auxiliary switch (1A, 1B)	V4-T2-382	■		■	■		■	
Auxiliary switch (2A, 2B)	V4-T2-382	■		■	■		■	
Auxiliary switch (3A, 3B)	V4-T2-382	■		■	■		■	
Auxiliary switch (1A, 1B) and alarm switch combination	V4-T2-384	■		■	■		■	
Auxiliary switch (2A, 2B) and alarm switch combination	V4-T2-384	■		■	■		■	
Shunt trip—standard	V4-T2-388	■			■			
Shunt trip—low energy	V4-T2-389	■			■			
Undervoltage release mechanism	V4-T2-396	■			■			
Eaton PowerNet communications kit (OPTIM 550)	V4-T2-397			■				
<b>External Accessories</b>								
Base mounting hardware	V4-T2-417	●	●	●	●	●	●	●
Interphase barriers	V4-T2-419	●	●	●	●	●	●	●
Terminal shield	V4-T2-419	■	■	■				
Non-padlockable handle block	V4-T2-420		■			■		
Padlockable handle lock hasp	V4-T2-421	□		□	□		□	
Key interlock kit	V4-T2-422	□		□	□		□	
Sliding bar interlock—requires two breakers	V4-T2-423	●	●	●				
Walking beam interlock—requires two breakers	V4-T2-423	●	●	●	●	●	●	●
Electrical (motor) operator	V4-T2-425	●	●	●	●	●	●	●
Plug-in adapters	V4-T2-426	●	●	●	●	●	●	●
Rear connecting studs	V4-T2-427	●	●	●	●	●	●	●
Panelboard connecting straps	V4-T2-428	●	●	●	●	●	●	●
Handle mechanisms	V4-T2-508	●	●	●	●	●	●	●
Handle extension	V4-T2-522	●	●	●	●	●	●	●
Solid-state (electronic) portable test kit	V4-T2-431	●	●	●	●	●	●	●
<b>OPTIM System Components Three Poles</b>								
Ground fault alarm unit	V4-T2-430							
Potential transformer module	V4-T2-430							
Breaker interface module (BIM)	V4-T2-431							
Digitrip OPTIMizer	V4-T2-431							
Auxiliary power module	V4-T2-431							
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- May be mounted on left or right pole—not both
- Accessory available/modification available

#### Note

① OPTIM 550 and 1050 are factory sealed and do not have the right pole available for accessories.

## Technical Data and Specifications

### UL 489 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			
		Volts AC (50/60 Hz)			
		240	277	480	600
ND	2, 3, 4	65	—	50	25
CND <sup>②</sup>	2, 3, 4	65	—	50	25
HND	2, 3, 4	100	—	65	35
CHND <sup>②</sup>	2, 3, 4	100	—	65	35
NDC	2, 3, 4	200	—	100	65
CNDC <sup>②</sup>	2, 3, 4	200	—	100	65
NDU <sup>③</sup>	3	300 <sup>④</sup>	—	150	75 <sup>⑤</sup>

### IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)		
		Volts AC (50/60 Hz)		
		240	415	690
<b>ND</b>				
$I_{CU}$	2, 3, 4	85	50	20
$I_{CS}$	2, 3, 4	85	50	10
<b>CND <sup>②</sup></b>				
$I_{CU}$	2, 3, 4	85	50	20
$I_{CS}$	2, 3, 4	85	50	10
<b>HND</b>				
$I_{CU}$	2, 3, 4	100	70	25
$I_{CS}$	2, 3, 4	100	50	13
<b>CHND <sup>②</sup></b>				
$I_{CU}$	2, 3, 4	100	70	25
$I_{CS}$	2, 3, 4	100	50	13
<b>NDC</b>				
$I_{CU}$	2, 3, 4	200	100	35
$I_{CS}$	2, 3, 4	100	50	18
<b>CNDC <sup>②</sup></b>				
$I_{CU}$	2, 3, 4	200	100	35
$I_{CS}$	2, 3, 4	100	50	18

#### Notes

- ① Utilization Category A circuit breakers.
- ② 100% rated breakers.
- ③ 800 amperes maximum rating.
- ④ Successfully tested at 300 kAIC, although UL recognizes maximum of 200 kAIC at 240 Vac.
- ⑤ Successfully tested at 75 kAIC, although UL recognizes maximum of 65 kAIC at 600 Vac.

## N-Frame Digitrip

Trip Unit Type	Digitrip OPTIM 550	Digitrip OPTIM 1050
rms sensing	Yes	Yes
<b>Breaker Type</b>		
Frame	N	N
Ampere range	400–1200 A	400–1200 A
Interrupting rating at 480 volts	50, 65, 100 (kA)	50, 65, 100 (kA)
<b>Protection</b>		
Ordering options	LSI, LSIG, LSI(A)	LSI(A), LISG
Fixed rated plug ( $I_n$ )	Yes	Yes
Overtemperature trip	Yes	Yes
<b>Long Delay Protection (L)</b>		
Adjustable rating plug ( $I_n$ )	No	No
Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds
Long delay time $I^4t$	1–5 seconds	1–5 seconds
Long delay thermal memory	Yes	Yes
High load alarm	No	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>		
Short delay pickup	150–800% x ( $I_r$ )	150–800% x ( $I_r$ )
Short delay time $I^2t$	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes	Yes
<b>Instantaneous Protection (I)</b>		
Instantaneous pickup	200–800% x ( $I_n$ )	200–800% x ( $I_n$ )
Discriminator	Yes	Yes
Instantaneous override	Yes	Yes
<b>Ground Fault Protection (G)</b>		
Ground fault alarm	20–100% x ( $I_s$ )	20–100% x ( $I_s$ )
Ground fault pickup	20–100% x ( $I_s$ )	20–100% x ( $I_s$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes ①	Yes
Ground fault thermal memory	Yes	Yes
<b>System Diagnostics</b>		
Status LEDs	Yes	Yes
Cause of trip LEDs	Yes	Yes
Magnitude of trip information	Yes	Yes
Remote signal contact—ground alarm	Yes ①	Yes
Local auxiliary and bell alarm contact	Optional	Included

**Legend**

BIM = Breaker Interface Module

(A) = GF Alarm

 $I_s$  = Sensor Rating $I_n$  = Rating Plug $I_r$  = Long Delay Pickup Setting**Note**

① Zone interlock kit.

**N-Frame Digitrip, continued**

<b>Trip Unit Type</b>	<b>Digitrip OPTIM 550</b>	<b>Digitrip OPTIM 1050</b>
<b>System Monitoring</b>		
Digital display	Yes <sup>①</sup>	Yes <sup>①</sup>
Current	Yes	Yes
Power and energy	No	Yes
Power quality—harmonics	No	Yes
Power factor	No	Yes
<b>Communications</b>		
Eaton PowerNet	No <sup>②</sup>	Yes
<b>Testing</b>		
Testing method	OPTIMizer, BIM, PowerNet	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting

**Notes**

- <sup>①</sup> By OPTIMizer/BIM.  
<sup>②</sup> Eaton's PowerNet kit.



# 2.4

## Molded Case Circuit Breakers

### Series C

#### Dimensions and Weights

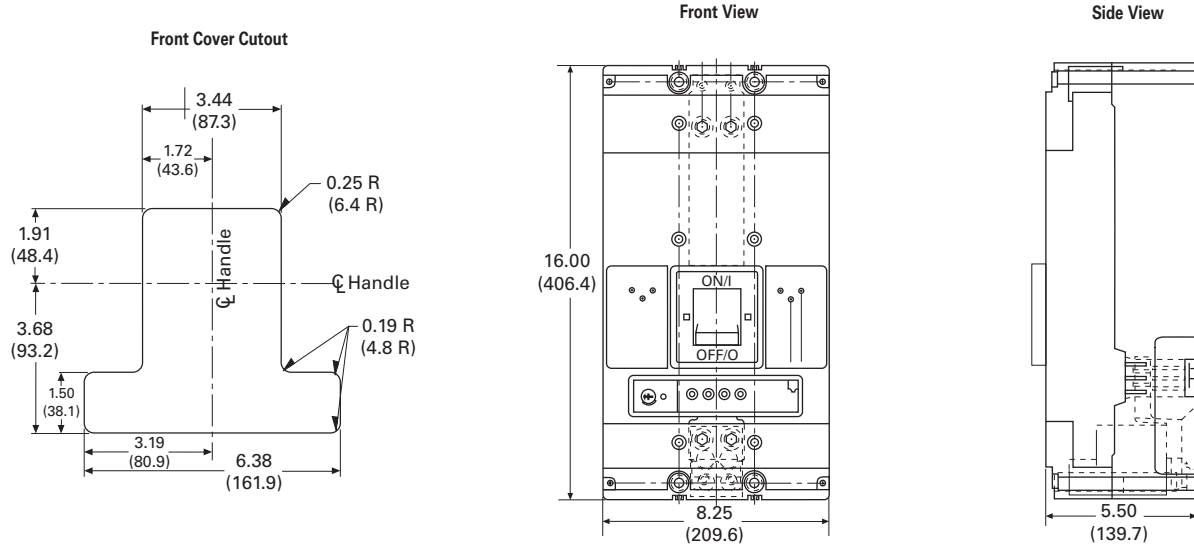
Approximate Dimensions in Inches (mm)

2

#### ND Frame

Number of Poles	Width	Height	Depth
2, 3	8.25 (209.6)	16.00 (406.4)	5.50 (139.7)
4	11.13 (282.6)	16.00 (406.4)	5.50 (139.7)

#### ND-Frame, Two- and Three-Pole



Approximate Shipping Weight in Lbs (kg)

#### ND Frame

Breaker Type	Complete Breaker		
	Two-Pole	Three-Pole	Four-Pole
ND, HND, NDC, NDU	37 (16.8)	45 (20.4)	58 (26.3)

Typical R-Frame Breaker



## Contents

<i>Description</i>	<i>Page</i>
Product Overview . . . . .	<b>V4-T2-220</b>
Standards and Certifications . . . . .	<b>V4-T2-221</b>
Quick Reference . . . . .	<b>V4-T2-222</b>
G-Frame (15–100 Amperes) . . . . .	<b>V4-T2-225</b>
F-Frame (10–225 Amperes) . . . . .	<b>V4-T2-239</b>
J-Frame (70–250 Amperes) . . . . .	<b>V4-T2-257</b>
K-Frame (70–400 Amperes) . . . . .	<b>V4-T2-265</b>
L-Frame (125–600 Amperes) . . . . .	<b>V4-T2-289</b>
M-Frame (300–800 Amperes) . . . . .	<b>V4-T2-315</b>
N-Frame (400–1200 Amperes) . . . . .	<b>V4-T2-326</b>
R-Frame (800–2500 Amperes)	
Catalog Number Selection . . . . .	<b>V4-T2-342</b>
Product Selection . . . . .	<b>V4-T2-343</b>
Accessories . . . . .	<b>V4-T2-355</b>
Technical Data and Specifications . . . . .	<b>V4-T2-356</b>
Dimensions and Weights . . . . .	<b>V4-T2-359</b>
Motor Circuit Protectors (MCP) . . . . .	<b>V4-T2-360</b>
Motor Protection Circuit Breakers (MPCB) . . . . .	<b>V4-T2-371</b>
Type ELC Current Limiter Attachment (Size 0–4) . . . . .	<b>V4-T2-373</b>
Current Limiting Circuit Breaker Module . . . . .	<b>V4-T2-374</b>
Internal Accessories . . . . .	<b>V4-T2-377</b>
External Accessories . . . . .	<b>V4-T2-410</b>

## R-Frame (800–2500 Amperes)

### Product Description

- Eaton R-Frame circuit breakers are available as frame (which includes trip unit), rating plug and terminals
- All R-Frame circuit breakers are suitable for reverse feed use

# 2.4

## Molded Case Circuit Breakers

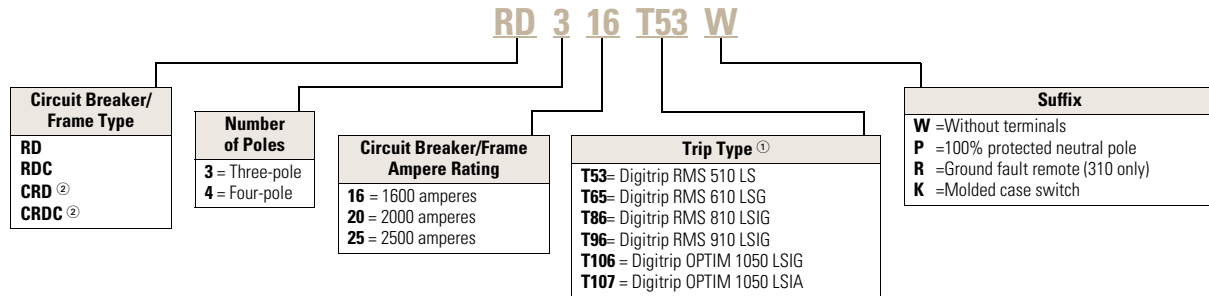
### Series C

#### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### Circuit Breaker/Frame



#### Notes

- ① For complete list of available trip types, refer to **Pages V4-T2-343 to V4-T2-352**.
- ② No four-pole for CRD and CRDC.

## Product Selection

### Digitrip RMS 510 Electronic Circuit Breakers with Interchangeable Rating Plugs

Order as individual components: breaker frame (which includes trip unit) and rating plug.

### Digitrip RMS 510 Electronic Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response) I – Adjustable Instantaneous Pickup G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	LI	LS	LSI	LIG	LSG	LSIG		
Catalog Number								
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T51W	RD316T53W	RD316T52W	RD316T54W	RD316T55W	RD316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T51W	RD320T53W	RD320T52W	RD320T54W	RD320T55W	RD320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T51W	RD325T53W	RD325T52W	RD325T54W	RD325T55W	RD325T56W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T51W	RDC316T53W	RDC316T52W	RDC316T54W	RDC316T55W	RDC316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T51W	RDC320T53W	RDC320T52W	RDC320T54W	RDC320T55W	RDC320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T51W	RDC325T53W	RDC325T52W	RDC325T54W	RDC325T55W	RDC325T56W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250

# 2.4

## Molded Case Circuit Breakers

### Series C

#### 100% Rated Digitrip RMS 510 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at 75 °C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

2

#### 100% Rated Digitrip RMS 510 Circuit Breakers

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L LI	S LS	I LSI	G LIG	LSG	LSIG	Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T51W	CRD316T53W	CRD316T52W	CRD316T54W	CRD316T55W	CRD316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRD320T51W	CRD320T53W	CRD320T52W	CRD320T54W	CRD320T55W	CRD320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	—	CRDC316T53W	CRDC316T52W	CRDC316T54W	CRDC316T55W	CRDC316T56W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRDC320T51W	CRDC320T53W	CRDC320T52W	CRDC320T54W	CRDC320T55W	CRDC320T56W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

① Includes B2016RDL rear connectors.

**Digitrip RMS 610 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 610 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only					
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number				
	S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response)											
I – Adjustable Instantaneous Pickup						LI	LS	LSI	LIG	LSG	LSIG	
G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)												Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>												
1600	RD316T61W	RD316T63W	RD316T62W	RD316T64W	RD316T65W	RD316T66W	800	RP6R16A080				
							1000	RP6R16A100				
							1200	RP6R16A120				
							1600	RP6R16A160				
2000	RD320T61W	RD320T63W	RD320T62W	RD320T64W	RD320T65W	RD320T66W	1000	RP6R20A100				
							1200	RP6R20A120				
							1600	RP6R20A160				
							2000	RP6R20A200				
2500	RD325T61W	RD325T63W	RD325T62W	RD325T64W	RD325T65W	RD325T66W	1600	RP6R25A160				
							2000	RP6R25A200				
							2500	RP6R25A250				
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>												
1600	RDC316T61W	RDC316T63W	RDC316T62W	RDC316T64W	RDC316T65W	RDC316T66W	800	RP6R16A080				
							1000	RP6R16A100				
							1200	RP6R16A120				
							1600	RP6R16A160				
2000	RDC320T61W	RDC320T63W	RDC320T62W	RDC320T64W	RDC320T65W	RDC320T66W	1000	RP6R20A100				
							1200	RP6R20A120				
							1600	RP6R20A160				
							2000	RP6R20A200				
2500	RDC325T61W	RDC325T63W	RDC325T62W	RDC325T64W	RDC325T65W	RDC325T66W	1600	RP6R25A160				
							2000	RP6R25A200				
							2500	RP6R25A250				

# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip RMS 610 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at 75 °C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

#### 100% Rated Digitrip RMS 610 Circuit Breakers

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	LI	LS	LSI	LIG	LSG	LSIG	Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
	<b>L – Adjustable Long Delay Pickup (I<sub>l</sub>) with Adjustable Long Delay Time</b> <b>S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I<sup>2</sup>t or Flat Response)</b> <b>I – Adjustable Instantaneous Pickup</b> <b>G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I<sup>2</sup>t or Flat Response)</b>							
	<b>LI                      LS                      LSI                      LIG                      LSG                      LSIG</b> <b>Catalog Number</b>							
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T61W	CRD316T63W	CRD316T62W	CRD316T64W	CRD316T65W	CRD316T66W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRD320T61W	CRD320T63W	CRD320T62W	CRD320T64W	CRD320T65W	CRD320T66W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	CRDC316T61W	CRDC316T63W	CRDC316T62W	CRDC316T64W	CRDC316T65W	CRDC316T66W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>①</sup>	CRDC320T61W	CRDC320T63W	CRDC320T62W	CRDC320T64W	CRDC320T65W	CRDC320T66W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

<sup>①</sup> Includes B2016RDL rear connectors.

**Digitrip RMS 810 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 810 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	LI	LS	LSI	LIG	LSG	LSIG	Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
	L – Adjustable Long Delay Pickup (I <sub>p</sub> ) with Adjustable Long Delay Time							
	S – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response)							
	I – Adjustable Instantaneous Pickup							
	G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)							
	Catalog Number							
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T81W	RD316T83W	RD316T82W	RD316T84W	RD316T85W	RD316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T81W	RD320T83W	RD320T82W	RD320T84W	RD320T85W	RD320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T81W	RD325T83W	RD325T82W	RD325T84W	RD325T85W	RD325T86W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T81W	RDC316T83W	RDC316T82W	RDC316T84W	RDC316T85W	RDC316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T81W	RDC320T83W	RDC320T82W	RDC320T84W	RDC320T85W	RDC320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T81W	RDC325T83W	RDC325T82W	RDC325T84W	RDC325T85W	RDC325T86W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250



# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip RMS 810 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at 75 °C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

#### 100% Rated Digitrip RMS 810 Circuit Breakers

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L LSI LI	S LS	I LSI	G LIG		LSIG	Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T81W	CRD316T83W	CRD316T82W	CRD316T84W	CRD316T85W	CRD316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>Ⓢ</sup>	CRD320T81W	CRD320T83W	CRD320T82W	CRD320T84W	CRD320T85W	CRD320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	CRDC316T81W	CRDC316T83W	CRDC316T82W	CRDC316T84W	CRDC316T85W	CRDC316T86W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>Ⓢ</sup>	CRDC320T81W	CRDC320T83W	CRDC320T82W	CRDC320T84W	CRDC320T85W	CRDC320T86W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

<sup>Ⓢ</sup> Includes B2016RDL rear connectors.

**Digitrip RMS 910 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip RMS 910 Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	L – Adjustable Long Delay Pickup ( $I_L$ ) with Adjustable Long Delay Time						Rated Current ( $I_n$ )	Fixed Rating Plug Catalog Number
	S – Adjustable Short Delay Pickup with Adjustable Short Delay Time ( $I^2t$ or Flat Response)							
I – Adjustable Instantaneous Pickup						LSIG		
G – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay ( $I^2t$ or Flat Response)								LSIG
	LI	LS	LSI	LIG	LSG			
	Catalog Number							
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	RD316T91W	RD316T93W	RD316T92W	RD316T94W	RD316T95W	RD316T96W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RD320T91W	RD320T93W	RD320T92W	RD320T94W	RD320T95W	RD320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RD325T91W	RD325T93W	RD325T92W	RD325T94W	RD325T95W	RD325T96W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	RDC316T91W	RDC316T93W	RDC316T92W	RDC316T94W	RDC316T95W	RDC316T96W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000	RDC320T91W	RDC320T93W	RDC320T92W	RDC320T94W	RDC320T95W	RDC320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
2500	RDC325T91W	RDC325T93W	RDC325T92W	RDC325T94W	RDC325T95W	RDC325T96W	1600	RP6R25A160
							2000	RP6R25A200
							2500	RP6R25A250

# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### 100% Rated Digitrip RMS 910 Circuit Breakers

The NEC allows the breaker to be rated at 100% of its frame size in an assembly, provided that 90 °C wire is applied at 75 °C ampacity. Order as individual components: breaker frame (which includes trip unit) and rating plug.

#### 100% Rated Digitrip RMS 910 Circuit Breakers

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only						Digitrip Rating Plug Only	
	LI	LS	LSI	LIG	LSG	LSIG	Rated Current (I <sub>n</sub> )	Fixed Rating Plug Catalog Number
	<b>L</b> – Adjustable Long Delay Pickup (I <sub>1</sub> ) with Adjustable Long Delay Time <b>S</b> – Adjustable Short Delay Pickup with Adjustable Short Delay Time (I <sup>2</sup> t or Flat Response) <b>I</b> – Adjustable Instantaneous Pickup <b>G</b> – Adjustable Ground Fault Pickup with Adjustable Ground Fault Time Delay (I <sup>2</sup> t or Flat Response)							
	<b>LI</b> <b>LS</b> <b>LSI</b> <b>LIG</b> <b>LSG</b> <b>LSIG</b>							
	<b>Catalog Number</b>							
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>								
1600	CRD316T91W	CRD316T93W	CRD316T92W	CRD316T94W	CRD316T95W	CRD316T96W	800	RP6R16A080
							1000	RP6R16A100
							1200	RP6R16A120
							1600	RP6R16A160
2000 <sup>Ⓢ</sup>	CRD320T91W	CRD320T93W	CRD320T92W	CRD320T94W	CRD320T95W	CRD320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>								
1600	CRDC316T91W	CRDC316T93W	CRDC316T92W	CRDC316T94W	CRDC316T95W	CRDC316T96W	800	RP6R16A080
							1000	RP6R16A100
							1000	RP6R16A100
							1200	RP6R16A120
2000 <sup>Ⓢ</sup>	CRDC320T91W	CRDC320T93W	CRDC320T92W	CRDC320T94W	CRDC320T95W	CRDC320T96W	1000	RP6R20A100
							1200	RP6R20A120
							1600	RP6R20A160
							2000	RP6R20A200

**Note**

<sup>Ⓢ</sup> Includes B2016RDL rear connectors.

**Digitrip OPTIM Electronic Circuit Breakers with Interchangeable Rating Plugs**

Order as individual components: breaker frame (which includes trip unit) and rating plug.

**Digitrip OPTIM Electronic Circuit Breakers with Interchangeable Rating Plugs**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIA 1050 Catalog Number	LSIG 1050 Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
1600	RD316T107W	RD316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000	RD320T107W	RD320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200
2500	RD325T107W	RD325T106W	1600	ORPR25A160
			2000	ORPR25A200
			2500	ORPR25A250
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
1600	RDC316T107W	RDC316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000	RDC320T107W	RDC320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200
2500	RDC325T107W	RDC325T106W	1600	ORPR25A160
			2000	ORPR25A200
			2500	ORPR25A250

# 2.4

## Molded Case Circuit Breakers

### Series C

#### 100% Rated 600 Volts AC Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plugs

Order as individual components: breaker frame (which includes trip unit) and rating plug.

2

#### 100% Rated 600 Volts AC Digitrip OPTIM Circuit Breakers with Interchangeable Rating Plugs

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only		Digitrip OPTIM Rating Plug Only	
	LSIA 1050 Catalog Number	LSIG 1050 Catalog Number	Ampere Rating	Fixed Rating Plug Catalog Number
<b>Three-Pole Standard Interrupting Capacity 600 Vac Rated 65 kAIC at 480 Vac</b>				
1600	CRD316T107W	CRD316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000 <sup>①</sup>	CRD320T107W	CRD320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200
<b>Three-Pole High Interrupting Capacity 600 Vac Rated 100 kAIC at 480 Vac</b>				
1600	CRDC316T107W	CRDC316T106W	800	ORPR16A080
			1000	ORPR16A100
			1200	ORPR16A120
			1600	ORPR16A160
2000 <sup>①</sup>	CRDC320T107W	CRDC320T106W	1000	ORPR20A100
			1200	ORPR20A120
			1600	ORPR20A160
			2000	ORPR20A200

#### Molded Case Switches

Refer to Eaton for UL listed, series tested Molded Case Switch application data.

#### Type RD—High Instantaneous (K)

Continuous Ampere Rating at 40 °C	Complete without Terminals	
	Three-Pole Catalog Number	Four-Pole Catalog Number
1600	RD316WK	RD416WK
2000	RD320WK	RD420WK

#### Notes

<sup>①</sup> Includes B2016RDL rear connectors.

Molded case switch may trip above 17,500 amperes.

## Accessories Selection Guide and Ordering Information

### Line and Load Terminals

Line and load terminals provide wire connecting capabilities for specific ranges of continuous current ratings and wire types. All terminals comply with Underwriters Laboratories Standards UL 486A and UL 486B and CSA C22.2 No. 65M. Unless otherwise specified, R-Frame circuit breaker line load terminals are shipped separately for field installation.

### Ordering Information

R-Frame circuit breakers have Cu/Al terminals as standard and Cu only terminals as an option. Specify if factory installation is required.

### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Hardware	AWG/kcmil Wire Range/ No. Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
<b>Wire Terminals</b>						
1600	Aluminum	Cu/Al	English	500–1000 (4)	300–500	<b>TA1600RD</b>
1600	Copper	Cu	English	1–600 (4)	50–300	<b>T1600RD</b>
2000	Aluminum	Cu/Al	English	2–600 (6)	35–300	<b>TA2000RD</b> <sup>①</sup>
<b>Rear Connectors</b>						
2000	Copper	—	English	—	—	<b>B2016RD</b>
2000	Copper	—	English	—	—	<b>B2016RDL</b> <sup>②</sup>
2500	Copper	—	English	—	—	<b>B2500RD</b> <sup>③</sup>

### Notes

- <sup>①</sup> Catalog Number includes bus connection, terminals and hardware for either line side or load side of three-pole breaker.
- <sup>②</sup> For use with 100% rated 1600 A and 2000 A frame. Do not order separately unless for replacement purposes. Included in breaker carton when 100% rated device is ordered.
- <sup>③</sup> For use with 2500 A frame. Do not order separately unless for replacement purposes. Included in breaker carton when 2500 A breaker is ordered.

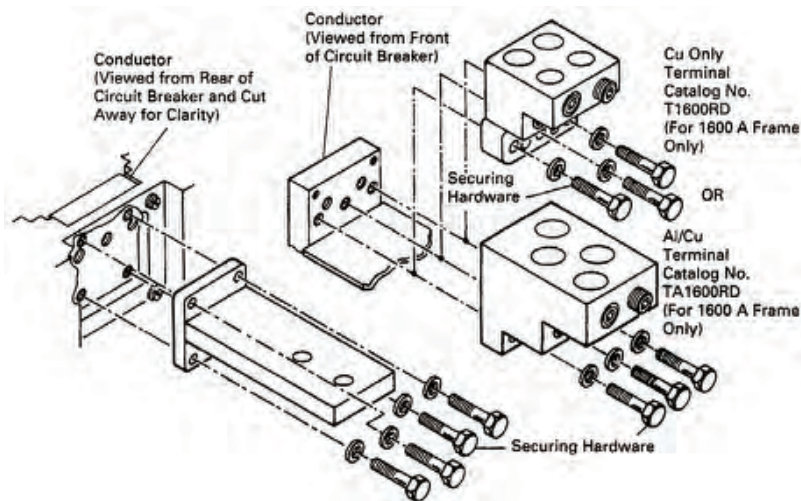
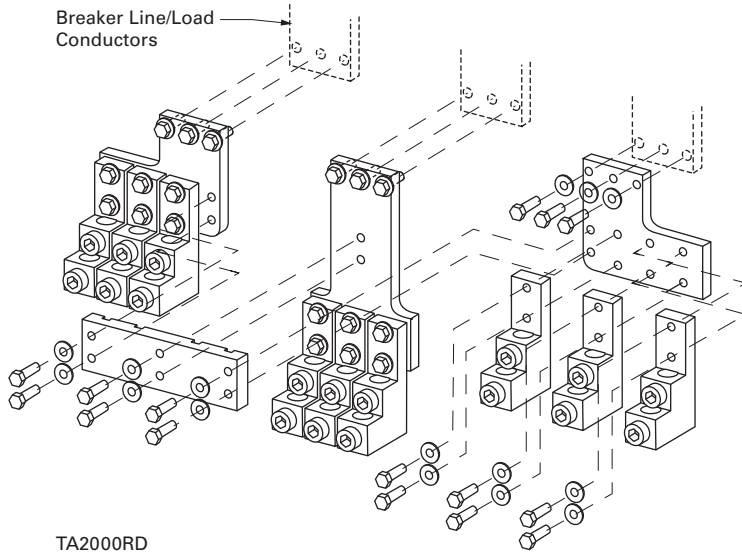
# 2.4

## Molded Case Circuit Breakers

### Series C

#### Mounting Hardware

2



## Accessories

### Allowable Accessory Combinations

Different combinations of accessories can be supplied, depending on the types of accessories and the number of poles in the circuit breaker.

### RD Frame Accessories

Description	Reference Page	Three-Pole Left	Center	Right	Four-Pole Left	Center	Right	Neu.
<b>Internal Accessories</b> <sup>①</sup>								
Alarm lockout (Make/Break)	V4-T2-380			■			■	
Alarm lockout (2Make/2Break)	V4-T2-380			■			■	
Auxiliary switch (2A, 2B)	V4-T2-380			■			■	
Auxiliary switch (4A, 4B)	V4-T2-380			■			■	
Shunt trip—standard	V4-T2-388			■			■	
Shunt trip—low energy	V4-T2-389			■			■	
Undervoltage release mechanism	V4-T2-396			■			■	
Accessory terminal block <sup>②</sup>	V4-T2-397			■				■
<b>External Accessories</b>								
Base mounting hardware	V4-T2-417							
Padlockable handle lock hasp	V4-T2-420		●			●		
Key interlock kit	V4-T2-422	■	■	■		■		
Walking beam interlock	V4-T2-423							
Electrical (motor) operator	V4-T2-425	■	■	■		■		
Handle mechanisms	V4-T2-508	■	■	■		■		
Handle extension <sup>③</sup>	V4-T2-522		■			■		
<b>OPTIM System Components</b>								
Breaker interface module (BIM)	V4-T2-431	●	●	●				
Digitrip OPTIMizer	V4-T2-431	●	●	●				
Auxiliary power module	V4-T2-431	●	●	●				
<b>Modifications (Refer to Eaton)</b>								
Special calibration	—	●	●	●	●	●	●	●
Moisture fungus treatment	V4-T2-220	●	●	●	●	●	●	●
Freeze-tested circuit breakers	—	●	●	●	●	●	●	●
Marine/naval application	—	●	●	●	●	●	●	●

#### Legend

- Applicable in indicated pole position
- Accessory available/modification available

#### Notes

- ① All accessories mount in the RH cavity which will accept one each shunt trip, UVR, auxiliary switch and alarm switch.
- ② Mounts outside breaker.
- ③ Included with breaker.



## Technical Data and Specifications

## 2

### UL 489/CSA Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)			
		Volts AC (50/60 Hz)			
		240	277	480	600
RD	3, 4	125	—	65	50
CRD <sup>②</sup>	3	125	—	65	50
RDC	3, 4	200	—	100	65
CRDC <sup>②</sup>	3	200	—	100	65

### IEC 947-2 Interrupting Capacity Ratings <sup>①</sup>

Circuit Breaker Type	Number of Poles	Interrupting Capacity (kA Symmetrical Amperes)		
		Volts AC (50/60 Hz)		
		240	415	690
<b>RD</b>				
$I_{cu}$	3, 4	135	70	25
$I_{cs}$	3, 4	100	50	13
<b>RDC</b>				
$I_{cu}$	3, 4	200	100	35
$I_{cs}$	3, 4	100	50	18

#### Notes

<sup>①</sup> Utilization Category A circuit breakers.

<sup>②</sup> 100% rated breakers.

See **Page V4-T2-357** for Trip Unit Specifications.

**Specifications****R-Frame Digitrip**

Trip Unit Type	Digitrip RMS 510	Digitrip RMS 610	Digitrip RMS 810	Digitrip RMS 910	Digitrip OPTIM 1050
rms sensing	Yes	Yes	Yes	Yes	Yes
<b>Breaker Type</b>					
Frame	R	R	R	R	R
Ampere range	800–2500 A	800–2500 A	800–2500 A	800–2500 A	800–2500 A
Interrupting rating at 480 volts	65, 100 (kA)	65, 100 (kA)	65, 100 (kA)	65, 100 (kA)	65, 100 (kA)
<b>Protection</b>					
Ordering options	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LI, LS, LSI, LIG, LSG, LSIG	LSI(A), LISG
Fixed rated plug ( $I_n$ )	Yes	Yes	Yes	Yes	Yes
Overtemperature trip	Yes	Yes	Yes	Yes	Yes
<b>Long Delay Protection (L)</b>					
Adjustable rating plug ( $I_n$ )	No	No	No	No	No
Long delay pickup	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )	0.5–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
Long delay time $I^2t$	2–24 seconds	2–24 seconds	2–24 seconds	2–24 seconds	2–24 seconds
Long delay time $I^4t$	No	No	No	No	1–5 Seconds
Long delay thermal memory	Yes	Yes	Yes	Yes	Yes
High load alarm	No	0.85 x $I_r$	0.85 x $I_r$	0.85 x $I_r$	0.5–1.0 x $I_r$
<b>Short Delay Protection (S)</b>					
Short delay pickup	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )	200–600% S1 and S2 x ( $I_r$ )	150–800% x ( $I_r$ ) <sup>①②</sup>
Short delay time $I^2t$	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Short delay time flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Short delay time zone selective interlocking	Yes	Yes	Yes	Yes	Yes
<b>Instantaneous Protection (I)</b>					
Instantaneous pickup	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )	200–600% M1 and M2 x ( $I_n$ )	200–800% x ( $I_n$ ) <sup>②</sup>
Discriminator	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes <sup>③</sup>	Yes
Instantaneous override	Yes	Yes	Yes	Yes	Yes
<b>Ground Fault Protection (G)</b>					
Ground fault alarm <sup>④</sup>	No	No	No	No	25–100% x ( $I_n$ )
Ground fault pickup <sup>④</sup>	25–100% x ( $I_g$ )	25–100% x ( $I_g$ )	25–100% x ( $I_g$ )	25–100% x ( $I_g$ )	25–100% x ( $I_n$ )
Ground fault delay $I^2t$	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Ground fault delay flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Ground fault zone selective interlocking	Yes	Yes	Yes	Yes	Yes
Ground fault thermal memory	Yes	Yes	Yes	Yes	Yes

**Legend**

BIM = Breaker Interface Module  
(A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting x  $I_n$

**Notes**

- ① Except 2500 ampere frame is 200–600%.  
② Varies by frame.  
③ LS/LSG only.  
④ Not to exceed 1200 amperes.

## R-Frame Digitrip, continued

2

Trip Unit Type	Digitrip RMS 510	Digitrip RMS 610	Digitrip RMS 810	Digitrip RMS 910	Digitrip OPTIM 1050
<b>System Diagnostics</b>					
Status LEDs	Yes	Yes	Yes	Yes	Yes
Cause of trip LEDs	Yes	Yes	Yes	Yes	Yes
Magnitude of trip information	No	Yes	Yes	Yes	Yes
Remote signal contacts	No	Yes	Yes	Yes	Yes
<b>System Monitoring</b>					
Digital display	No	Yes	Yes	Yes	Yes <sup>①</sup>
Current	No	Yes	Yes	Yes	Yes
Voltage	No	No	No	Yes	No
Power and energy	No	No	Yes	Yes	Yes
Power quality—harmonics	No	No	No	Yes	Yes
Power factor	No	No	Yes (over Eaton PowerNet only)	Yes	Yes
<b>Communications</b>					
Eaton PowerNet	No	No	Yes	Yes	Yes
<b>Testing</b>					
Testing method	Integral	Integral	Integral	Integral	OPTIMizer, BIM, PowerNet

**Legend**

BIM = Breaker Interface Module  
 (A) = GF Alarm  
 $I_s$  = Sensor Rating  
 $I_n$  = Rating Plug  
 $I_r$  = Long Delay Pickup Setting x  $I_n$

**Note**

<sup>①</sup> By OPTIMizer/BIM.

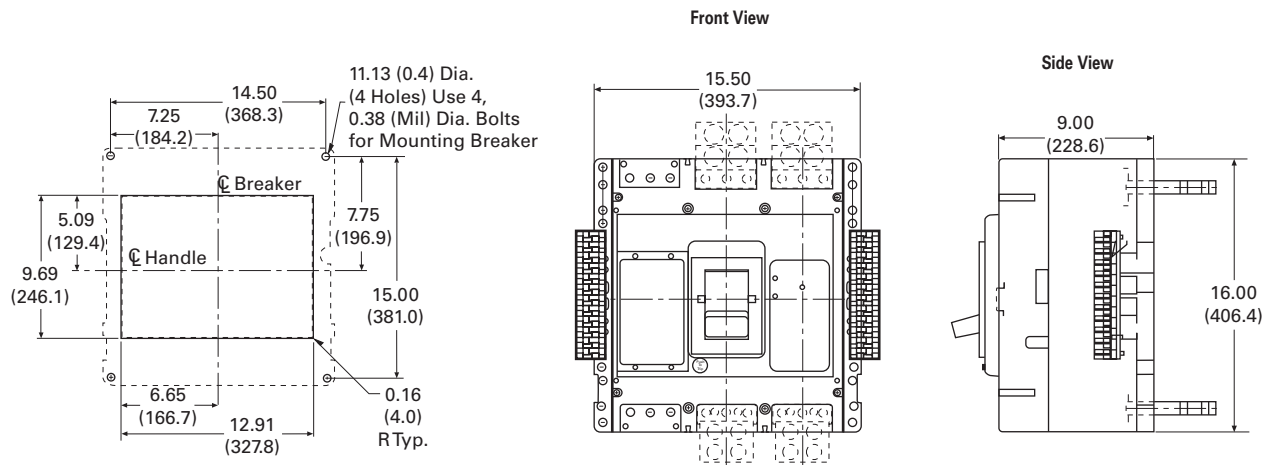
**Dimensions and Weights**

Dimensions in Inches (mm)

**RD Frame**

Number of Poles	Width	Height	Depth
3	15.50 (393.7)	16.00 (406.4)	9.75 (247.7)
4	20.00 (508.0)	16.00 (406.4)	9.75 (247.7)

**RD-Frame, Three-Pole, 1600 and 2000 Amperes**



Approximate Shipping Weight in Lbs (kg)

**RD Frame**

Breaker Type	Complete Breaker	
	Three-Pole	Four-Pole
<b>1600 Amperes</b>		
RD, CRD <sup>Ⓢ</sup> , RDC, CRDC <sup>Ⓢ</sup>	102 (46.3)	135 (61.2)
<b>2000 Amperes</b>		
RD, RDC	102 (46.3)	135 (61.2)
CRD, CRDC	130 (59.0)	175 (79.4)
<b>2500 Amperes</b>		
RD, RDC	135 (61.2)	182 (82.6)

**Note**

<sup>Ⓢ</sup> No four-pole for CRD and CRDC.

#### Motor Circuit Protectors



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External Accessories . . . . .	<b>V4-T2-410</b>

### Motor Circuit Protectors (MCP)

#### Product Description

Designated as Eaton’s Types GMCP and HMCP, the instantaneous-only motor circuit protector (MCP) is available in ratings from 3 A to 1200 A for motor starter sizes 0 through 8.

An innovative design of internal components allows higher MCP-starter combination interrupting ratings. The MCP is marked to permit proper electrical application within the assigned equipment ratings.

#### Standards and Certifications

The MCP is designed to comply with the applicable requirements of Underwriters Laboratories Standard UL 489, Canadian Standards Association Standard C22.2 No. 5.1, and International Electrotechnical Commission Recommendations IEC 157-1.

The MCP is a recognized component (UL File E7819) and complies with the applicable requirements of Underwriters Laboratories Standard UL 489. It is also designed to comply with the applicable requirements of Canadian Standards Association Standard C22.2 No. 5.1, International Electrotechnical Commission Recommendations IEC 157-1, and nameplates bear the CE marking.

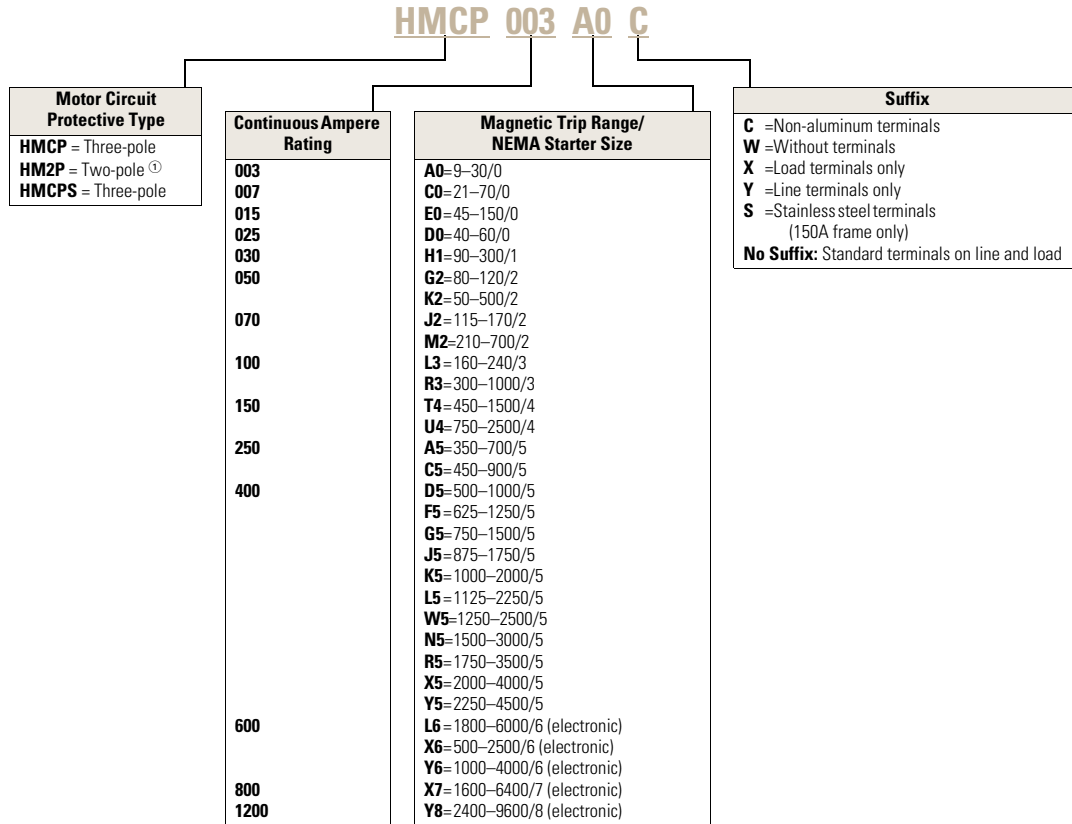


**Note:** Interrupting ratings are dependent on starter it is used with.

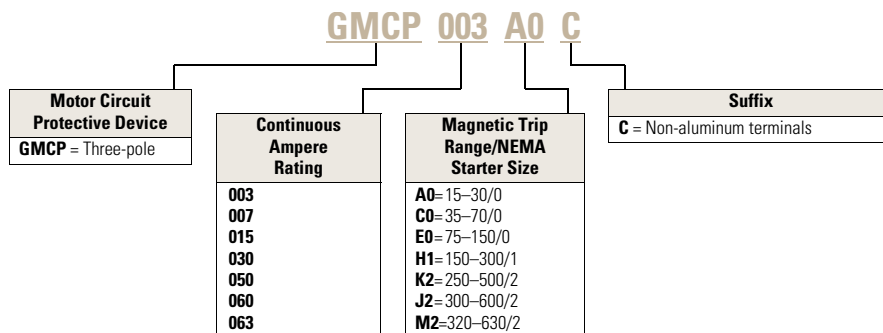
**Catalog Number Selection**

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

**Motor Circuit Protector**



**Motor Circuit Protector**



**Note**

① On J- and K-Frame HMCPs only.

## Product Selection

## G-Frame

## 480 Vac Maximum, 600Y/347 Vac

NEMA Starter Size	Continuous Amperes	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting	MCP Catalog Number
0	3	A	1.1–1.2	15	GMCP003A0C
		B	1.3–1.5	18	
		C	1.6–1.7	21	
		D	1.8–1.9	24	
		E	2.0–2.2	27	
		F	2.3–2.5	30	
0	7	A	2.6–3.1	35	GMCP007C0C
		B	3.2–3.6	42	
		C	3.7–3.9	49	
		D	4.3–4.7	56	
		E	4.8–5.2	63	
		F	5.3–5.7	70	
0	15	A	5.7–6.8	75	GMCP015E0C
		B	6.9–7.9	90	
		C	8.0–9.1	105	
		D	9.2–10.3	120	
		E	10.4–11.4	135	
		F	11.5–12.6	150	
1	30	A	11.5–13.7	150	GMCP030H1C
		B	13.8–16.0	180	
		C	16.1–18.3	210	
		D	18.4–20.6	240	
		E	20.7–22.9	270	
		F	23.0–25.2	300	
2	50	A	19.3–22.9	250	GMCP050K2C
		B	23.0–26.8	300	
		C	26.9–30.6	350	
		D	30.7–34.5	400	
		E	34.6–38.3	450	
		F	38.4–42.1	500	
3	60	A	23.1–27.5	300	GMCP060J2C
		B	27.7–32.2	360	
		C	32.3–36.7	420	
		D	36.9–41.4	480	
		E	41.5–46.0	540	
		F	46.2–50.5	600	
3	63	A	24.2–32.1	320	GMCP063M2C
		B	29.1–34.8	380	
		D	38.8–46.4	500	
		E	43.6–48.9	570	
		F	48.5–53.7	630	

**Notes**

① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate Cam settings and/or MCP ratings should be used.

All GMCP 3–63A come with line and load steel body terminals for Cu only wire. Refer to **Page V4-T2-226** under Optional Terminal Types.

UL recognized and CSA approved.

## Accessories

### Modifications for GMCP

Internal accessories must be factory installed.

### Internal Accessories <sup>①</sup>

Type Accessory	Electrical Ratings			Contact Arrangement	Factory Suffix	Style Number
	Volts	Frequency	Amperes			
Shunt trip <sup>②</sup>	120	50/60 Hz	1.1	—	S5	1373D62G18
Shunt trip <sup>②</sup>	240	50/60 Hz	2.1	—	S6	1373D62G19
Auxiliary switch <sup>③</sup>	240	50/60 Hz	6.0	1A/1B	A3	1288C74G03
Auxiliary switch <sup>③</sup>	240	50/60 Hz	6.0	2A/2B	A6	1288C73G03
Alarm switch <sup>③</sup>	240	50/60 Hz	6.0	Make/Break	B3	1288C75G03
Auxiliary switch/alarm switch combination <sup>③</sup>	240	50/60 Hz	6.0	1A/1B Make/Break	B13	1288C76G09

### External Mounted Accessories



Description	Number Units in Package	Style Number
Lock dog (non-padlockable)	1	1294C01H01
Mounting hardware	1	624B375G23
DIN rail adapter <sup>④</sup>	10	1225C79G02

### Modifications for HMCP

See Internal Accessories starting on **Page V4-T2-377**.

### Handle Mechanisms for Series C Frames

#### Kits Only (Kit Includes Shaft, Mechanism and Handle)—GMCP-Frame

Description	Rating Type		GMCP-Frame Catalog Number
	NEMA	IP	
 S01 Blue Handle S01 blue handle, 12-inch shaft	1/3R/12	54	GMHMVD12B / 68C6039G05
	4/4X	65	GMHMVD12BX / 68C6039G07
 S01 Red Handle S01 red handle, 12-inch shaft	1/3R/12	54	GMHMVD12R / 68C6039G06
	4/4X	65	GMHMVD12RX / 68C6039G08

### Direct (Close-Coupled) Handle Mechanisms

#### G Direct <sup>⑤</sup>

Frame	Black Handle		Yellow Handle	
	With Shroud Catalog Number	Without Shroud Catalog Number	With Shroud Catalog Number	Without Shroud Catalog Number
GMCP	HRGMC1S	HRGMC10	HRGMC3S	HRGMC30

#### Notes

- ① Only one accessory may be installed in GMCP.
- ② LH only.
- ③ RH only.
- ④ For use with standard 35 mm DIN rail such as, 35 x 7.5 or 15 mm per DIN EN50022.
- ⑤ Suitable for use on two- or three-pole G-Frame.

No UVR available on GMCP.



# 2.4

## Molded Case Circuit Breakers

### Series C

#### F-Frame

2

#### 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number
0	3	A	0.69–0.91	9	<b>HMCP003A0C</b>
		B	0.92–1.0	12	
		C	1.1–1.2	15	
		D	1.3–1.5	18	
		E	1.6–1.7	21	
		F	1.8–1.9	24	
		G	2.0–2.2	27	
		H	2.3–2.5	30	
0	7	A	1.5–2.0	21	<b>HMCP007C0C</b>
		B	2.1–2.5	28	
		C	2.6–3.1	35	
		D	3.2–3.6	42	
		E	3.7–3.9	49	
		F	4.3–4.7	56	
		G	4.8–5.2	63	
		H	5.3–5.7	70	
0	15	A	3.4–4.5	45	<b>HMCP015E0C</b>
		B	4.6–5.6	60	
		C	5.7–6.8	75	
		D	6.9–7.9	90	
		E	8.0–9.1	105	
		F	9.2–10.3	120	
		G	10.4–11.4	135	
		H	11.5–12.6	150	
1	30	A	6.9–9.1	90	<b>HMCP030H1C</b>
		B	9.2–11.4	120	
		C	11.5–13.7	150	
		D	13.8–16.0	180	
		E	16.1–18.3	210	
		F	18.4–20.6	240	
		G	20.7–22.9	270	
		H	23.0–25.2	300	
2	50	A	11.5–15.2	150	<b>HMCP050K2C</b>
		B	15.3–19.1	200	
		C	19.2–22.9	250	
		D	23.0–26.8	300	
		E	26.9–30.6	350	
		F	30.7–4.5	400	
		G	34.6–38.3	450	
		H	38.4–42.1	500	

#### 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number
2	70	A	16.1–21.4	210	<b>HMCP070M2C</b>
		B	21.5–26.8	280	
		C	26.9–32.2	350	
		D	32.3–37.5	420	
		E	37.6–42.9	490	
		F	43.0–48.3	560	
		G	48.4–53.7	630	
		H	53.8–59.1	700	
3	100	A	23.0–30.6	300	<b>HMCP100R3C</b>
		B	30.7–38.3	400	
		C	38.4–46.0	500	
		D	46.1–53.7	600	
		E	53.8–61.4	700	
		F	61.5–69.1	800	
		G	69.2–76.8	900	
		H	76.9–84.5	1000	
4	150	A	34.6–46.0	450	<b>HMCP150T4C</b>
		B	46.1–57.5	600	
		C	57.6–69.1	750	
		D	69.2–80.6	900	
		D	69.2–80.6	900	
		E	80.7–92.2	1050	
		F	92.3–103.7	1200	
		G	103.8–115.2	1350	
4	150	A	57.0–75.0	750	<b>HMCP150U4C</b>
		B	76.0–95.0	1000	
		C	96.0–114.0	1250	
		D	115.0–130.7	1500	
		E	③	1750	
		F	③	2000	
		G	③	2250	
		H	③	2500	

#### Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate Cam settings and/or MCP ratings should be used.
- ② For DC applications, actual trip levels are approximately 40% higher than values shown.
- ③ Settings above 130 amperes are for special applications. NEC Article 430.110(a) requires the ampere rating of the disconnecting means to be not less than 115% of the motor full load ampere rating.

HMCP 3–100 A come with line and load steel body terminals, 3T100FB. HMCP 150A come with line and load steel body terminals, 3T150FB.

**Special Low Magnetic Protection Application MCP****600 Vac Maximum, 250 Vdc Maximum**

<b>Cont. Amps</b>	<b>Cam Setting</b>	<b>MCP Trip Setting <sup>①</sup></b>	<b>MCP Catalog Number</b>
25	A	40	<b>HMCP025D0C</b>
	B	43	
	D	49	
	E	52	
	F	55	
	G	58	
	H	60	
	50	A	
B		87	
C		93	
D		98	
E		103	
F		109	
G		115	
H		120	
70	A	115	<b>HMCP070J2C</b>
	B	122	
	C	130	
	D	139	
	E	145	
	F	153	
	G	160	
	H	170	
100	A	160	<b>HMCP100L3C</b>
	B	174	
	C	185	
	D	196	
	E	207	
	F	218	
	G	229	
	H	240	

**Notes**

<sup>①</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.

HMCP 25–100 A come with line and load steel body terminals, 3T100FB.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### MCPs for Application with Motor Starters Equipped with Electronic Overload Relays

2

#### 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number
0	3	A	0.69–0.91	9	<b>HMCP5003A0C</b>
		B	0.92–1.0	12	
		C	1.1–1.2	15	
		D	1.3–1.5	18	
		E	1.6–1.7	21	
		F	1.8–1.9	24	
		G	2.0–2.2	27	
		H	2.3–2.5	30	
0	7	A	1.5–2.0	21	<b>HMCP5007C0C</b>
		B	2.1–2.5	28	
		C	2.6–3.1	35	
		D	3.2–3.6	42	
		E	3.7–3.9	49	
		F	4.3–4.7	56	
		G	4.8–5.2	63	
		H	5.3–5.7	70	
0	15	A	3.4–4.5	45	<b>HMCP5015E0C</b>
		B	4.6–5.6	60	
		C	5.7–6.8	75	
		D	6.9–7.9	90	
		E	8.0–9.1	105	
		F	9.2–10.3	120	
		G	10.4–11.4	135	
		H	11.5–12.6	150	
1	30	A	6.9–9.1	90	<b>HMCP5030H1C</b>
		B	9.2–11.4	120	
		C	11.5–13.7	150	
		D	13.8–16.0	180	
		E	16.1–18.3	210	
		F	18.4–20.6	240	
		G	20.7–22.9	270	
		H	23.0–25.2	300	
2	50	A	11.5–15.2	150	<b>HMCP5050K2C</b>
		B	15.3–19.1	200	
		C	19.2–22.9	250	
		D	23.0–26.8	300	
		E	26.9–30.6	350	
		F	30.7–34.5	400	
		G	34.6–38.3	450	
		H	38.4–42.1	500	

#### 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number
3	100	A	23.0–30.6	300	<b>HMCP5100R3C</b>
		B	30.7–38.3	400	
		C	38.4–46.0	500	
		D	46.1–53.7	600	
		E	53.8–61.4	700	
		F	61.5–69.1	800	
		G	69.2–76.8	900	
		H	76.9–84.5	1000	
4	150	A	34.6–46.0	450	<b>HMCP5150T4C</b>
		B	46.1–57.5	600	
		C	57.6–69.1	750	
		D	69.2–80.6	900	
		E	80.7–92.2	1050	
		F	92.3–103.7	1200	
		G	103.8–115.2	1350	
		H	115.3–126.7	1500	
4	150	A	57.0–75.0	750	<b>HMCP5150U4C</b>
		B	76.0–95.0	1000	
		C	96.0–114.0	1250	
		D	115.0–130.7	1500	
		E	③	1750	
		F	③	2000	
		G	③	2250	
		H	③	2500	

#### Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- ② For DC applications, actual trip levels are approximately 40% higher than values shown.
- ③ Settings above 130A are for special applications. NEC Article 430.110(a) requires the ampere rating of the disconnecting means to be not less than 115% of the motor full load ampere rating.

HMCP 25–100 A come with line and load steel body terminals, 3T100FB.

HMCP 3–100 A come with line and load steel body terminals, 3T100FB. HMCP 150A come with line and load steel body terminals, 3T150FB.

**J-Frame****600 Vac Maximum, 250 Vdc Maximum**

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number <sup>③</sup>
4	250	A	27.0–30.7	350	<b>HMCP250A5C</b>
		B	30.8–33.8	400	
		C	33.9–36.9	440	
5	250	D	37.0–40.3	480	
		E	40.4–43.8	525	
		F	43.9–46.9	570	
		G	47.0–50.7	610	
		H	47.0–50.7	660	
		I	47.0–50.7	700	
5	250	A	34.7–38.8	450	<b>HMCP250C5C</b>
		B	38.9–43.4	505	
		C	43.5–47.6	565	
		D	47.7–52.2	620	
		E	52.3–56.5	680	
		F	56.6–60.7	735	
		G	60.8–64.9	790	
		H	65.0–69.2	845	
		I	69.3–73.5	900	
5	250	A	38.5–43.4	500	<b>HMCP250D5C</b>
		B	43.5–48.0	565	
		C	48.1–53.0	625	
		D	53.1–57.6	690	
		E	57.7–62.3	750	
		F	62.4–67.3	810	
		G	67.4–71.9	875	
		H	72.0–76.9	935	
		I	77.0–81.6	1000	
5	250	A	48.1–53.8	625	<b>HMCP250F5C</b>
		B	53.9–59.9	700	
		C	60.0–66.1	780	
		D	66.2–72.3	860	
		E	72.4–78.4	940	
		F	78.5–83.8	1020	
		G	83.9–89.9	1090	
		H	90.0–96.1	1170	
		I	96.2–102.0	1250	
5	250	A	57.7–64.6	750	<b>HMCP250G5C</b>
		B	64.7–71.9	840	
		C	72.0–79.2	935	
		D	79.3–86.5	1030	
		E	86.6–93.8	1125	
		F	93.9–101.1	1220	
		G	101.2–108.4	1315	
		H	108.5–115.3	1410	
		I	115.4–122.4	1500	

**600 Vac Maximum, 250 Vdc Maximum, continued**

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number <sup>③</sup>
5	250	A	67.4–75.3	875	<b>HMCP250J5C</b>
		B	75.4–83.8	980	
		C	83.9–92.3	1090	
		D	92.4–100.7	1200	
		E	100.8–109.2	1310	
		F	109.3–117.6	1420	
		G	117.7–126.1	1530	
		H	126.2–134.6	1640	
		I	134.7–142.8	1750	
5	250	A	77.0–86.6	1000	<b>HMCP250K5C</b>
		B	86.6–96.1	1125	
		C	96.2–105.7	1250	
		D	105.8–115.3	1375	
		E	115.4–124.9	1500	
		F	125.0–134.6	1625	
		G	134.7–144.2	1750	
		H	144.3–153.8	1875	
		I	153.9–163.3	2000	
5	250	A	86.6–97.3	1125	<b>HMCP250L5C</b>
		B	97.4–108.4	1265	
		C	108.5–118.8	1410	
		D	118.9–129.9	1545	
		E	130.0–140.7	1690	
		F	140.8–151.5	1830	
		G	151.6–162.3	1970	
		H	162.4–173.0	2110	
		I	173.1–183.6	2250	
5	250	A	96.2–108.0	1250	<b>HMCP250W5C</b>
		B	108.1–119.9	1405	
		C	120.0–132.3	1560	
		D	132.4–144.2	1720	
		E	144.3–156.1	1875	
		F	156.2–168.0	2030	
		G	168.1–179.9	2185	
		H	180.0–192.3	2340	
		I	192.4–204.0	2500	

**Notes**

<sup>①</sup> Motor FLA ranges are typical. The corresponding trip setting is at 13 times the minimum FLA value shown. Where a 13 times setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.

<sup>②</sup> For DC applications, actual trip levels are approximately 40% higher than values shown.

<sup>③</sup> Three-pole catalog numbers shown. Two-pole catalog numbers begin with **HM2P** in place of **HMCP**.

All HMCP and HM2P 250A come with line and load steel body terminals, T250KB. (With suffix "C," without "C" comes with TA250KB.)

# 2.4

## Molded Case Circuit Breakers

### Series C

#### K-Frame

2

#### 600 Vac Maximum, 250 Vdc Maximum

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number <sup>③</sup>
4	400	A	27.0–30.7	350	<b>HMCP400A5C</b>
		B	30.8–33.8	400	
		C	33.9–36.9	440	
5	400	D	37.0–40.3	480	<b>HMCP400A5C</b>
		E	40.4–43.8	525	
		F	43.9–46.9	570	
		G	47.0–50.7	610	
		H	50.8–53.8	660	
		I	53.9–57.2	700	
5	400	A	38.5–43.4	500	<b>HMCP400D5C</b>
		B	43.5–48.0	565	
		C	48.1–53.0	626	
		D	53.1–57.6	690	
		E	57.7–62.3	750	
		F	62.4–67.3	810	
		G	67.4–71.9	875	
		H	72.0–76.9	935	
		I	77.0–81.6	1000	
5	400	A	48.1–53.8	625	<b>HMCP400F5C</b>
		B	53.9–59.9	700	
		C	60.0–66.1	780	
		D	66.2–72.3	860	
		E	72.4–78.4	940	
		F	78.5–83.8	1020	
		G	83.9–89.9	1090	
		H	90.0–96.1	1170	
		I	96.2–102.0	1250	
5	400	A	57.7–64.6	750	<b>HMCP400G5C</b>
		B	64.7–71.9	840	
		C	72.0–79.2	935	
		D	79.3–86.5	1030	
		E	86.6–93.8	1125	
		F	93.9–101.1	1220	
		G	101.2–108.4	1315	
		H	108.5–115.3	1410	
		I	115.4–122.4	1500	
5	400	A	67.4–75.3	875	<b>HMCP400J5C</b>
		B	75.4–83.8	980	
		C	83.9–92.3	1090	
		D	92.4–100.7	1200	
		E	100.8–109.2	1310	
		F	109.3–117.6	1420	
		G	117.7–126.1	1530	
		H	126.2–134.6	1640	
		I	134.7–142.8	1750	

#### 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>①</sup>	MCP Trip Setting <sup>②</sup>	MCP Catalog Number <sup>③</sup>
5	400	A	77.0–86.5	1000	<b>HMCP400K5C</b>
		B	86.6–96.1	1125	
		C	96.2–105.7	1250	
		D	105.8–115.3	1375	
		E	115.4–124.9	1500	
		F	125.0–134.6	1625	
5	400	G	134.7–144.2	1750	<b>HMCP400L5C</b>
		H	144.3–153.8	1875	
		I	153.9–163.3	2000	
		A	86.6–97.3	1125	
		B	97.4–108.4	1265	
		C	108.5–118.8	1410	
		D	118.9–129.9	1545	
		E	130.0–140.7	1690	
		F	140.8–151.5	1830	
5	400	G	151.6–162.3	1970	<b>HMCP400W5C</b>
		H	162.4–173.0	2110	
		I	173.1–183.6	2250	
		A	96.2–108.0	1250	
		B	108.1–119.9	1405	
		C	120.0–132.3	1560	
		D	132.4–144.2	1720	
		E	144.3–156.1	1875	
		F	156.2–168.0	2030	
5	400	G	168.1–179.9	2185	<b>HMCP400N5C</b>
		H	180.0–192.3	2340	
		I	192.4–204.0	2500	
		A	115.4–129.9	1500	
		B	130.0–144.2	1690	
		C	144.3–158.4	1875	
		D	158.5–173.0	2060	
		E	173.1–187.6	2250	
		F	187.7–201.9	2440	
5	400	G	202.0–216.1	2625	<b>HMCP400O5C</b>
		H	216.2–230.7	2810	
		I	230.8–244.9	3000	

#### Notes

- ① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.
- ② For DC applications, actual trip levels are approximately 40% higher than values shown.
- ③ Three-pole catalog numbers shown. Two-pole catalog numbers begin with **HM2P** in place of **HMCP**.

All HMCP and HM2P 400 A come with aluminum body terminals, 3TA400K. Catalog numbers with suffix "C" as shown above come with copper body terminals 3T400K.

## 600 Vac Maximum, 250 Vdc Maximum, continued

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting ②	MCP Catalog Number ③
5	400	A	134.7–151.5	1750	<b>HMCP400R5C</b>
		B	151.6–168.4	1970	
		C	168.5–185.3	2190	
		D	185.4–201.9	2410	
		E	202.0–218.8	2625	
		F	218.9–235.7	2845	
		G	235.8–252.6	3065	
		H	252.7–269.2	3285	
		I	269.3–285.7	3500	
5	400	A	153.9–173.0	2000	<b>HMCP400X5C</b>
		B	173.1–192.3	2250	
		C	192.4–211.5	2500	
		D	211.6–230.7	2750	
		E	230.8–249.9	3000	
		F	250.0–269.2	3250	
		G	269.3–288.4	3500	
		H	288.5–307.6	3750	
		I	307.7–326.9	4000	
5	400	A	173.1–194.5	2250	<b>HMCP400Y5C</b>
		B	194.6–216.1	2530	
		C	216.2–237.6	2810	
		D	237.7–259.5	3090	
		E	259.6–281.1	3375	
		F	281.2–302.6	3655	
		G	302.7–324.1	3935	
		H	324.2–346.1	4215	
		I	346.2–368.1	4500	

## L-Frame

## 600 Vac Maximum ④

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) ①	MCP Trip Setting	MCP Catalog Number
6	600	A	138.5–184.5	1800	<b>HMCP600L6W</b>
		B	184.6–230.7	2400	
		C	230.8–276.8	3000	
		D	276.9–323.0	3600	
		E	323.1–369.1	4200	
		F	369.2–415.3	4800	
		G	415.4–461.4	5400	
		H	461.5–507.7	6000	
6	600	A	38.5–46.1	500	<b>HMCP600X6W</b>
		B	46.2–61.4	600	
		C	61.5–76.8	800	
		D	76.9–96.1	1000	
		E	96.2–115.3	1250	
		F	115.4–153.7	1500	
		G	153.8–192.2	2000	
		H	192.3–230.7	2500	
6	600	A	76.9–96.1	1000	<b>HMCP600Y6W</b>
		B	96.2–115.3	1250	
		C	115.4–153.7	1500	
		D	153.8–192.2	2000	
		E	192.3–230.7	2500	
		F	230.8–269.1	3000	
		G	269.2–307.6	3500	
		H	307.7–346.1	4000	

**Notes**

① Motor FLA ranges are typical. The corresponding trip setting is at 13 x the minimum FLA value shown. Where a 13 x setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.

② For DC applications, actual trip levels are approximately 40% higher than values shown.

③ Three-pole catalog numbers shown. Two-pole catalog numbers begin with **HM2P** in place of **HMCP**.

④ Equipped with electronic trip device.

All HMCP and HM2P 400 A come with aluminum body terminals, 3TA400K. Catalog numbers with suffix "C" as shown above come with copper body terminals 3T400K.

All HMCP 600 A come without terminals. For terminals, see **Page V4-T2-321**.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### N-Frame

2

#### 600 Vac Maximum <sup>①</sup>

NEMA Starter Size	Cont. Amps	Cam Setting	Motor Full Load Current Amperes (FLA) <sup>②</sup>	MCP Trip Setting	MCP Catalog Number
7	800	A	123.1–184.5	1600	<b>HMCP800X7W</b>
		B	184.6–246.1	2400	
		C	246.2–307.6	3200	
		D	307.7–369.1	4000	
		E	369.2–430.7	4800	
		F	430.8–492.2	5600	
		G	492.3–553.7	6400	
8	1200	A	184.6–276.8	2400	<b>HMCP12Y8W</b>
		B	276.9–369.1	3600	
		C	369.2–461.4	4800	
		D	461.5–553.7	6000	
		E	553.8–646.1	7200	
		F	646.2–738.4	8400	
		G	738.5–830.7	9600	

#### Notes

- ① Equipped with electronic trip device.
- ② Motor FLA ranges are typical. The corresponding trip setting is at 13X the minimum FLA value shown. Where a 13X setting is required for an intermediate FLA value, alternate cam settings and/or MCP ratings should be used.

## Motor Protection Circuit Breakers



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## Motor Protection Circuit Breakers (MPCB)

## Product Description

Motor protection circuit breakers (MPCBs) provide UL 489 branch circuit protection, UL 508 and CSA C22.2 No. 14 motor protection, and meet IEC 60947-2 and 50947-4 requirements. Typical branch motor loads are protected by three-component starters, consisting of breaker, contactor and overload relay, or fuse, contactor and overload relay. The MPCB application-specific protection eliminates the need for motor overload relay found in the traditional three-component starter assembly. The branch motor load protection is simplified to an MPCB and contactor, reducing both space requirements and heat generation in customer panels. Protection is provided by application-specific electronic trip units.

The electronic trip unit provides typical motor overload relay functionality and short-circuit protection against potential phase-to-phase or phase-to-ground faults.

- Disconnecting means
- Branch circuit short-circuit protection
- Overload protection
  - Class 5, 10, 15 and 20
- Phase unbalance protection
  - FDMP breaker trips when there is a 40% difference between any phase compared to the calculated three-phase average

- Phase loss protection
  - Active when the maximum phase current is greater than 50% of FLA setting
  - Breaker will trip when minimum phase current is 25% or less than the maximum phase current
  - Time delay of 1 or 2 seconds before breaker trips
- Thermal memory to prevent immediate restart after overload trip to allow motor to cool down

The MPCB is based on the Series C F-Frame. Accessories for standard Series C breakers apply to the MPCB. Unlike Motor Circuit Protectors (MCPs), MPCBs are UL 489 listed with 35 kA and 65 kA interruption ratings.



## Product Selection

2

## FDMP and HFDMP

Continuous Amperes	35 kA Without Phase Unbalance, Class 10 Motor Protection Only	35 kA With Phase Unbalance and Adjustable Motor Class Protection	65 kA Without Phase Unbalance, Class 10 Motor Protection Only	65 kA With Phase Unbalance and Adjustable Motor Class Protection
80	FDMP3080L	FDMP3080JL	HFDMP3080L	HFDMP3080JL
100	FDMP3100L	FDMP3100JL	HFDMP3100L	HFDMP3100JL
160	FDMP3160L	FDMP3160JL	HFDMP3160L	HFDMP3160JL
205	FDMP3205L	FDMP3205JL	HFDMP3205L	HFDMP3205JL

## FLA Ie Dial Setting

Continuous Amperes	A	B	C	D	E	F	G	H
80	40	50	60	70	80	—	—	—
100	80	—	90	—	100	—	—	—
160	100	115	130	145	160	—	—	—
205	160	170	180	195	205	—	—	—

## Technical Data and Specifications

## Specifications

Feature	FDMP	HFDMP
Interruption rating at 240 V	65 kA	100 kA
Interruption rating at 480 V	35 kA	65 kA
Interruption rating at 600 V	18 kA	25 kA
Icu/lcs at 240 V	65 kA/33 kA ①	100 kA/50 kA ①
Icu/lcs at 415 V	35 kA/18 kA ①	65 kA/33 kA ①
100% rated	No	No
FLA range (A)	40–205	40–205
Motor class protection	5, 10, 15, 20	5, 10, 15, 20
Phase unbalance protection (current)—active for phase current >0.5 FLA setting	≥ 40% delta (single-phase); (three-phase avg.) for 5 seconds	≥ 40% delta (single-phase); (three-phase avg.) for 5 seconds
Phase loss protection (current)—active for phase current >0.5 FLA setting	Min. phase ≤ 0.25 max. phase for 1 second	Min. phase ≤ 0.25 max. phase for 1 second
Thermal memory protection	Yes	Yes
High load indicator	—	—
Pre-detection relays	—	—
Internal accessories	Factory installed Aux. alarm, shunt trip, UVR	Factory installed Aux. alarm, shunt trip, UVR

## Notes

① IEC ratings available only on FWMP and HFWMP.

For additional breaker solutions, see **Page V4-T2-193**.

## Type ELC Current Limiter Attachment



## Type ELC Current Limiter Attachment (Size 0–4)

## Product Description

Eaton's Type ELC current limiter attachment for the MCP is designed to provide increased interrupting capacity. The combination may be used for the application up to 200,000 A symmetrical at 600 Vac, making the MCP suitable for use in network distribution systems or other applications where unusually high fault currents are available. The current limiter connects to the load end of the MCP and is provided with terminals suitable for copper or aluminum conductors. (See table at right.)

Limiters are coordinated with the MCP so that normal fault currents are interrupted automatically by the MCP without any damage to the limiter. Only the rare very high fault is opened by the limiter. Faults that are interrupted by the limiter also magnetically trip the MCP, opening all three poles, preventing single-phase operation.

Each of the three poles of the Type ELC limiter is equipped with an indicator that extends when a fault is interrupted by the limiter.

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## Product Selection

## Type ELC Current Limiter Attachment



## ELC Current Limiter Attachment

MCP Rating (Amperes)	Catalog Number
3	ELC3003R
7	ELC3007R
15	ELC3015R
30	ELC3030R
50	ELC3050R
100	ELC3100R
150	ELC3150R

## Technical Data and Specifications

Type ELC Current Limiter Terminal Wire Sizes <sup>①</sup>

Type ELC Current Limiter Maximum Amperes	Wire Range AWG	Metric (mm <sup>2</sup> )
<b>Standard Aluminum Terminals</b>		
50	14–2	2.5–35
100	1–4/0	50–95
150	1–4/0	50–95
<b>Non-Standard Terminals (Steel)</b>		
50	14–2 <sup>②</sup>	2.5–35
100	—	—
150	—	—

## Notes

- <sup>①</sup> Terminal wire connectors are UL listed for standard stranded wire sizes as defined in UL 486A or UL 486B.
- <sup>②</sup> Optional on special order for copper cable only.

All HMCP 800 A and 1200 A come without terminals. For terminals, see **Page V4-T2-321**.

#### Current Limiting Circuit Breaker Module

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### Current Limiting Circuit Breaker Module

#### Product Overview

Power demand continues to grow in new and existing facilities. To meet increased demand, larger utility supplies, spot networks and large facility transformers are installed. The increased capacity of the electrical source results in increased fault currents in excess of 100 kA short-circuit protection. Eaton manufactures non-fused current limiting modules with interrupting capacities up to 200 kA at 600 Vac. Unlike fused current limiters with a one-time use, a current limiter module provides an automatic reset of the module after a short-circuit event. Resetting the molded-case circuit breaker is the only action required to restore critical power to the system; there is no time wasted with sourcing the correct replacement fuses or module to bring the system back online.

#### Product Description

The current limiting breaker modules use a unique contact design to enhance the system protection similar to that of the circuit breaker. When high short-circuit current is flowing through the contacts of these modules, the design results in very high interrupting capacities and improved current limiting characteristics.

#### Application Description

High-performance breakers are most commonly applied when very high fault levels are available and with applications where the current limiting capability is used upstream of the final load to limit current. Typical loads include lighting, power distribution, and motor control applications.

#### Features and Benefits

Superior system protection:

- Auto reset improves system uptime and eliminates the need for finding replacement parts
- No fuses to replace, reducing the overall cost of ownership and the waste created by fuses
- Overloads, by using inverse time current tripping characteristics of the molded-case circuit breaker
- Low-level short circuits, by using instantaneous and/or short-time delay tripping characteristics of the molded-case circuit breaker
- High-level short circuits, by using ultra-high-speed, blow-apart contacts of the current limiting module in series with the circuit breaker contacts
- Let-through currents, by improved opening speed of the contacts, the resultant rapid rise of arc voltage introduces impedance into the system

#### Standards and Certifications

- UL 489
- CSA C22.2



## Product Selection

## Series C High Performance Ratings

Type	Product	Amperes	480 Vac (UL)	600 Vac (UL)
FDC 3P thermal-magnetic	Breaker only	15–225	100	35
	With limiter	40–200	200	200

## FD Frame

FD IC Rating—200 kAIC at 600 Vac <sup>①</sup>

Ampere Rating	Breaker with Line Side Mounted Current Limiter <sup>②</sup>	Breaker with Load Side Mounted Current Limiter <sup>③</sup>
<b>Thermal-Magnetic</b>		
40	FDC3040Q01	FDC3040YQ02
45	FDC3045Q01	FDC3045YQ02
50	FDC3050Q01	FDC3050YQ02
60	FDC3060Q01	FDC3060YQ02
70	FDC3070Q01	FDC3070YQ02
80	FDC3080Q01	FDC3080YQ02
90	FDC3090Q01	FDC3090YQ02
100	FDC3100Q01	FDC3100YQ02
110	FDC3110Q01	FDC3110YQ02
125	FDC3125Q01	FDC3125YQ02
150	FDC3150Q01	FDC3150YQ02
175	FDC3175Q01	FDC3175YQ02
200	FDC3200Q01	FDC3200YQ02

## Limiter Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm <sup>2</sup>	AWG Wire Range/ Number of Conductors	Catalog Number
<b>Standard Pressure Type Terminals</b>					
250	Aluminum	Cu/Al	10–185	#8–350 (1)	TA250FJ <sup>④</sup>

## Breaker Load Terminals (For Line Mounted Limiters Only)

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire Range	Metric Wire Range mm <sup>2</sup>	Package of Three Terminals Catalog Number
<b>Standard Pressure Type Terminals</b>					
100	Steel	Cu/Al	14–1/0	2.5–50	3T100FB
225	Aluminum	Cu/Al	4–4/0	25–95	3TA225FD

**Notes**

- <sup>①</sup> Line and load terminal included.  
<sup>②</sup> Two interphase barriers provided, mounted on line end of limiter, catalog number **FJ1PBK**.  
<sup>③</sup> Four interphase barriers provided, (2) line end of breaker, (2) load end of limiter.  
<sup>④</sup> Load side breaker terminations included for units configured with line mounted limiters.

### Technical Data and Specifications

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#### UL 489 Current Limiting Data

Frame	Circuit	$I_p$ (kA)	$I^2T$ ( $10^6 A^2s$ )
LDC	240 V/200 kA	64.80	6.80
LDC	480 V/100 kA	66.90	9.33
LDC	600 V/50 kA	54.30	8.92

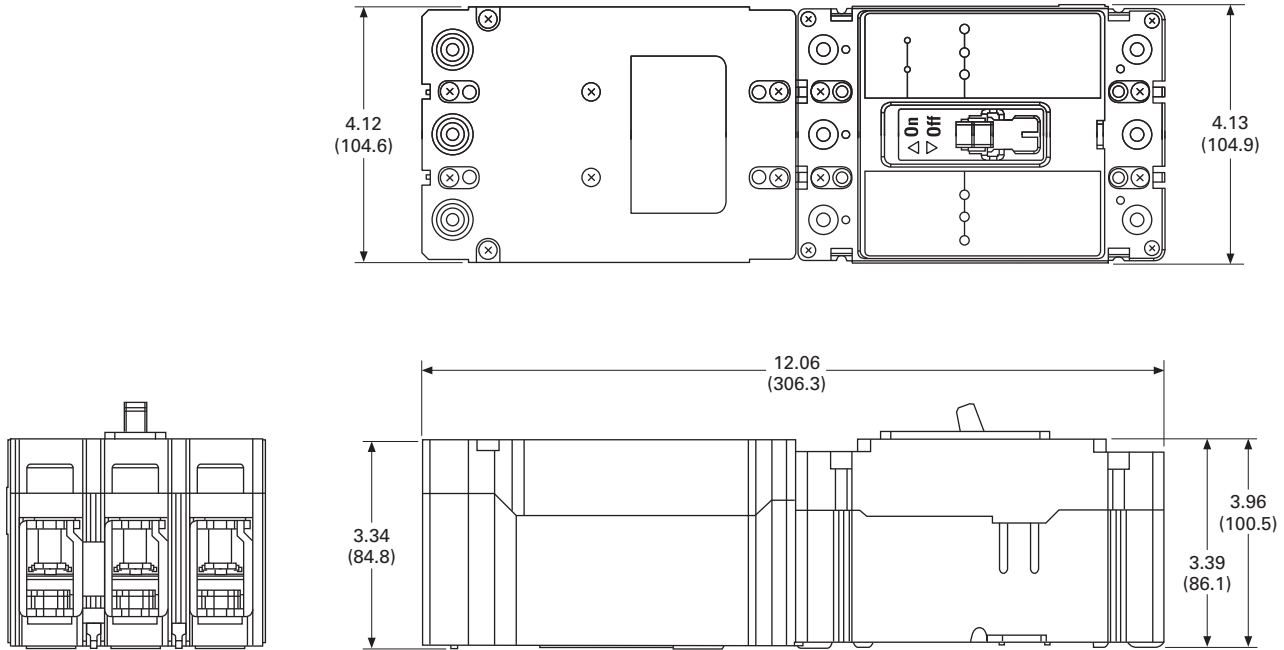
### Dimensions and Weights

Approximate Dimensions in Inches (mm)

#### Assembled Breaker and Current Limiting Module

Frame	Height	Width	Depth	Weight in lbs (kg)
FD + limiter	12.06 (306.3)	4.13 (104.9)	3.39 (86.1)	8.50 (3.86)

#### FD-Frame With Current Limiter Module



## Series C Internal Accessories



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## Internal Accessories

## Product Overview

**Alarm Switch**

For remote indication of automatic trip operation. Does not function with manual switching; however, it will operate when either a shunt trip or undervoltage release is operated. A “make” contact closes and a “break” contact opens when the alarm/lockout switch operates. The switch automatically resets when the circuit breaker is reset.

**Auxiliary Switch**

The auxiliary switch provides circuit breaker contact status information by monitoring the position of the molded cross bar that contains the moving contact arms. The auxiliary switch is used for remote indication and interlock system verification, and consists of one or two SPDT switches housed in a plug-in module. Each SPDT switch has one “a” and one “b” contact. When the circuit breaker contacts are open, the “a” contact is open and the “b” contact is closed.

**Auxiliary Switch and Alarm Switch Combination**

Each catalog number listed in tables on **Pages V4-T2-382** and **V4-T2-383** includes one auxiliary switch and one alarm switch. In an auxiliary switch ASL switch combination, the auxiliary switch is always mounted on the side of the plug-in module next to the center pole of the circuit breaker.

**Shunt Trip**

The shunt trip provides remote controlled tripping of the circuit breaker. The shunt trip consists of an intermittent rated solenoid with a tripping plunger and a cutoff switch assembled to a plug-in module. When required for ground fault protection applications, certain AC rated shunt trips, as noted in the electrical rating table, are suitable for operation at 55 percent of rated voltage.

Select shunt trip catalog number for the voltage within the indicated voltage range. Shunt trip coils are designed to be applied at specific AC or DC voltages within the voltage range shown. Electrical ratings are also shown on applicable circuit breaker accessory nameplates.

**Low Energy Shunt Trip**

Low energy shunt trip devices are designed to operate from low energy output signals from dedicated current sensors typically applied in ground fault protection schemes. However, with a proper control voltage source, they may be applied in place of conventional trip devices for special applications. Flux paths surrounding permanent magnets used in the shunt trip assembly hold a charged spring poised in readiness to operate the circuit breaker trip mechanism.

When a 100 microfarad capacitor charged to 28 Vdc is discharged through the shunt trip coil, the resultant flux opposes the permanent magnet flux field, which releases the stored energy in the spring to trip the circuit breaker. As the circuit breaker resets, the shunt trip reset arm is actuated by the circuit breaker handle, resetting the shunt trip. The plug-in module is mounted in retaining slots in the top of the trip unit. Coil is intermittent-rated only. Cutoff provisions required in control circuit.

**Undervoltage Release Mechanism**

The undervoltage release mechanism monitors a voltage (typically a line voltage) and trips the circuit breaker when the voltage falls to between 70 and 35 percent of the solenoid coil rating.

The undervoltage release mechanism consists of a continuous rated solenoid with a plunger and tripping lever mounted in a plug-in module. The tab on the tripping lever resets the undervoltage release mechanism when normal voltage has been restored and the circuit breaker handle is moved to the reset (or OFF) position. With less than pickup voltage applied to the undervoltage release mechanism, the circuit breaker contacts will not touch when a closing operation is attempted.

**Note:** Undervoltage release mechanism accessories are not designed for, and should not be used as, circuit interlocks.

**Accessory Terminal Block (R-Frame)**

(For fixed-mounted configuration.)

Internal accessory wiring leads are normally supplied with pigtail leads (18 AWG) that exit from the right side of the circuit breaker. Where specified, fixed-mounted accessory terminal blocks are available. A maximum of one 24-point terminal block can be installed on the right side of the circuit breaker for the internal accessories.

For convenience in determining the appropriate number of terminal block points required, refer to **Page V4-T2-378**.

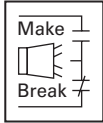
**PowerNet and Zone Interlock Kits (OPTIM 550 only) K-, L- and N-Frames**

Eaton's PowerNet Communications Kit can be ordered to add PowerNet communications to an existing OPTIM 550 breaker in the field. An 18-inch (457.2 mm) wiring pigtail is routed to the rear of the breaker: two wires for PowerNet and two wires for 24 Vdc (45 mA load). It is recommended that the power supply be an "isolated high quality" unit.

## Product Selection

## Alarm Switch

## Alarm Switch



## G-Frame Alarm Switch (RH Only) ①

Electrical Ratings			Contact Arrangement	Factory Suffix	Catalog Number ②③④
Volts	Frequency	Amperes			
<b>Alarm Switch</b>					
240	50/60 Hz	6	1 Make/1 Break	<b>B3</b>	<b>1288C75G03</b>
<b>Alarm Switch Auxiliary Switches Combination</b>					
240	50/60 Hz	6	1 Make/1 Break and 1A/1B	<b>B13</b>	<b>1288C76G09</b>

## F-Frame Alarm Switch ①

Number of Contacts (Make and Break)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit ⑤		
		18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side	Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear ⑥ Suffix Number	Opposite Side Suffix Number			
1	Left ⑦	<b>B01</b>	<b>B02</b>	<b>B03</b>	<b>B04</b>	<b>A1L1LPK</b>	<b>A1L1LTK</b>
	Right	<b>B05</b>	<b>B06</b>	<b>B07</b>	<b>B08</b>	<b>A1L1RPK</b>	<b>A1L1RTK</b>
2	Left ⑦	<b>B09</b>	<b>B10</b>	—	<b>B11</b>	<b>A2L1LPK</b>	<b>A2L1LTK</b>
	Right	<b>B12</b>	<b>B13</b>	—	<b>B14</b>	<b>A2L1RPK</b>	<b>A2L1RTK</b>
1	Single-pole	<b>B15</b> ⑧	—	—	—	—	—

## F-Frame HMCP Alarm Switch ①

Number of Contacts (Make and Break)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit ⑤		
		18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side	Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear ⑥ Suffix Number	Opposite Side Suffix Number			
1	Left ⑦	<b>B01</b>	<b>B02</b>	<b>B03</b>	<b>B04</b>	<b>MA1L1LPK</b>	<b>MA1L1LTK</b>
	Right	<b>B05</b>	<b>B06</b>	<b>B07</b>	<b>B08</b>	<b>MA1L1RPK</b>	<b>MA1L1RTK</b>
2	Left ⑦	<b>B09</b>	<b>B10</b>	—	<b>B11</b>	<b>MA2L1LPK</b>	<b>MA2L1LTK</b>
	Right	<b>B12</b>	<b>B13</b>	—	<b>B14</b>	<b>MA2L1RPK</b>	<b>MA2L1RTK</b>

## J-Frame and HMCP (J) Alarm Switch

Number of Contacts (Make and Break)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Field Mounted Field Installation Kits ⑨		
		18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side	Pigtail Leads	Terminal Block
		Same Side Suffix Number	Rear ⑦ Suffix Number	Opposite Side Suffix Number			
1	Left ⑧	<b>B01</b>	<b>B02</b>	<b>B03</b>	<b>B04</b>	<b>A1L2LPK</b>	<b>A1L2LTK</b>
	Right	<b>B05</b>	<b>B06</b>	<b>B07</b>	<b>B08</b>	<b>A1L2RPK</b>	<b>A1L2RTK</b> ⑨

## Notes

- ① F-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed; however, this is not recommended for FDE breakers. Accessory installation should be done before the circuit breaker is mounted and connected.
- ② Includes 24-inch (609.6 mm) external pigtail leads, 18 AWG (16–0.010).
- ③ A maximum of two internal accessories may be mounted in a three-pole circuit breaker.
- ④ Suitable for mounting in right pole only of two- or three-pole breaker.
- ⑤ Not listed with Underwriters Laboratories; for field installation.
- ⑥ Standard pigtail lead exit location.
- ⑦ Standard mounting location.
- ⑧ Factory installation only. Leads exit load end of circuit breaker.
- ⑨ Listed with Underwriters Laboratories; for field installation on interchangeable trip unit breakers under E64983.
- ⑩ Standard mounting location—leads exit rear of breaker.



## K-Frame and HMCP (K) Alarm Switch

Number of Sets of Contacts (1M and 1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left <sup>③</sup>	B01		B02	B03
	Right <sup>④</sup>	B05	B06	B07	B08	A1L3RPK	A1L3RTK
2	Left <sup>③</sup>	B09	B10	—	B11	A2L3LPK	A2L3LTK
	Right <sup>④</sup>	B12	B13	—	B14	A2L3RPK	A2L3RTK

## L-, HMCP (L) and (M) Frames and Alarm Switch

Number of Sets of Contacts (1M and 1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left <sup>③</sup>	B01		B02	B03
	Right	B05	B06	B07	B08	A1L4RPK	A1L4RTK
2	Left <sup>③</sup>	B09	B10	—	B11	A2L4LPK	A2L4LTK
	Right	B12	B13	—	B14	A2L4RPK	A2L4RTK

## N-Frame and HMCP (N) Alarm Switch

Number of Sets of Contacts (1M and 1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>⑤</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left	B01		B02	B03
	Right <sup>③</sup>	B05	B06	B07	B08	A1L5RPK	A1L5RTK
2	Left	B09	B10	—	B11	A2L5LPK	A2L5LTK
	Right <sup>③</sup>	B12	B13	—	B14	A2L5RPK	A2L5RTK

## R-Frame Alarm Switch (RH Only)

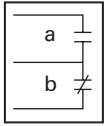
Number of Contacts (Make and Break)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads Suffix Number <sup>⑥</sup>	Field Mounted Field Installation Kits <sup>⑤</sup> Pigtail Leads Catalog Number <sup>⑥</sup>
	1	B05
2	B12	A2L6RPK

## Notes

- ① Listed with Underwriters Laboratories; for field installation on interchangeable trip unit breakers under E64983.
- ② Standard mounting location.
- ③ Standard mounting location—leads exit rear of breaker.
- ④ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.
- ⑤ Listed with Underwriters Laboratories for field installation under E64983.
- ⑥ A maximum of three ASL plug-in modules may be installed in a circuit breaker.

## Auxiliary Switch

## Auxiliary Switch



## G-Frame Auxiliary Switch (RH Only)

Electrical Ratings			Contact Arrangement	Factory Suffix	Catalog Number <sup>①②</sup>
Volts	Frequency	Amperes			
240	50/60 Hz	6	1a/1b	A3	1288C74G03
240	50/60 Hz	6	2a/2b	A6	1288C73G03

## F-Frame and HMCP (F) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads				Factory Installation Kit <sup>④</sup>	
		Same Side Suffix Number	Rear <sup>③</sup> Suffix Number	Opposite Side Suffix Number	Terminal Block Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left <sup>⑤</sup>	A01	A02	A03	A04
	Left <sup>⑤</sup>	A15 <sup>⑦</sup>	A16 <sup>⑦</sup>	A17 <sup>⑦</sup>	—	E1X1PK	—
	Right or Neutral <sup>⑥</sup>	A05	A06	A07	A08	A1X1PK	A1X1RTK <sup>⑧</sup>
	Right or Neutral <sup>⑥</sup>	A18 <sup>⑦</sup>	A19 <sup>⑦</sup>	A20 <sup>⑦</sup>	—	—	—
2	Left <sup>⑤</sup>	A09	A10	—	A11	A2X1LPK	A2X1LTK
	Left <sup>⑤</sup>	A21 <sup>⑦</sup>	A22 <sup>⑦</sup>	—	—	E2X1LPK	—
	Right or Neutral <sup>⑥</sup>	A12	A13	—	A14	A2X1RPK	A2X1RTK <sup>⑧</sup>
	Right or Neutral <sup>⑥</sup>	A23 <sup>⑦</sup>	A24 <sup>⑦</sup>	—	—	E2X1RPK	—

F-Frame with Electronic Trip Unit Auxiliary Switch <sup>⑨</sup>

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads				Factory Installation Kit <sup>④</sup>	
		Same Side Suffix Number	Rear <sup>③</sup> Suffix Number	Opposite Side Suffix Number	Terminal Block Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
		<b>Trip Unit Type 310+</b>					
1	Right	A30	A31	A32	—	—	—
<b>Trip Unit Type 210+</b>							
1	Right	A33	A34	A35	—	—	—

## J-Frame and HMCP (J) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads				Field Mounted Factory Installation Kit <sup>⑩</sup>	
		Same Side Suffix Number	Rear <sup>③</sup> Suffix Number	Opposite Side Suffix Number	Terminal Block Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1	Left	A01	A02	A03	A04
	Right <sup>⑪</sup>	A05	A06	A07	A08	A1X2PK	A1X2RTK <sup>⑪</sup>
2	Left	A09	A10	—	A11	A2X2PK	A2X2LTK
	Right <sup>⑪</sup>	A12	A13	—	A14	A2X2PK	A2X2RTK <sup>⑪</sup>

## Notes

- ① Includes 24-inch external pigtail leads, 18 AWG (16–0.010).
- ② A maximum of two internal accessories may be mounted in a three-pole circuit breaker. Suitable for mounting in right pole only of two- or three-pole breaker.
- ③ Standard pigtail lead exit location.
- ④ Not listed with Underwriters Laboratories; for field installation.
- ⑤ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ⑥ Not for use on F-Frame with electronic trip unit.
- ⑦ 125 volts (max.), 50/60 Hz switch for use in electronic circuit of 100 micro amperes and 15 Vdc minimum.
- ⑧ Not for use on four-pole circuit breakers.
- ⑨ Only for use on three-pole F-Frame breakers with electronic trip unit. Installation auxiliary switch for FD electronic breakers on right pole must be performed at breaker factory.
- ⑩ Listed with Underwriters Laboratories for field installation or interchangeable trip unit breakers under E64983.
- ⑪ Standard mounting location—leads exit rear of breaker.

#### K-Frame and HMCP (K) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Field Mounted Factory Installation Kit ①	
		Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
1	Left	A01	A02	A03	A04	A1X3PK	A1X3LTK
	Right ②③	A05	A06	A07	A08	A1X3PK	A1X3RTK ④
2	Left	A09	A10	—	A11	A2X3PK	A2X3LTK
	Right ②③	A12	A13	—	A14	A2X3PK	A2X3RTK ④
	Right	A21	A22	—	—	1482D28G10 ⑥⑦	—
3	Left	A18	—	—	A15	A3X3LPK	A3X3LTK
	Right ③	A17	—	—	A16	A3X3RPK	A3X3RTK ④

#### L-, HMCP (L) and (M) Frames and Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Field Mounted Factory Installation Kit ①	
		Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
1	Left	A01	A02	A03	A04	A1X4PK	A1X4LTK
	Right ②	A05	A06	A07	A08	A1X4PK	A1X4RTK ④
2	Left	A09	A10	—	A11	A2X4PK	A2X4LTK
	Right ②	A12	A13	—	A14	A2X4PK	A2X4RTK ④
3	Left	A18	—	—	A15	A3X4PK	A3X4LTK
	Right ②	A17	—	—	A16	A3X4PK	A3X4RTK ④

#### N-Frame and HMCP (N) Auxiliary Switch

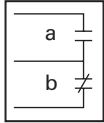
Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Field Mounted Factory Installation Kit ①	
		Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number		Pigtail Leads	Terminal Block
1	Left	A01	A02	A03	A04	A1X5PK	A1X5LTK
	Right ②	A05	A06	A07	A08	A1X5PK	A1X5RTK ④
2	Left	A09	A10	—	A11	A2X5PK	A2X5LTK
	Right ②	A12	A13	—	A14	A2X5PK	A2X5RTK ④
3	Left	A18	—	—	A15	A3X5LPK	A3X5LTK
	Right ②	A17	—	—	A16	A3X5RPK	A3X5RTK ④

#### R-Frame Auxiliary Switch (RH Only)

Number of Contacts A and B	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads Suffix Number ⑤	Field Mounted Field Installation Kits ① Pigtail Leads Catalog Number ⑤
	2	A12
4	A19	A4X6RPK

#### Notes

- ① Listed with Underwriters Laboratories for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.
- ④ Not for use on four-pole circuit breakers.
- ⑤ A maximum of two auxiliary switches (any combination of 2a/2b or 4a/4b plug-in modules may be installed in a circuit breaker).
- ⑥ This option is not field installable.
- ⑦ Available on the OPTIM 550 only. Communications are not available with this option.

**Auxiliary Switch and Alarm Switch Combination****Auxiliary Switch and Alarm Switch Combination****F-Frame Auxiliary Switch and Alarm Switch Combination** ①

Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit ②	
	18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads
	Same Side	Rear ③	Terminal Block	Same Side	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
Left ③	C01	C02	C03	AAL1LPK	AAL1LTK
Right	C04	C05	C06	AAL1RPK	AAL1RTK ④

**F-Frame HMCP Auxiliary Switch and Alarm Switch Combination**

Mounting Location (Pole)	Factory Mounted Connection Type and Location			Factory Installation Kit ②	
	18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads
	Same Side	Rear ③	Same Side	Same Side	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
Left ④	C01	C02	C03	MAAL1LPK	MAAL1LTK
Right	C04	C05	C06	MAAL1RPK	MAAL1RPK

**J-Frame and HMCP (J) Auxiliary Switch and Alarm Switch Combination**

Number of Sets of Contacts (1A and 1B) (1M–1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Terminal Block	Field Mounted Field Installation Kits ⑤	
		18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads	Terminal Block
		Same Side	Rear ⑥	Opposite Side	Same Side	Same Side	Terminal Block
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left	C01	C02	—	C03	AAL2LPK	AAL2LTK
	Right ④	C04	C05	—	C06	AAL2RPK	AAL2RTK ④

**K-Frame and HMCP (K) Auxiliary Switch and Alarm Switch Combination**

Number of Sets of Contacts (1A and 1B) (1M–1B)	Mounting Location (Pole)	Factory Mounted Connection Type and Location			Terminal Block	Field Mounted Field Installation Kits ⑤	
		18-Inch (457 mm) Pigtail Leads			Terminal Block	Pigtail Leads	Terminal Block
		Same Side	Rear ⑥	Opposite Side	Same Side	Same Side	Terminal Block
		Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
1	Left	C01	C02	—	C03	AAL3LPK	AAL3LTK
	Right ⑥⑦	C04	C05	—	C06	AAL3RPK ⑧	AAL3RTK
	Right	C07	C08	—	—	1482D28G09 ⑧⑨	—

**Notes**

- ① Auxiliary switch and alarm switch combination options (Cxx) are not available on FDE 310+ with LSG or LSIG trip units due to exit wire limitations. To obtain both features, order a left mounting alarm switch (B01-B04 or B09-B11), and right mounting auxiliary switch (A30-A32).
- ② Not listed with Underwriters Laboratories for field installation.
- ③ Standard mounting location.
- ④ Not for use on four-pole circuit breakers.
- ⑤ Listed with Underwriters Laboratories for field installation of interchangeable trip unit breakers under E64983.
- ⑥ Standard mounting location—leads exit rear of breaker.
- ⑦ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.
- ⑧ Will not install on OPTIM Trip (RH).
- ⑨ Available on the OPTIM 550 only. Communications are not available with this option.
- ⑩ This option is not field installable.

## L-, HMCP (L) and (M) Frames and Auxiliary Switch and Alarm Switch Combination

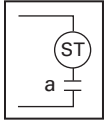
Number of Sets of Contacts	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1A, 1B and 1 Make/1 Break	Left	C01		C02	—
	Right <sup>②</sup>	C04	C05	—	C06	AA114RPK	AA114RTK <sup>③</sup>
2A, 2B and 1 Make/1 Break	Left	C07	C08	—	C12	AA214LPK	AA214LTK
	Right <sup>②</sup>	C10	C11	—	C13	AA214RPK	AA214RTK <sup>③</sup>
3A, 3B and 1 Make/1 Break	Left	C14	—	—	—	AA314LPK	—
	Right <sup>②</sup>	C15	—	—	—	AA314RPK	—

## N-Frame and HMCP (N) Auxiliary Switch and Alarm Switch Combination

Number of Sets of Contacts	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
		Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
		1A, 1B and 1 Make/1 Break	Left	C01		C02	—
	Right <sup>②</sup>	C04	C05	—	C06	AA115RPK	AA115RTK <sup>③</sup>
2A, 2B and 1 Make/1 Break	Left	C07	C08	—	C12	AA215LPK	AA215LTK
	Right <sup>②</sup>	C10	C11	—	C13	AA215RPK	AA215RTK <sup>③</sup>

**Notes**

- ① Listed with Underwriters Laboratories for field installation under E64983.  
 ② Standard mounting location—leads exit rear of breaker.  
 ③ Not for use on four-pole circuit breaker.

**Shunt Trip****Shunt Trip****G-Frame Shunt Trip (LH Three-Pole Only)**

Electrical Ratings				
Volts	Frequency	Amperes	Suffix Number	Catalog Number
120	50/60 Hz	1.1	<b>S1</b>	<b>1373D62G01</b>
240	50/60 Hz	2.1	<b>S2</b>	<b>1373D62G02</b>
12	DC	2.8	<b>S3</b>	<b>1373D62G15</b>
24	DC	5.7	<b>S4</b>	<b>1373D62G16</b>
24	60 Hz	—	<b>S7</b>	<b>1373D62G20</b>

**F-Frame and HMCP (F) Shunt Trip**

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location			Factory Installation Kit <sup>①</sup>		
	18-Inch (457.2 mm) Pigtail Leads <sup>②</sup>			Terminal Block	Pigtail Leads	Terminal Block
	Same Side	Rear <sup>③</sup>	Opposite Side	Same Side		
	Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC/DC Ratings</b>						
12–24 Vac or Vdc	<b>S01</b>	<b>S02</b>	<b>S03</b>	<b>S04</b>	<b>SNT1LP03K</b>	<b>SNT1LT03K</b>
48–127 Vac or 48–60 Vdc <sup>④</sup>	<b>S05</b>	<b>S06</b>	<b>S07</b>	<b>S08</b>	<b>SNT1LP08K</b>	<b>SNT1LT08K</b>
208–380 Vac or 110–127 Vdc	<b>S09</b>	<b>S10</b>	<b>S11</b>	<b>S12</b>	<b>SNT1LP12K</b>	<b>SNT1LT12K</b>
415–600 Vac or 220–250 Vdc	<b>S13</b>	<b>S14</b>	<b>S15</b>	<b>S16</b>	<b>SNT1LP18K</b>	<b>SNT1LT18K</b>
<b>Right- or Neutral-Pole Mounting AC/DC Ratings <sup>⑤</sup></b>						
12–24 Vac or Vdc	<b>S17</b>	<b>S18</b>	<b>S19</b>	<b>S20</b>	<b>SNT1RP03K</b>	<b>SNT1RT03K <sup>⑥</sup></b>
48–127 Vac or 48–60 Vdc <sup>④</sup>	<b>S21</b>	<b>S22</b>	<b>S23</b>	<b>S24</b>	<b>SNT1RP08K</b>	<b>SNT1RT08K <sup>⑥</sup></b>
208–380 Vac or 110–127 Vdc	<b>S25</b>	<b>S26</b>	<b>S27</b>	<b>S28</b>	<b>SNT1RP12K</b>	<b>SNT1RT12K <sup>⑥</sup></b>
415–600 Vac or 220–250 Vdc	<b>S29</b>	<b>S30</b>	<b>S31</b>	<b>S32</b>	<b>SNT1RP18K</b>	<b>SNT1RT18K <sup>⑥</sup></b>

**Notes**

- ① Not listed with Underwriters Laboratories, for field installation.
- ② Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ③ Standard pigtail lead exit location.
- ④ 120 Vac marked suitable for ground fault protection devices.
- ⑤ Standard mounting location.
- ⑥ Not for use on four-pole circuit breakers.

G-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory. Internal accessories are UL listed for factory installation under E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### J-Frame and HMCP (J) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
	<b>Left-Pole Mounting AC/DC Ratings <sup>②</sup></b>					
12–24 Vac or Vdc	S41	S42	S43	S44	SNT2P04K	SNT2T04K
48–60 Vac or Vdc	S49	S50	S51	S52	SNT2P06K	SNT2T06K
110–240 Vac or 110–125 Vdc <sup>③</sup>	S09	S10	S11	S12	SNT2P11K	SNT2T11K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT2P14K	SNT2T14K
480–600 Vac	S17	S18	S19	S20	SNT2P18K	SNT2T18K
<b>Right- or Neutral-Pole Mounting AC/DC Ratings</b>						
12–24 Vac or Vdc	S45	S46	S47	S48	SNT2P04K	SNT2T04K <sup>④</sup>
48–60 Vac or Vdc	S53	S54	S55	S56	SNT2P06K	SNT2T06K <sup>④</sup>
110–240 Vac or 110–125 Vdc <sup>③</sup>	S29	S30	S31	S32	SNT2P11K	SNT2T11K <sup>④</sup>
380–440 Vac or 220–250 Vdc	S33	S34	S35	S36	SNT2P14K	SNT2T14K <sup>④</sup>
480–600 Vac	S37	S38	S39	S40	SNT2P18K	SNT2T18K <sup>④</sup>

#### K-Frame and HMCP (K) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
	<b>Left-Pole Mounting AC/DC Ratings <sup>②</sup></b>					
12–24 Vac or Vdc	S41	S42	S43	S44	SNT3P04K	SNT3T04K
48–60 Vac or Vdc	S49	S50	S51	S52	SNT3P06K	SNT3T06K
110–240 Vac or 110–125 Vdc <sup>③</sup>	S09	S10	S11	S12	SNT3P11K	SNT3T11K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT3P14K	SNT3T14K
480–600 Vac	S17	S18	S19	S20	SNT3P18K	SNT3T18K
<b>Right- or Neutral-Pole Mounting AC/DC Ratings <sup>⑤⑥</sup></b>						
12–24 Vac or Vdc	S45	S46	S47	S48	SNT3P04K	SNT3T04K <sup>④</sup>
48–60 Vac or Vdc	S53	S54	S55	S56	SNT3P06K	SNT3T06K <sup>④</sup>
110–240 Vac or 110–125 Vdc <sup>③</sup>	S29	S30	S31	S32	SNT3P11K	SNT3T11K <sup>④</sup>
380–440 Vac or 220–250 Vdc	S33	S34	S35	S36	SNT3P14K	SNT3T14K <sup>④</sup>
480–600 Vac	S37	S38	S39	S40	SNT3P18K	SNT3T18K <sup>④</sup>

#### Notes

- ① Listed with Underwriters Laboratories for field installation under E64983.
- ② Standard mounting location—leads exit rear of breaker.
- ③ Suitable for use with Class 1 ground fault sensing element.
- ④ Not for use on four-pole circuit breakers.
- ⑤ For use with KT (thermal-magnetic) trip units only.
- ⑥ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.

## L-, HMCP (L) and (M) Frames and Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads				Field Mounted Field Installation Kits <sup>①</sup>	
	Same Side		Rear <sup>②</sup>	Opposite Side	Terminal Block	
	Suffix Number	Suffix Number	Suffix Number	Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
<b>Left-Pole Mounting AC/DC Ratings <sup>②</sup></b>						
12–24 Vac or Vdc	S01	S02	S03	S04	SNT4LP03K	SNT4LT03K
48–60 Vac	S05	S06	S07	S08	SNT4LP05K	SNT4LT05K
48–60 Vdc	S85	S86	S87	—	SNT4LP23K	SNT4LT23K
110–240 Vac	S09	S10	S11	S12	SNT4LP11K	SNT4LT11K
110–125 Vdc	S41	S42	S43	S44	SNT4LP26K	SNT4LT26K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT4LP14K	SNT4LT14K
480–600 Vac	S17	S18	S19	S20	SNT4LP18K	SNT4LT18K
<b>Right-Pole Mounting AC/DC Ratings <sup>③</sup></b>						
12–24 Vac or Vdc	S21	S22	S23	S24	SNT4RP03K	SNT4RT03K
48–60 Vac	S25	S26	S27	S28	SNT4RP05K	SNT4RT05K
48–60 Vdc	S88	S89	S90	—	SNT4RP23K	SNT4RT23K
110–240 Vac	S29	S30	S31	S32	SNT4RP11K	SNT4RT11K
110–125 Vdc	S45	S46	S47	S48	SNT4RP26K	SNT4RT26K
380–440 Vac or 220–250 Vdc	S33	S34	S35	S36	SNT4RP14K	SNT4RT14K
480–600 Vac	S37	S38	S39	S40	SNT4RP18K	SNT4RT18K

**Notes**

<sup>①</sup> Listed with Underwriters Laboratories, for field installation under E64983.

<sup>②</sup> Standard mounting location—leads exit rear of breaker.

<sup>③</sup> For use with LT (thermal-magnetic) three-pole trip units only.



## N-Frame and HMCP (N) Shunt Trip

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Field Mounted Field Installation Kits <sup>①</sup>		
	Same Side	Rear <sup>②</sup>	Opposite Side	Terminal Block Same Side	Pigtail Leads	Terminal Block
	Suffix Number	Suffix Number	Suffix Number	Suffix Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC/DC Ratings <sup>②</sup></b>						
9–24 Vac or Vdc	S01	S02	S03	S04	SNT5LP03K	SNT5LT03K
48–60 Vac	S05	S06	S07	S08	SNT5LP05K	SNT5LT05K
110–240 Vac <sup>③</sup>	S09	S10	S11	S12	SNT5LP11K	SNT5LT11K
110–125 Vdc	S41	S42	S43	S44	SNT5LP26K	SNT5LT26K
380–440 Vac or 220–250 Vdc	S13	S14	S15	S16	SNT5LP14K	SNT5LT14K
480–600 Vac	S17	S18	S19	S20	SNT5LP18K	SNT5LT18K
48–60 Vdc	S21	S22	S23	S24	SNT5LP23K	SNT5LT23K

## R-Frame Shunt Trip (RH Only)

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads	Field Mounted Field Installation Kits <sup>①</sup>
	Suffix Number <sup>④</sup>	Pigtail Leads Catalog Number <sup>④</sup>
24 Vac or Vdc	S21	SNT6P03K
48–60 Vac	S25	SNT6P05K
110–240 Vac	S29	SNT6P11K
380–440 Vac or 220–250 Vdc	S33	SNT6P14K
480–600 Vac	S37	SNT6P18K
48–60 Vdc	S88	SNT6P23K
110–125 Vdc	S45	SNT6P26K

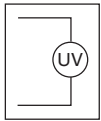
**Notes**

- <sup>①</sup> Listed with Underwriters Laboratories for field installation under E64983.  
<sup>②</sup> Standard mounting location—leads exit rear of breaker.  
<sup>③</sup> Supply voltages suitable for use with Class 1 GFP devices. Marking label included with accessory kits.  
<sup>④</sup> A maximum of two shunt trip plug-in modules may be installed in a circuit breaker.

### Low Energy Shunt Trip Ordering Information

Select shunt trip catalog number for the voltage within the indicated voltage range. Shunt trip coils are designed to be applied at specific AC or DC voltages within the voltage range shown. Electrical ratings are also shown on applicable circuit breaker accessory nameplates.

#### Low Energy Shunt Trip



#### F-, J-, K-, L-, M-, N- and R-Frames and HMCPs Low Energy Shunt Trip <sup>①</sup>

Mounting Positions (Pole)	Factory Mounted Connection Type and Location			Field Mounted Field Installation Kits <sup>②</sup>		
	18-Inch (457.2 mm) Pigtail Leads			Terminal Block		
	Same Side Suffix Number	Rear <sup>③</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
<b>F-Frame</b>						
Left	N01	N02	N03	N04	LST1LPK <sup>④</sup>	LST1LTK <sup>④</sup>
Right <sup>③</sup>	N05	N06	N07	N08	LST1RPK <sup>④</sup>	LST1RTK <sup>④</sup>
<b>J-Frame</b>						
Left	N01	N02	N03	—	LST2LPK	—
Right <sup>③</sup>	N05	N06	N07	—	LST2RPK	—
<b>K-Frame</b>						
Left <sup>③</sup>	N01	N02	N03	—	LST3LPK	—
Right <sup>⑤⑥</sup>	N05	N06	N07	—	LST3RPK	—
<b>L- and M-Frames</b>						
Left	N01	N02	N03	—	LST4LPK	—
Right	N05	N06	N07	—	LST4RPK	—
<b>N-Frame</b>						
Left <sup>③</sup>	N01	N02	N03	—	LST5LPK	—
<b>R-Frame</b>						
Right	N01	—	—	—	LST6RPK	—

#### Notes

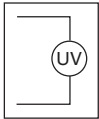
- ① Cutoff provisions required in control circuit.
- ② Listed with Underwriters Laboratories for field installation under E64983.
- ③ Standard mounting location—leads exit rear of breaker.
- ④ For F-Frame HMCP, add an "M" to beginning of catalog number. Field Installation Kit referenced for factory use only, not UL listed for field installation.
- ⑤ For use with thermal-magnetic trip units only.
- ⑥ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.

### Undervoltage Release Mechanism Ordering Information

2

Select handle reset undervoltage release mechanism catalog number for the voltage within the indicated voltage range. Undervoltage release mechanism coils are designed to be applied at specific AC or DC voltages within the voltage range shown on applicable circuit breaker accessory nameplates.

#### Undervoltage Release Mechanism



#### G-Frame Undervoltage Release Mechanism (LH Three-Pole Only)

##### Electrical Ratings

Volts (AC Only)	Frequency (Hz)	Amperes	Style Numbers <sup>①②③</sup>	Factory Suffix
120	50/60	0.05	<b>1373D62G03</b>	<b>T1</b>
24	50/60	0.22	<b>1373D62G04</b>	<b>T2</b>
48	50/60	0.11	<b>1373D62G05</b>	<b>T3</b>
60	50/60	0.10	<b>1373D62G06</b>	<b>T4</b>
110	50	0.049	<b>1373D62G07</b>	<b>T5</b>
208	60	0.026	<b>1373D62G08</b>	<b>T6</b>
220	50	0.025	<b>1373D62G09</b>	<b>T7</b>
240	50/60	0.024	<b>1373D62G10</b>	<b>T8</b>
380	50	0.015	<b>1373D62G11</b>	<b>T9</b>
415	50	0.013	<b>1373D62G12</b>	<b>T10</b>
440	50	0.012	<b>1373D62G13</b>	<b>T11</b>
480	60	0.01	<b>1373D62G14</b>	<b>T12</b>

##### Notes

- ① Includes 24-inch (609.6 mm) external pigtail leads, 18 AWG (16–0.010).
- ② A maximum of two internal accessories may be mounted in a three-pole circuit breaker.
- ③ Suitable for mounting in left pole only of three-pole breaker.

G-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory.

Internal accessories are UL listed for factory installation under E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

### F-Frame Factory Mounted (For F-Frame Breaker and F-Frame HMCP) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Connection Type and Location 18-Inch Pigtail Leads			Terminal Block Same Side Suffix Number
	Same Side	Rear <sup>①</sup>	Opposite Side	
	Suffix Number	Suffix Number	Suffix Number	
<b>Left-Pole Mounting AC Ratings</b>				
12 Vac	U01	U02	U03	U04
24 Vac	U05	U06	U07	U08
48 Vac	U37	U38	U39	U40
60 Vac	U97	U98	U99	U100
110–127 Vac	U13	U14	U15	U16
208–240 Vac	U17	U18	U19	U20
380–480 Vac	U21	U22	U23	U24
525–600 Vac	U25	U26	U27	U28
<b>Right-Pole Mounting AC Ratings <sup>②③</sup></b>				
12 Vac	U49	U50	U51	U52
24 Vac	U53	U54	U55	U56
48 Vac	U85	U86	U87	U88
60 Vac	U101	U102	U103	U104
110–127 Vac	U61	U62	U63	U64
208–240 Vac	U65	U66	U67	U68
380–480 Vac	U69	U70	U71	U72
525–600 Vac	U73	U74	U75	U76
<b>Left-Pole Mounting DC Ratings</b>				
12 Vdc	U29	U30	U31	U32
24 Vdc	U33	U34	U35	U36
48 Vdc	U37	U38	U39	U40
60 Vdc	U97	U98	U99	U100
110–127 Vdc	U41	U42	U43	U44
220–250 Vdc	U45	U46	U47	U48
<b>Right-Pole Mounting DC Ratings <sup>②③</sup></b>				
12 Vdc	U77	U78	U79	U80
24 Vdc	U81	U82	U83	U84
48 Vdc	U85	U86	U87	U88
60 Vdc	U101	U102	U103	U104
110–127 Vdc	U89	U90	U91	U92
220–250 Vdc	U93	U94	U95	U96

#### Notes

- ① Standard pigtail lead exit location.
- ② Standard mounting location.
- ③ Not for use on right pole of four-pole circuit breaker.

F-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory.

Internal accessories are UL listed for factory installation under E7819.

Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

## F-Frame Field Mounted Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	F-Frame Breaker Factory Installation Kits <sup>①</sup>		F-Frame Breaker HMCP	
	Pigtail Leads	Terminal Block	Pigtail Leads	Terminal Block
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
<b>Left-Pole Mounting AC Ratings</b>				
12 Vac	UVH1LP02K	UVH1LT02K	MUVH1LP02K	MUVH1LT02K
24 Vac	UVH1LP03K	UVH1LT03K	MUVH1LP03K	MUVH1LT03K
48 Vac	UVH1LP22K	UVH1LT22K	MUVH1LP22K	MUVH1LT22K
60 Vac	UVH1LP24K	UVH1LT24K	MUVH1LP24K	MUVH1LT24K
110–127 Vac	UVH1LP08K	UVH1LT08K	MUVH1LP08K	MUVH1LT08K
208–240 Vac	UVH1LP11K	UVH1LT11K	MUVH1LP11K	MUVH1LT11K
380–480 Vac	UVH1LP15K	UVH1LT15K	MUVH1LP15K	MUVH1LT15K
525–600 Vac	UVH1LP18K	UVH1LT18K	MUVH1LP18K	MUVH1LT18K
<b>Right-Pole Mounting AC Ratings <sup>②③</sup></b>				
12 Vac	UVH1RP02K	UVH1RT02K	MUVH1RP02K	MUVH1RT02K
24 Vac	UVH1RP03K	UVH1RT03K	MUVH1RP03K	MUVH1RT03K
48 Vac	UVH1RP22K	UVH1RT22K	MUVH1RP22K	MUVH1RT22K
60 Vac	UVH1RP24K	UVH1RT24K	MUVH1RP24K	MUVH1RT24K
110–127 Vac	UVH1RP08K	UVH1RT08K	MUVH1RP08K	MUVH1RT08K
208–240 Vac	UVH1RP11K	UVH1RT11K	MUVH1RP11K	MUVH1RT11K
380–480 Vac	UVH1RP15K	UVH1RT15K	MUVH1RP15K	MUVH1RT15K
525–600 Vac	UVH1RP18K	UVH1RT18K	MUVH1RP18K	MUVH1RT18K
<b>Left-Pole Mounting DC Ratings</b>				
12 Vdc	UVH1LP20K	UVH1LT20K	MUVH1LP20K	MUVH1LT20K
24 Vdc	UVH1LP21K	UVH1LT21K	MUVH1LP21K	MUVH1LT21K
48 Vdc	UVH1LP22K	UVH1LT22K	MUVH1LP22K	MUVH1LT22K
60 Vdc	UVH1LP24K	UVH1LT24K	MUVH1LP24K	MUVH1LT24K
110–127 Vdc	UVH1LP26K	UVH1LT26K	MUVH1LP26K	MUVH1LT26K
220–250 Vdc	UVH1LP28K	UVH1LT28K	MUVH1LP28K	MUVH1LT28K
<b>Right-Pole Mounting DC Ratings <sup>②③</sup></b>				
12 Vdc	UVH1RP20K	UVH1RT20K	MUVH1RP20K	MUVH1RT20K
24 Vdc	UVH1RP21K	UVH1RT21K	MUVH1RP21K	MUVH1RT21K
48 Vdc	UVH1RP22K	UVH1RT22K	MUVH1RP22K	MUVH1RT22K
60 Vdc	UVH1RP22K	UVH1RT22K	MUVH1RP22K	MUVH1RT22K
110–127 Vdc	UVH1RP26K	UVH1RT26K	MUVH1RP26K	MUVH1RT26K
220–250 Vdc	UVH1RP28K	UVH1RT28K	MUVH1RP28K	MUVH1RT28K

**Notes**

- ① Not listed with Underwriters Laboratories, for field installation.
- ② Standard mounting location.
- ③ Not for use on right pole of four-pole circuit breaker.

## J-Frame and HMCP (J) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location			Field Mounted Field Installation Kits <sup>②</sup>		
	18-Inch (457.2 mm) Pigtail Leads			Terminal Block <sup>①</sup>	Pigtail Leads Catalog Number	Terminal Block <sup>③</sup> Catalog Number
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number		
<b>Left-Pole Mounting AC Ratings <sup>④</sup></b>						
12 Vac	U05	U06	U07	U08	UVH2LP02K	UVH2LT02K
24 Vac	U09	U10	U11	U12	UVH2LP03K	UVH2LT03K
48–60 Vac	U13	U14	U15	U16	UVH2LP05K	UVH2LT05K
110–127 Vac	U17	U18	U19	U20	UVH2LP08K	UVH2LT08K
208–240 Vac	U21	U22	U23	U24	UVH2LP11K	UVH2LT11K
380–480 Vac	U25	U26	U27	U28	UVH2LP15K	UVH2LT15K
<b>Right-Pole Mounting AC Ratings <sup>③</sup></b>						
12 Vac	U37	U38	U39	U40	UVH2RP02K	UVH2RT02K
24 Vac	U41	U42	U43	U44	UVH2RP03K	UVH2RT03K
48–60 Vac	U45	U46	U47	U48	UVH2RP05K	UVH2RT05K
110–127 Vac	U49	U50	U51	U52	UVH2RP08K	UVH2RT08K
208–240 Vac	U53	U54	U55	U56	UVH2RP11K	UVH2RT11K
380–480 Vac	U57	U58	U59	U60	UVH2RP15K	UVH2RT15K
<b>Left-Pole Mounting DC Ratings <sup>④</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH2LP20K	UVH2LT20K
24 Vdc	T05	T06	T07	T08	UVH2LP21K	UVH2LT21K
48–60 Vdc	T09	T10	T11	T12	UVH2LP23K	UVH2LT23K
110–127 Vdc	T13	T14	T15	T16	UVH2LP26K	UVH2LT26K
220–250 Vdc	T17	T18	T19	T20	UVH2LP28K	UVH2LT28K
<b>Right-Pole Mounting DC Ratings <sup>③</sup></b>						
12 Vdc	T21	T22	T23	T24	UVH2RP20K	UVH2RT20K
24 Vdc	T25	T26	T27	T28	UVH2RP21K	UVH2RT21K
48–60 Vdc	T29	T30	T31	T32	UVH2RP23K	UVH2RT23K
110–127 Vdc	T33	T34	T35	T36	UVH2RP26K	UVH2RT26K
220–250 Vdc	T37	T38	T39	T40	UVH2RP28K	UVH2RT28K

**Notes**

- <sup>①</sup> For electrical rating data for manual, automatic and electrical reset undervoltage release mechanisms, refer to Eaton.  
<sup>②</sup> Listed with Underwriters Laboratories for field installation under E64983.  
<sup>③</sup> Not for use on right pole of four-pole circuit breakers.  
<sup>④</sup> Standard mounting location—leads exit rear of breaker.

## K-Frame and HMCP (K) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location				Field Mounted Field Installation Kits ①	
	18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Pigtail Leads Catalog Number	Terminal Block Catalog Number
	Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number		
<b>Left-Pole Mounting AC Ratings ②</b>						
12 Vac	U05	U06	U07	U08	UVH3LP02K	UVH3LT02K
24 Vac	U09	U10	U11	U12	UVH3LP03K	UVH3LT03K
48–60 Vac	U13	U14	U15	U16	UVH3LP05K	UVH3LT05K
110–127 Vac	U17	U18	U19	U20	UVH3LP08K	UVH3LT08K
208–240 Vac	U21	U22	U23	U24	UVH3LP11K	UVH3LT11K
380–480 Vac	U25	U26	U27	U28	UVH3LP15K	UVH3LT15K
<b>Right-Pole Mounting AC Ratings ③④⑤</b>						
12 Vac	U37	U38	U39	U40	UVH3RP02K	UVH3RT02K
24 Vac	U41	U42	U43	U44	UVH3RP03K	UVH3RT03K
48–60 Vac	U45	U46	U47	U48	UVH3RP05K	UVH3RT05K
110–127 Vac	U49	U50	U51	U52	UVH3RP08K	UVH3RT08K
208–240 Vac	U53	U54	U55	U56	UVH3RP11K	UVH3RT11K
380–480 Vac	U57	U58	U59	U60	UVH3RP15K	UVH3RT15K
<b>Left-Pole Mounting DC Ratings ②</b>						
12 Vdc	T01	T02	T03	T04	UVH3LP20K	UVH3LT20K
24 Vdc	T05	T06	T07	T08	UVH3LP21K	UVH3LT21K
48–60 Vdc	T09	T10	T11	T12	UVH3LP23K	UVH3LT23K
110–127 Vdc	T13	T14	T15	T16	UVH3LP26K	UVH3LT26K
220–250 Vdc	T17	T18	T19	T20	UVH3LP28K	UVH3LT28K
<b>Right-Pole Mounting DC Ratings ③④⑤</b>						
12 Vdc	T21	T22	T23	T24	UVH3RP20K	UVH3RT20K
24 Vdc	T25	T26	T27	T28	UVH3RP21K	UVH3RT21K
48–60 Vdc	T29	T30	T31	T32	UVH3RP23K	UVH3RT23K
110–127 Vdc	T33	T34	T35	T36	UVH3RP26K	UVH3RT26K
220–250 Vdc	T37	T38	T39	T40	UVH3RP28K	UVH3RT28K

**Notes**

- ① Listed with Underwriters Laboratories, for field installation under E64983.  
 ② Standard mounting location—leads exit rear of breaker.  
 ③ For use with KT (thermal-magnetic) trip units only.  
 ④ Not for use on right pole of four-pole circuit breaker.  
 ⑤ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.

## L-, HMCP (L) and (M)-Frames and Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location				Field Mounted Field Installation Kits <sup>①</sup>	
	18-Inch (457.2 mm) Pigtail Leads			Terminal Block	Pigtail Leads Catalog Number	Terminal Block Catalog Number
	Same Side Suffix Number	Rear <sup>②</sup> Suffix Number	Opposite Side Suffix Number	Same Side Suffix Number		
<b>Left-Pole Mounting AC Ratings <sup>②</sup></b>						
12 Vac	U05	U06	U07	U08	UVH4LP02K	UVH4LT02K
24 Vac	U09	U10	U11	U12	UVH4LP03K	UVH4LT03K
48–60 Vac	U13	U14	U15	U16	UVH4LP05K	UVH4LT05K
110–127 Vac	U17	U18	U19	U20	UVH4LP08K	UVH4LT08K
208–240 Vac	U21	U22	U23	U24	UVH4LP11K	UVH4LT11K
380–480 Vac	U25	U26	U27	U28	UVH4LP15K	UVH4LT15K
<b>Right-Pole Mounting AC Ratings <sup>③④</sup></b>						
12 Vac	U37	U38	U39	U40	UVH4RP02K	UVH4RT02K
24 Vac	U41	U42	U43	U44	UVH4RP03K	UVH4RT03K
48–60 Vac	U45	U46	U47	U48	UVH4RP05K	UVH4RT05K
110–127 Vac	U49	U50	U51	U52	UVH4RP08K	UVH4RT08K
208–240 Vac	U53	U54	U55	U56	UVH4RP11K	UVH4RT11K
380–480 Vac	U57	U58	U59	U60	UVH4RP15K	UVH4RT15K
<b>Left-Pole Mounting DC Ratings <sup>②</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH4LP20K	UVH4LT20K
24 Vdc	T05	T06	T07	T08	UVH4LP21K	UVH4LT21K
48–60 Vdc	T09	T10	T11	T12	UVH4LP23K	UVH4LT23K
110–127 Vdc	T13	T14	T15	T16	UVH4LP26K	UVH4LT26K
220–250 Vdc	T17	T18	T19	T20	UVH4LP28K	UVH4LT28K
<b>Right-Pole Mounting DC Ratings <sup>③④</sup></b>						
12 Vdc	T21	T22	T23	T24	UVH4RP20K	UVH4RT20K
24 Vdc	T25	T26	T27	T28	UVH4RP21K	UVH4RT21K
48–60 Vdc	T29	T30	T31	T32	UVH4RP23K	UVH4RT23K
110–127 Vdc	T33	T34	T35	T36	UVH4RP26K	UVH4RT26K
220–250 Vdc	T37	T38	T39	T40	UVH4RP28K	UVH4RT28K

**Notes**

- ① Listed with Underwriters Laboratories for field installation under E64983.  
 ② Standard mounting location—leads exit rear of breaker.  
 ③ For use with LT (thermal-magnetic) trip units only.  
 ④ Not for use on right pole of four-pole circuit breaker.



## N-Frame and HMCP (N) Undervoltage Release Mechanism

Voltage Rating (AC Freq. = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads				Field Mounted Field Installation Kits <sup>①</sup>	
	Terminal Block			Same Side Suffix Number	Pigtail Leads Catalog Number	Terminal Block Catalog Number
	Same Side	Rear <sup>②</sup>	Opposite Side			
	Suffix Number	Suffix Number	Suffix Number			
<b>Left-Pole Mounting AC Ratings <sup>②</sup></b>						
12 Vac	U05	U06	U07	U08	UVH5LP02K	UVH5LT02K
24 Vac	U09	U10	U11	U12	UVH5LP03K	UVH5LT03K
48–60 Vac	U13	U14	U15	U16	UVH5LP05K	UVH5LT05K
110–127 Vac	U17	U18	U19	U20	UVH5LP08K	UVH5LT08K
208–240 Vac	U21	U22	U23	U24	UVH5LP11K	UVH5LT11K
380–480 Vac	U25	U26	U27	U28	UVH5LP29K	UVH5LT29K
<b>Left-Pole Mounting DC Ratings <sup>②</sup></b>						
12 Vdc	T01	T02	T03	T04	UVH5LP20K	UVH5LT20K
24 Vdc	T05	T06	T07	T08	UVH5LP21K	UVH5LT21K
48–60 Vdc	T09	T10	T11	T12	UVH5LP23K	UVH5LT23K
110–127 Vdc	T13	T14	T15	T16	UVH5LP26K	UVH5LT26K
220–250 Vdc	T17	T18	T19	T20	UVH5LP28K	UVH5LT28K

## R-Frame Undervoltage Release Mechanism (RH only)

Voltage Rating (AC Frequency = 50/60 Hz)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads		Field Mounted Field Installation Kits <sup>③</sup>
	Suffix Number <sup>④</sup>		Pigtail Leads Catalog Number <sup>④</sup>
	Suffix Number	Suffix Number	Catalog Number
12 Vac	U37		UVH6RP02K
24 Vac	U41		UVH6RP03K
48–60 Vac	U45		UVH6RP05K
110–127 Vac	U49		UVH6RP08K
208–240 Vac	U53		UVH6RP11K
380–500 Vac	U57		UVH6RP29K
12 Vdc	T21		UVH6RP20K
24 Vdc	T25		UVH6RP21K
48–60 Vdc	T29		UVH6RP23K
110–125 Vdc	T33		UVH6RP26K
220–250 Vdc	T37		UVH6RP28K

**Notes**

- ① Listed with Underwriters Laboratories for field installation under E64983.  
 ② Standard mounting location—leads exit rear of breaker.  
 ③ Endurance: 500 electrical operations plus 2500 mechanical operations.  
 ④ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are orange and brown.

**Accessory Terminal Block (R-Frame)****Accessory Terminal Block (R-Frame)****R-Frame Accessory Terminal Block** <sup>①</sup>

Factory Installed Suffix Number	Field Mounted Catalog Number
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Q01	TBRDK
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**Number of Control Wires for Each Internally Mounted Accessory**

Type of Accessory	Number of Contacts per Single Accessory	Required Number of Wires
Auxiliary switch	2a/2b 4a/4b	6 12
Alarm (Signal)/ Lockout switch	1m/1b 2m/2b	6 12
Shunt trip	N/A	2
Low energy shunt	N/A	2
Undervoltage release mechanism	N/A	2

**PowerNet and Zone Interlock Kits (OPTIM 550 Only)  
K-, L- and N-Frames****PowerNet and Zone  
Interlock Kits****PowerNet Interlock Kit** <sup>②</sup>

Circuit Breaker	Factory Install Suffix	Catalog Number
K-Frame	PN	ICK550K
L-Frame	PN	ICK550L
N-Frame	PN	ICK550N

**Zone Interlock/Ground Kit** <sup>②③</sup>

Circuit Breaker	Factory Install Suffix	Catalog Number
K-Frame	ZG	ZGK550K
L-Frame	ZG	ZGK550L
N-Frame	ZG	ZGK550N

**PowerNet and Zone Interlock/Ground Kit** <sup>②③</sup>

Circuit Breaker	Factory Install Suffix	Catalog Number
K-Frame	ZGP	ZGPK550K
L-Frame	ZGP	ZGPK550L
N-Frame	ZGP	ZGPK550N

**Notes**

- ① One 24-point accessory terminal block provided with circuit breaker when ordered factory installed or shipped from warehouse as separate item when ordered for field installation. See Digitrip RMS master connection diagram (IL 29C714).
- ② Installation of these kits restrict any other attachments from being installed in the RH pole.
- ③ Includes a ground fault alarm signal that can drive the ground fault alarm unit (catalog number GFAU).

## Technical Data and Specifications

### Alarm Switch

#### F-Frame Electrical Rating Data <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
<b>Multi-Pole Circuit Breakers</b>			
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500
<b>Single-Pole Circuit Breakers</b>			
125/250	50/60 Hz	6 <sup>③</sup>	2000
28	DC	3 <sup>③</sup>	2000
28	DC	5 <sup>④</sup>	2000

#### J-Frame Electrical Rating Data <sup>⑤⑥</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### K-Frame Electrical Rating Data <sup>⑥⑦</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### L- and M-Frames Electrical Rating Data <sup>⑥⑦</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### N-Frame Electrical Rating Data <sup>⑧</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

#### R-Frame Electrical Rating Data <sup>⑨⑩</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

### Auxiliary Switch

#### F-Frame Electrical Rating Data <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
125 <sup>③</sup>	50/60 Hz	1	2500
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### J-Frame Electrical Rating Data <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### K-Frame Electrical Rating Data <sup>②⑤</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### L- and M-Frames Electrical Rating Data <sup>②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### N-Frame Electrical Rating Data <sup>②⑥</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>④</sup>	2500
250	DC	0.25 <sup>④</sup>	2500

#### R-Frame Electrical Rating Data <sup>⑦⑧</sup>

Maximum Voltage	Frequency	Maximum Current Amperes
600	50/60 Hz	6
125	DC	0.50 <sup>④</sup>
250	DC	0.25 <sup>④</sup>

#### Notes

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ② Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ③ Non-inductive load.
- ④ Inductive (L/R = 0.026).
- ⑤ Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ⑥ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ⑦ Endurance: 5000 electrical operations plus 1000 mechanical operations.
- ⑧ Endurance: 3000 electrical operations plus 1000 mechanical operations.
- ⑨ Endurance: 500 electrical operations plus 2500 mechanical operations.
- ⑩ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are red, black and blue.

**Auxiliary Switch and Alarm Switch Combination****F-Frame Electrical Rating Data** <sup>①②</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2200
250	DC	0.25 <sup>③</sup>	2200

**J-Frame Electrical Rating Data** <sup>②④</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**K-Frame Electrical Rating Data** <sup>②④</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**L- and M-Frames Electrical Rating Data** <sup>②⑤</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**N-Frame Electrical Rating Data** <sup>②⑥</sup>

Maximum Voltage	Frequency	Maximum Current Amperes	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.50 <sup>③</sup>	2500
250	DC	0.25 <sup>③</sup>	2500

**Notes**

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ② Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>).
- ③ Non-inductive load.
- ④ Endurance: 4000 electrical operations plus 4000 mechanical operations.
- ⑤ Endurance: 1000 electrical operations plus 5000 mechanical operations.
- ⑥ Endurance: 500 electrical operations plus 2000 mechanical operations.

**Shunt Trip****F-Frame and HMCP Shunt Trip Electrical Rating Data** ①②③

2

Catalog Number	Application Ratings		Electrical Operating Ratings					One Minute Dielectric Withstand Voltage (V)		
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.25 (A)	I <sub>rms</sub> at 0.33s (A)		VA	
SNT1LP03K or SNT1LT03K	12–24	50/60	9	6.3	6.1	4.3	40	1048		
			12		8.5				6	75
			24		17				12	300
	12–24	DC	12	9	8	100				
			24				16		400	
			24				16		400	
SNT1LP08K or SNT1LT08K	48–127	50/60	48	33.6	2.7	1.9	92	1254		
			60		3.4				2.4	140
			110		6.2				4.4	480
			120		6.8				4.8	570
			127		7.2				5.1	640
	48–60	DC	48	33.6	2.1	100				
			60				2.6		160	
			60				2.6		160	
			60				2.6		160	
SNT1LP12K or SNT1LT12K	208–380	50/60	208	146	1.2	0.25	180	1760		
			220		1.3				0.27	200
			240		1.4				0.29	240
			380		2.3				0.31	610
	110–125	DC	110	77	0.5	55				
			120				0.55		66	
			120				0.55		66	
			125				0.57		71	
			125				0.57		71	
SNT1LP18K or SNT1LT18K	415–600	50/60	400	280	1.1	0.77	310	2200		
			415		1.1				0.8	330
			440		1.2				0.85	380
			480		1.3				0.93	450
			525		1.4				1.02	530
			550		1.5				1.06	590
	220–250	DC	220	154	0.48	110				
			250				0.55		140	
			250				0.55		140	
			250				0.55		140	

**Notes**

- ① Average unlatching time: 6 milliseconds.
- ② Average circuit breaker contact total opening time: 18 milliseconds.
- ③ Endurance: 6000 electrical operations plus 4000 mechanical operations.

J-Frame and HMCP (J) Shunt Trip Electrical Rating Data <sup>①②③</sup>

Catalog Number	Application Ratings		Electrical Operating Ratings						One Minute Dielectric Withstand Voltage (V)	
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.25 (A)	I <sub>rms</sub> at 0.33s (A)	VA		
SNT2P04K or SNT2T04K	12–24	50/60	12	9	17.7	12.6	164	1048		
			24		38.3				27.4	631
	12–24	DC	12	9	7.3	87	405			
			24		16.9					
SNT2P06K or SNT2T06K	48–60	50/60	48	36	24.4	17.3	830	1120		
			60		30.1				21.3	1280
	48–60	DC	48	36	14.8	710	1105			
			60		18.4					
SNT2P11K or SNT2T11K	110–240	50/60	110	60	0.9	0.6	66	1480		
			120		1				0.7	84
			127		1.1				0.8	102
			208		2.4				1.7	354
			220		2.6				1.8	396
			240		2.6				1.8	432
	110–125	DC	110	60	1	112	138	150		
			120		1.1					
			125		1.2					
SNT2P14K or SNT2T14K	380–440	50/60	380	285	0.34	0.25	127	1880		
			400		0.38				0.27	150
			415		0.4				0.29	163
			440		0.44				0.31	188
	220–250	DC	220	165	0.19	40	58			
			250		0.22					
SNT2P18K or SNT2T18K	480–600	50/60	480	360	0.13	0.07	34	2200		
			525		0.13				0.08	42
			550		0.13				0.09	50
			600		0.14				0.1	60

**Notes**

- ① Average unlatching time: 6 milliseconds.  
 ② Average circuit breaker contact total opening time: 18 milliseconds.  
 ③ Endurance: 6000 electrical operations plus 2000 mechanical operations.

K-Frame and HMCP (K) Shunt Trip Electrical Rating Data <sup>①②③</sup>

Catalog Number	Application Ratings		Electrical Operating Ratings					One Minute Dielectric Withstand Voltage (V)			
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.25 (A)	I <sub>rms</sub> at 0.33s (A)		VA		
SNT3P04K or SNT3T04K	12–24	50/60	12	9	17.7	12.6	164	1048			
			24		38.3				27.4	631	
	12–24	DC	12	9			7.3		87		
			24							16.9	405
SNT3P06K or SNT3T06K	48–60	50/60	48	36	24.4	17.3	830	1120			
			60		30.1				21.3	1280	
	48–60	DC	48	36			14.8		710		
			60							18.4	1105
SNT3P11K or SNT3T11K	110–240	50/60	110	60	1.3	0.9	100	1480			
			120		1.4				1	120	
			127		1.5				1.1	140	
			208		2.8				2	420	
			220		3				2.1	470	
			240		3.2				2.3	550	
	110–125	DC	110	82			1		110		
			120							1.1	130
			125							1.2	140
SNT3P14K or SNT3T14K	380–440	50/60	380	285	0.37	0.25	95	1880			
			400		0.39				0.27	108	
			415		0.42				0.29	120	
			440		0.44				0.31	136	
	220–250	DC	220	165			0.19		41		
			250							0.22	54
SNT3P18K or SNT3T18K	480–600	50/60	480	360	0.11	0.08	40	2200			
			525		0.13				0.09	50	
			550		0.13				0.09	50	
			600		0.16				0.12	70	

**Notes**

- ① Approximate unlatching time: 6 milliseconds.  
 ② Approximate total circuit breaker contact opening time: 8 milliseconds.  
 ③ Endurance: 5000 electrical operations plus 1000 mechanical operations.

L-Frame and HMCP (L) and M-Frame Shunt Trip Electrical Rating Data <sup>①②③</sup>

Catalog Number	Application Ratings		Electrical Operating Ratings						One Minute Dielectric Withstand Voltage (V)	
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.25 (A)	I <sub>rms</sub> at 0.33s (A)	VA		
SNT4P03K or SNT4T03K	12–24	50/60	9	6.3	7.2	5.1	46	1048		
			12		11.6				8.2	98
			24		28.6				20.2	485
	12–24	DC	9	6.3	7.2	5.1	46	1048		
			12						8.5	75
			24						8.6	103
SNT4P05K SNT4T05K	48–60	50/60	48	34	0.72	0.51	82	1120		
			60		1.2				0.84	126
SNT4P11K or SNT4T11K	110–240	50/60	110	77	0.89	0.63	69	1480		
			120		1.03				0.73	88
			127		1.1				0.8	102
			208		2.3				1.6	333
			220		2.4				1.7	374
			240		2.6				1.8	432
SNT4P14K or SNT4T14K	380–440	50/60	380	266	0.3	0.21	80	1880		
			400		0.34				0.24	96
			415		0.35				0.25	104
			440		0.38				0.27	119
	220–250	DC	220	154	0.34	0.21	80	1880		
			250						0.34	0.27
SNT4P18K or SNT4T18K	480–600	50/60	480	336	0.07	0.05	24	2200		
			525		0.08				0.06	32
			550		0.09				0.07	39
			600		0.11				0.08	48
SNT4P23K SNT4T23K	48–60	DC	48	34	0.76	0.51	36	1120		
			60		0.95				0.73	57
SNT4P26K or SNT4T26K	110–125	DC	110	77	0.42	0.21	46	1250		
			120		0.43				0.22	52
			125		0.44				0.23	55

**Notes**

- ① Approximate unlatching time: 6 milliseconds.  
 ② Approximate total circuit breaker contact opening time: 18 milliseconds.  
 ③ Endurance: 5000 electrical operations plus 1000 mechanical operations.



N-Frame and HMCP (N) Shunt Trip Electrical Rating Data <sup>①②③</sup>

Catalog Number	Application Ratings		Electrical Operating Ratings					One Minute Dielectric Withstand Voltage (V)		
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.25 (A)	I <sub>rms</sub> at 0.33s (A)		VA	
SNT5LP03K or SNT5LT03K	9–24	50/60	9	6.3	7.2	5.1	46	1048		
			12		11.6				8.2	98
			24		28				19.8	475
	9–24	DC	9	7.2	8.8	79	145			
			12						12.1	610
			24						25.4	610
SNT5LP05K SNT5LT05K	48–60	50/60	48	34	2.4	1.7	82	1120		
			60		3		126			
SNT5LP11K or SNT5LT11K	110–240	50/60	110	77	0.86	0.61	67	1480		
			120		0.98		83			
			127		1.1		95			
			208		2.3		333			
			220		2.4		374			
			240		2.6		432			
SNT5LP14K or SNT5LT14K	380–440	50/60	380	266	0.28	0.2	76	1880		
			400		0.31		88			
			415		0.33		95			
			440		0.35		110			
	220–250	DC	220	154	0.21	46				
			250		0.22		55			
SNT5LP18K or SNT5LT18K	480–600	50/60	480	336	0.06	0.04	19	2200		
			525		0.08		32			
			550		0.08		33			
			600		0.1		42			
SNT5LP23K SNT5LT23K	48–60	DC	48	34	1.4	67	1120			
			60		1.7		102			
SNT5LP26K or SNT5LT26K	110–125	DC	110	77	1.1	121	1250			
			120		1.2		144			
			125		1.2		150			

**Notes**

- ① Approximate unlatching time: 6 milliseconds.
- ② Approximate total circuit breaker contact opening time: 18 milliseconds.
- ③ Endurance: 3000 electrical operations plus 1000 mechanical operations.

R-Frame Shunt Trip Electrical Rating Data <sup>①②③④⑤⑥</sup>

Catalog Number	Application Ratings		Electrical Operating Ratings						
	Voltage (V)	Frequency (Hz)	Supply Voltage (V)	Minimum Operating Voltage (V)	I <sub>p</sub> (A)	I <sub>rms</sub> at 0.25 (A)	I <sub>rms</sub> at 0.33s (A)	VA	One Minute Dielectric Withstand Voltage (V)
SNT6P03K	24	50/60	24	16.8	36.1		25.5	612	1050
	24	DC	24	16.8			16.5		
SNT6P05K	48–60	50/60	48	34	11.9		8.4	403	1120
			60		15.7		11.1	666	
SNT6P11K	110–240	50/60	110	60	5.09		3.6	396	1480
			120		5.66		4	480	
			127		5.94		4.2	533	
			208		10.2		7.2	1498	
			220		10.5		7.4	1628	
			240		11.2		7.9	1896	
SNT6P14K	380–440	50/60	380	266	5.94		4.2	1596	2200
			400		6.23		4.4	1760	
			415		6.51		4.6	1909	
			440		6.93		4.9	2156	
	220–250	DC	220	154			1.7	374	1500
			250				1.9	475	
SNT6P18K	480–600	50/60	480	336	0.68		0.48	230	2200
			525		0.78		0.55	289	
			550		0.79		0.56	308	
			600		0.91		0.64	384	
SNT6P23K	48–60	DC	48	34			7.1	341	1120
			60				8.8	258	
SNT6P26K	110–125	DC	110	77			2.4	264	1250
			120				2.6	312	
			125				2.8	350	

**Notes**

- ① Approximate unlatching time of 6 milliseconds.
- ② Average circuit breaker contact total opening time approximately 62 milliseconds, at rated voltage.
- ③ Endurance: 500 electrical operations and 2500 mechanical operations.
- ④ Shunt trip can be operated up to a maximum of six times per minute.
- ⑤ Maximum operating voltage—110% of maximum voltage range rating.
- ⑥ Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are yellow and white.

# 2.4

## Molded Case Circuit Breakers

### Series C

#### Undervoltage Release Mechanism

2

#### F-Frame Electrical Rating Data <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	6.3	7.6	1.3	12	4.2	8.4	10.2	2.8
12	4.2	6.3	7.6	2.5	12	4.2	8.4	10.2	2.8
24	8.4	16.8	20.4	1.4	24	8.4	16.8	20.4	1.6
48	21.0	33.6	40.8	1.2	48	21.0	33.6	40.8	1.3
60	21.0	33.6	40.8	1.9	60	21.0	33.6	40.8	2.0
110	44.5	77.0	93.5	1.3	110	44.5	77.0	93.5	1.5
120	44.5	77.0	93.5	1.5	120	44.5	77.0	93.5	1.7
127	44.5	77.0	93.5	1.7	125	44.5	77.0	93.5	1.9
208	84.0	145.6	176.8	2.2	220	87.5	154.0	187.0	2.6
220	84.0	145.6	176.8	2.4	250	87.5	154.0	187.0	3.4
240	84.0	145.6	176.8	2.9	—	—	—	—	—
380	168.0	266.0	323.0	2.9	—	—	—	—	—
415	168.0	266.0	323.0	3.5	—	—	—	—	—
440	168.0	266.0	323.0	3.9	—	—	—	—	—
480	168.0	266.0	323.0	4.6	—	—	—	—	—
525	210.0	367.0	446.0	4.3	—	—	—	—	—
550	210.0	367.0	446.0	4.8	—	—	—	—	—
600	210.0	367.0	446.0	5.8	—	—	—	—	—

#### J-Frame Electrical Rating Data <sup>②③</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	250	87.5	154.0	187.0	4.0
240	84.0	145.6	176.8	3.8	—	—	—	—	—
380	168.0	266.0	323.0	3.4	—	—	—	—	—
415	168.0	266.0	323.0	4.0	—	—	—	—	—
440	168.0	266.0	323.0	4.6	—	—	—	—	—
480	168.0	266.0	323.0	5.4	—	—	—	—	—

#### Notes

- ① Endurance: 6000 electrical operations plus 4000 mechanical operations.
- ② Endurance: 6000 electrical operations plus 2000 mechanical operations.
- ③ For electrical rating data for manual, automatic and electrical reset undervoltage release mechanisms, refer to Eaton.

**K-Frame Electrical Rating Data** <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	250	87.5	154.0	187.0	4.0
240	84.0	145.6	176.8	3.8	—	—	—	—	—
380	168.0	266.0	323.0	3.4	—	—	—	—	—
415	168.0	266.0	323.0	4.0	—	—	—	—	—
440	168.0	266.0	323.0	4.6	—	—	—	—	—
480	168.0	266.0	323.0	5.4	—	—	—	—	—

**L- and M-Frames Electrical Rating Data** <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	250	87.5	154.0	187.0	4.0
240	84.0	145.6	176.8	3.8	—	—	—	—	—
380	168.0	266.0	323.0	3.4	—	—	—	—	—
415	168.0	266.0	323.0	4.0	—	—	—	—	—
440	168.0	266.0	323.0	4.6	—	—	—	—	—
480	168.0	266.0	323.0	5.4	—	—	—	—	—

**Note**

<sup>①</sup> Endurance: 5000 electrical operations plus 1000 mechanical operations.

# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### N-Frame Electrical Rating Data <sup>①</sup>

50/60 Hz					DC				
Supply Voltage	Dropout Voltage		Pickup Voltage	VA	Supply Voltage	Dropout Voltage		Pickup Voltage	VA
	Minimum	Maximum	Maximum			Minimum	Maximum	Maximum	
12	4.2	8.4	10.2	1.9	12	4.2	8.4	10.2	1.6
24	8.4	16.8	20.4	3.9	24	8.4	16.8	20.4	3.1
48	21.0	33.6	40.8	2.5	48	21.0	33.6	40.8	2.0
60	21.0	33.6	40.8	3.8	60	21.0	33.6	40.8	3.1
110	44.5	77.0	93.5	1.8	110	44.5	77.0	93.5	1.6
120	44.5	77.0	93.5	2.1	120	44.5	77.0	93.5	1.9
127	44.5	77.0	93.5	2.4	125	44.5	77.0	93.5	2.2
208	84.0	145.6	176.8	2.7	220	87.5	154.0	187.0	3.1
220	84.0	145.6	176.8	3.1	220	87.5	154.0	187.0	—
240	84.0	145.6	176.8	3.8	250	—	—	—	4.0
380	175.0	266.0	323.0	3.4	—	—	—	—	—
415	175.0	266.0	323.0	4.0	—	—	—	—	—
480	175.0	266.0	323.0	4.6	—	—	—	—	—
500	175.0	266.0	323.0	5.4	—	—	—	—	—

**Note**

① Endurance: 3000 electrical operations plus 1000 mechanical operations.

R-Frame AC Undervoltage Release Mechanism (Handle Reset) Ratings <sup>①②</sup>

Catalog Suffix	Application Ratings Voltage (V)	Electrical Operating Ratings			Approximate Operating Time (ms)			Maximum Circuit Breaker Contact Opening	Dielectric Withstand Voltage (V) <sup>⑤</sup>	
		Supply Voltage (V)	Dropout Voltage (V)		Pickup Voltage (V) Max.	Minimum UVR Response <sup>③</sup>	Initiation Circuit Breaker Contact Separation <sup>④</sup>			
			Minimum	Maximum		VA				
02/02K	12	12	4.2	8.4	10.2	2.3	5	46	77	1024
03/03K	24	24	8.4	16.8	20.4	3.1	5	46	77	1048
05/05K	48–60	48	21.0	33.5	40.8	3.4	5	46	77	1120
		60	21.0	33.5	40.8	6.0	5	46	77	1120
08/08K	110–127	110	44.5	77.0	93.5	3.3	5	46	77	1254
		120	44.5	77.0	93.5	3.6	5	46	77	1254
		127	44.5	77.0	93.5	3.8	5	46	77	1254
11/11K	208–240	208	84.0	145.6	176.8	4.2	5	46	77	1480
		220	84.0	145.6	176.8	6.6	5	46	77	1480
		240	84.0	145.6	176.8	7.2	5	46	77	1480
29/29K	380–500	380	168.0	266.0	323.0	3.8	5	46	77	2000
		415	168.0	266.0	323.0	8.3	5	46	77	2000
		440	168.0	266.0	323.0	8.8	5	46	77	2000
		480	168.0	266.0	323.0	9.6	5	46	77	2000
		500	168.0	266.0	323.0	10.0	5	46	77	2000

R-Frame DC Undervoltage Release Mechanism (Handle Reset) Ratings <sup>①②</sup>

Catalog Suffix	Application Ratings Voltage (V)	Electrical Operating Ratings			Approximate Operating Time (ms)			Maximum Circuit Breaker Contact Opening	Dielectric Withstand Voltage (V) <sup>⑤</sup>	
		Supply Voltage (V)	Dropout Voltage (V)		Pickup Voltage (V) Max.	Minimum UVR Response <sup>③</sup>	Initiation Circuit Breaker Contact Separation <sup>④</sup>			
			Minimum	Maximum		VA				
20/20K	12	12	4.2	8.4	10.2	3.4	5	46	77	1024
21/21K	24	24	8.4	16.8	20.4	4.3	5	46	77	1048
23/23K	48–60	48	21.0	33.5	40.8	4.8	5	46	77	1120
		60	21.0	33.5	40.8	7.2	5	46	77	1120
26/26K	110–127	110	43.8	77.0	93.5	3.3	5	46	77	1250
		120	43.8	77.0	93.5	3.6	5	46	77	1250
		125	43.8	77.0	93.5	3.8	5	46	77	1250
28/28K	220–250	220	87.5	154.0	187.0	6.6	5	46	77	1500
		250	87.5	154.0	187.0	7.5	5	46	77	1500

**Notes**

- ① Endurance: 500 electrical operations plus 2500 mechanical operations.  
 ② Pigtail wire size: 18 AWG (0.82 mm<sup>2</sup>). Leads are orange and brown.  
 ③ UVR will override a momentary voltage dip up to the response time shown.  
 ④ Unlatching occurs 1 millisecond before circuit breaker contacts begin to separate.  
 ⑤ For 1 minute.

## Series C External Accessories

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## External Accessories

## Product Overview

**End Cap Kit**

The end cap kit slides onto the line or load conductor of the circuit breaker and acts as a threaded adapter for the conductor to accept a ring terminal or other bolt-on connector. The end cap kit is available with English and metric thread sizes. (Field installation only.) Listed per UL File E7819.

**Keeper Nut**

The keeper nut slides onto the line or load conductor of the circuit breaker and acts as a threaded adapter for the conductor to accept a ring terminal or other bolt-on connector. The keeper nut is available with English and metric thread sizes. Screws and washers are supplied by customer. (Field installation only.) Listed per UL File E7819.

**L-, M-, N-Frames**

Not required. Terminals are threaded.

**J-Frame Plug Nut**

The plug nut is used in applications where screw-connected ring-type terminals are preferred to connect cables to circuit breaker conductors. The plug nut is press-fit into the opening in the circuit breaker terminal conductor. Screws and washers are supplied by customer.

**Terminal Adapter****Control Wire Terminal Kit**

The control wire terminal kit provides a means to tap off control power from a main disconnect, using the provided male end of a quick disconnect.

For use with steel or stainless steel terminals only.

**Note:** Terminal Kits contain one terminal for each pole and one terminal cover.

**Multiwire Connectors**

Eaton's field-installed multiwire connectors for the load side (OFF) end terminals are used to distribute the load from the circuit breaker to multiple devices without the use of separate distribution terminal blocks.

Multiwire lug kits include mounting hardware, insulators and tin-plated aluminum connectors to replace three mechanical load lugs. UL listed as used on the load side (OFF) end.

**Terminal Shields**

Terminal shields provide protection against accidental contact with live line side terminations. Terminal shields are fabricated from high dielectric insulating material and fasten over the front terminal access openings. Small openings in the shields provide limited access to the terminals for tightening connectors. (Field installation only.)

**Rear Fed Terminals.**

Rear fed terminals allow the cable to connect to the breaker from the back instead of the top. Terminal shields or interphase barriers are included with each rear fed terminal kit (depending on frame size). When catalog number starts with a 3, it indicates a kit with three terminals in each kit. Catalog number beginning with a TA indicates one terminal.

**Terminal End Covers**

The terminal end covers are designed for use in motor control center applications where, because of confined spaces, line side conductors are normally custom fitted. The molded end covers are made of high dielectric glass-polyester and slide over the line ends of the circuit breaker. Close fitting conductor openings are molded into the end covers. The end cover and circuit breaker case fit together to form terminal compartments that isolate discharged ionizing gases during circuit breaker tripping. Terminal end covers are available with two conductor opening diameters, 0.25-inch (6.4 mm) and 0.41-inch (10.4 mm), and are listed per UL File E7819. (Field installation only.)

**Interphase Barriers**

The interphase barriers provide additional electrical clearance between circuit breaker poles for special termination applications. The barriers are high dielectric insulating plates that are installed in the molded slots between the terminals. (Field installation only.) Two per package.

**Base Mounting Plate**

Suitable for mounting six single-pole circuit breakers.

**DIN Rail Adapter**

For use with standard 35 mm DIN rail such as, 35 x 7.5 or 35 x 15 mm per DIN EN50022.

Adapter mounting screws included are for use with two- and three-pole circuit breakers. Adapters for single-pole circuit breakers clip into the base molding.

**Key Operated Attachment****Lock Dog (Non-Padlockable)****Non-Padlockable Handle Block**

The non-padlockable handle block secures the circuit breaker handle in either the ON or OFF position. (Trip-free operation allows the circuit breaker to trip when the

handle block holds the circuit breaker handle in the ON position.) The device is positioned over the circuit breaker handle and secured by a setscrew to deter accidental operation of the circuit breaker handle. Listed per UL File E7819. (Field installation only.)

**Padlockable Handle****Padlockable Handle Lock**

The device is positioned in the cover opening to prevent handle movement. Will accommodate one 5/16-inch (8 mm) padlock.

**Snap-on Padlockable Handle Lock Hasp**

The snap-on padlockable handle lock allows the handle to be locked in the OFF or ON position. (Trip-free operation allows the circuit breaker to trip when the handle lock holds the circuit breaker handle in the ON position.) This device was designed for use on the single-pole circuit breaker, but may be used on one-, two-, three- and four-pole styles. The handle lock snaps onto the escutcheon area of the handle with an optional retaining screw for added secureness. The handle lock will accommodate one padlock with a 1/4-inch (6.4 mm) shackle. Listed per UL File E7819. (Field installation only.)

**Padlockable Handle Lock Hasp**

The padlockable handle lock hasp allows the handle to be locked in the ON or OFF position. (Trip-free operation allows the circuit breaker to trip when the handle lock holds the circuit breaker handle in the ON position.) The hasp mounts on the circuit breaker cover within the trimline. The cover is predrilled on both sides of the operating handle so that the hasp can be mounted on either side of the handle. The hasp will accommodate up to three padlocks with 1/4-inch (6.4 mm) shackles, one per circuit breaker. Listed per UL File E7819. (Field installation only.)

**Cylinder Lock**

The cylinder lock internally blocks the trip bar in the tripped position to prevent the circuit breaker from being switched to ON. The cylinder lock is factory installed in the left pole only of the circuit breaker cover. Other internally mounted accessories cannot be installed in the same pole as the cylinder lock. (Factory installation only.)

**Key Interlock Kit (Lock Not Included)**

The key interlock is used to externally lock the circuit breaker handle in the OFF position. When the key interlock is locked, an extended deadbolt blocks movement of the circuit breaker handle. Uniquely coded keys are removable only with the deadbolt extended. Each coded key controls a group of circuit breakers for a given specific customer installation.

The key interlock assembly is Underwriters Laboratories listed for field installation under UL File E7819 and consists of a mounting kit and a purchaser supplied deadbolt lock. The mounting kit comprises a mounting plate, which is secured to the circuit breaker cover in either the left- or right-pole position, key interlock mounting screws, and a wire seal. Specific mounting kits are required for individual key interlock types.

**Sliding Bar Interlock**

The sliding bar interlock provides mechanical interlocking between two adjacent three-pole circuit breakers. It is installed on the enclosure cover between the circuit breakers. When the sliding bar interlock handle is moved from one side to the other, a bar extends to alternately block movement of the circuit breaker handles and prevents both circuit breakers from being switched to ON at the same time. Sliding bar interlocks are not UL listed. (Field installation only.)

**Walking Beam Interlock**

The walking beam Interlock provides mechanical interlocking between two adjacent circuit breakers of the same pole configuration. The walking beam interlock mounts on a bracket behind and between the circuit breakers. A plunger on each end of the beam is inserted through an access hole in the back plate and base of each circuit breaker. The walking beam interlock prevents both circuit breakers from being switched ON at the same time. If a walking beam interlock is installed, the wiring troughs in the back of the circuit breaker case are blocked by the plungers and cannot be used for cross wiring. Factory modified circuit breakers are required for this application. UL File E38116.

**Electrical Operator**

The electrical (solenoid) operator is a single solenoid mechanism that enables local and remote circuit breaker ON, OFF, and reset switching. The electrical operator is mounted on the circuit breaker cover within the trimline of the circuit breaker. The electrical operator uses a unique bi-stable latch that allows the device to operate using one solenoid. The accessory provides high-speed switching with a maximum operating time of 5 cycles (80 mS), making it suitable for generator synchronizing applications.

Means are provided for remote electrical operation and for local manual operation. A special slide includes provisions for padlocking the circuit breaker handle in the OFF position. The slide will accept three padlock shackles with a maximum diameter of 1/4-inch (6.4 mm) each. An interlock electrically disconnects the solenoid when the electrical operator cover is removed. The rating data tables provide electrical rating data for the electrical (solenoid) operator.



The electrical (motor) operator allows the circuit's breaker to be opened, closed or reset remotely. It also has a lock-off capability and provisions for manual operation.

The electrical (motor) operator contains a reversible motor connected to a ball screw. The ball screw drives the circuit breaker handle. Limit switches and relays are used to control the motor.

#### **Plug-In Adapters**

Plug-in adapters simplify installation and front removal of circuit breakers. Individual line and load plug-in adapters are available for rear connection applications on two-, three-, and four-pole circuit breakers. Common mounting plates for line- and load-end adapters are available.

One plug-in adapter kit is required for line-end and one for load-end.

Plug-in adapters are UL approved unless otherwise noted.

#### **Rear Connecting Studs**

Rear connecting studs are available in several sizes to accommodate specific fixed-mounted circuit breaker applications.

Each rear connecting stud assembly consists of one stud and one tube. To maintain proper clearances between poles, select alternate long and short stud assemblies for circuit breakers with more than one pole. One assembly is required for line-end and one for load-end of each pole. Tubes must be ordered separately. Connecting studs are available only with English thread sizes.

**Note:** Not UL listed.

#### **Panelboard Connecting Straps**

Panelboard connecting straps are used to connect the circuit breaker terminals to the panelboard bus. The panelboard connecting straps are available with various ratings for outside and center poles. (Field installation only.)

Panelboard connecting straps are available to meet the needs of most standard panelboard applications. Style numbers for mounting brackets for CDP panelboard installations are also included.

**Note:** Not UL listed. Refer to panelboard manufacturer for compatibility.

#### **Type LFD Current Limiter**

The LFD current limiter is an accessory that bolts to the load end of a standard FDB or FD thermal-magnetic circuit breaker, providing 200,000 A interrupting capacity at up to 600 Vac. LFD current limiters for thermal-magnetic and electronic circuit breakers are listed with Underwriters Laboratories under File E47239.

#### **Ground Fault Alarm Unit**

The ground fault alarm unit is a remotely mounted device with a combination indicating light/test button that will light when the breaker trips or alarms on ground fault. The ground fault alarm unit requires a separate 120 Vac power source to power the light and the internal relay, which has 1NO and 1NC contacts for remote indication. The ground fault alarm unit can be panel mounted for ordering with an optional face mounting bracket. For use on Digitrip 310 only, K- through N-Frame.

#### **IQ Energy Sentinel**

The IQ Energy Sentinel is a highly accurate, microprocessor-based, breaker-mounted device designed to monitor power and energy readings. It represents an alternative to watt meters, watt-hour meters, and watt demand meters. Key advantages include savings in space, lower installation costs, and remote monitoring capability.

The IQ Energy Sentinel mounts on the load side of a Series C F-Frame (150 ampere) circuit breaker. It can be applied on three-phase, four-wire systems, or single-phase, three-wire systems with voltage connected through Phases A and C.

For more information, see Descriptive Bulletin 8178.

#### **Potential Transformer Module**

The potential transformer module is required for the Digitrip OPTIM 1050 to provide a voltage input to allow the trip unit to monitor power and energy as well as power factor. The potential transformer module is a 6 VA transformer with a primary voltage input of up to 600 volt line to line. Three 0.1 ampere fuses are provided on the primary of the transformer and can be used for isolation purposes during dielectric testing. The device is normally panel mounted and can feed up to 16 OPTIM trip units.

#### **Solid-State (Electronic) Portable Test Kit**

The solid-state (electronic) portable test kit provides verification of performance of all ratings of Digitrip 310 electronic trip units installed in circuit breakers while in service under varying load and/or phase imbalance. The test kit operates on 120-volt, 50/60 Hz power; it includes complete instructions and test times for testing long time, short time/instantaneous operation and optional ground fault operation of the circuit breaker.

**Breaker Interface Module (BIM)**

The Breaker Interface Module (BIM) is a panel mounted user interface device that is mounted on the front of an electrical assembly or at a remote location. The BIM is used to access, configure, test and display information for OPTIM trip units and other devices. The BIM consists of four display windows, eight function buttons, 18 LEDs, and a graphical time/current curve to provide breaker status, operational information, protection status and energy monitoring. A 24 Vdc power supply is required to provide power to the BIM. This is supplied by the switchboard builder to Eaton's specifications. The BIM is a member of Eaton's PowerNet family of communicating devices that connects OPTIM trip units, Digitrip RMS 810/910 trip units and energy sentinels as a subnetwork system. The BIM can also be connected to a main network via a PONI module to PowerNet software.

**Digitrip OPTIMizer**

The Digitrip OPTIMizer is a hand-held programmer that is used to access, configure, test and display information from OPTIM trip units. The OPTIMizer plugs into the front of an OPTIM trip unit via an eight-pin telephone jack and is powered by a nine-volt battery or the auxiliary power module. One highlighted feature is the "Copy" and "Download" commands.

Setting up multiple OPTIM trips can be finished in minutes and with no errors. An Auxiliary Power Module connection provides a trip test when control power is not present at the breaker. The OPTIMizer is supplied as a standard package to include the programmer, the eight-pin connection cord, battery and carrying case. The auxiliary power module is optional.

**Auxiliary Power Module**

The auxiliary power module is a power supply requiring 120 Vac input at 50 or 60 Hz that provides a 32 Vdc output. The auxiliary power module provides control power for testing an OPTIM trip unit when other means of control power is not available or for continuous OPTIMizer operation versus temporary with a battery. The auxiliary power module connects into the top of the Digitrip OPTIMizer via a keyed receptacle. The main application for the auxiliary power module would be for the testing of a standalone non-communicating OPTIM breaker that ordinarily would not have control power.

**Cause of Trip Display/Remote Mount Cause of Trip Display**

The Cause of Trip Display can be field-installed on any Digitrip RMS 310+ trip unit. The device provides breaker information through an LCD screen, such as cause of trip, phrase current, ground current and low loads. The display is ideal for troubleshooting common trips such as ground fault, long delay, and instantaneous/short delay. The DIGIVIEW version will provide a local display at the breaker without additional wiring by connecting directly onto the trip unit. The DIGIVIEWR06 version has a 6 foot cable that allows users to mount the display on the outside of an enclosure door and connect to the trip unit that is contained inside the enclosure.

**Cause of Trip LED Module**

The Cause of Trip LED Module can be field-installed on any Digitrip RMS 310+ trip unit. The device provides a cause of trip indication via LED. The Cause of Trip LED Module connects directly onto the trip unit. When the breaker trips, the module indicates the cause of trip (long delay, short delay, instantaneous and ground) via LED indication. The module is reset after the breaker is reset.

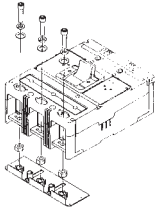
**Note:** The OPTIMizer can work off of 32 Vdc control power, although 24 Vdc is the standard on OPTIM breakers.

#### Product Selection

2

#### Termination Hardware—End Cap Kit

##### End Cap Kit

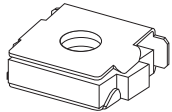


##### End Cap Kit

Thread Type	Thread Size	Catalog Number
<b>Two-Pole F-Frame (225A)</b>		
Imperial	10–32	KPEK12
Metric	M–5	KPEKM12
<b>Three-Pole F-Frame (225A)</b>		
Imperial	10–32	KPEK1
Metric	M–5	KPEKM1
<b>Four-Pole F-Frame (225A)</b>		
Imperial	10–32	KPEK14
Metric	M–5	KPEKM14
<b>Three-Pole J-Frame</b>		
Imperial	0.312–18	KPEK2
Metric	M–8	KPEKM2
<b>Four-Pole J-Frame</b>		
Imperial	0.312–18	KPEK24
Metric	M–8	KPEKM24
<b>Three-Pole K-Frame</b>		
Imperial	0.312–18	KPEK3
Metric	M–8	KPEKM3
<b>Four-Pole K-Frame</b>		
Imperial	0.312–18	KPEK34
Metric	M–8	KPEKM34
<b>Three-Pole L-Frame</b>		
Imperial	0.312–18	KPEK4
Metric	M–8	KPEKM4
<b>Four-Pole L-Frame</b>		
Imperial	0.312–18	KPEK44
Metric	M–8	KPEKM44

#### Termination Hardware—Keeper Nut

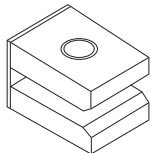
##### F-Frame Keeper Nut



##### F-Frame Keeper Nut

Thread Type	Thread Size	Catalog Number Package of 12 (Priced Individually)
Imperial	10–32	KPR1A
Metric	M–5	KPR1AM

##### K-Frame Keeper Nut

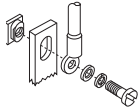


##### K-Frame Keeper Nut

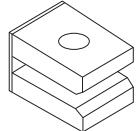
Thread Type	Thread Size	Line/Load End	Catalog Number Package of 3
Imperial	0.375–16	Line	KPR3A
		Load	KPR3B
Metric	M–8	Line	KPR3AM
		Load	KPR3BM

**Note**

L-, M-, N-Frames not required. Terminals are threaded.

**Termination Hardware****J-Frame Plug Nut****J-Frame Plug Nut**

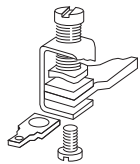
Thread Type	Thread Size	Catalog Number Package of 6
Imperial	0.250–20	PLN2
Metric	M–6	PLN2M

**K-Frame Terminal Adapter****K-Frame Terminal Adapter** ①

Line/Load End	Catalog Number
Line and load	TAD3

**F-Frame Ordering Information**

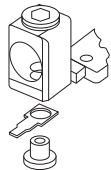
Terminals must be ordered separately. Priced individually.

**F-Frame Kit****F-Frame Control Wire Terminal Kit** ②

Description	Maximum Amperes	Catalog Number
Package of 12 control wire terminal tangs.	150	FCWTK
	225	FCWTK225

**J- and K-Frame Ordering Information**

Terminals must be ordered separately. Priced individually.

**J- and K-Frame Kit****J- and K-Frame Control Wire Terminal Kit**

Description	Catalog Number
Package of 12 control wire terminal tangs.	KCWTK

**L-Frame Control Wire Terminal Kit**

AWG Wire Range/Number Conductors	Metric Wire Range mm <sup>2</sup>	Catalog Number
Al/Cu 3/0–350 kcmil (2)	95–150	TA602LDCW ③
Cu 250–350 kcmil (2)	120–250	T602LDCW ③
Al/Cu 400–500 kcmil (2)	185–240	2TA603LDKCW ④⑤
Al/Cu 400–500 kcmil (2)	185–240	3TA603LDKCW ④⑥
Al/Cu 400–500 kcmil (2)	185–240	4TA603LDKCW ④⑦

**Notes**

- ① K-Frame terminal adapter for use in replacing LB/DA breakers.
- ② Not for use with T250KB terminals.
- ③ Individually packed.
- ④ Terminal kits contain one terminal for each pole and one terminal cover.
- ⑤ Two-pole kit.
- ⑥ Three-pole kit.
- ⑦ Four-pole kit.

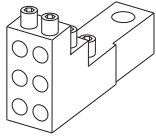
## Termination Hardware

2

## G-Frame Control Wire Terminal

Description	Catalog Number	Catalog Number
Control wire terminal (kit of 12)	5652B38G01	GCWTK

## Multiwire Connectors



## Multiwire Connectors Ordering Information (Package of 3)

Maximum Amperes	Wires per Terminal	Wire Size Range AWG Cu	Kit Catalog Number <sup>①</sup>
<b>G-Frame <sup>②</sup></b>			
100	3	14–2	3TA100G3K
	6	14–6	3TA100G6K
<b>F-Frame</b>			
225	3	14–2	3TA150F3K
	6	14–6	3TA150F6K
<b>J-Frame</b>			
250	3	14–2	3TA250J3K
	6	14–6	3TA250J6K
<b>K-Frame</b>			
400	3	14–2/0	3TA400K3K
	6	14–3	3TA400K6K

## Rear Fed Terminals

Frame	Maximum Amperes	Wire Size Range AWG Cu	Catalog Number <sup>①</sup>
FD	150	14–4/0	TA150FDRF
	150	14–4/0	3TA150FDRF
	225	6–300 kcmil	TA225FDRF
	225	6–300 kcmil	3TA225FDRF
KD	400	250–500 kcmil	TA350KRF
	400	250–500 kcmil	3TA350KRF
MDL	800	3/0 MAX (3)	TA800MDLRF
	800	3/0 MAX (3)	3TA800MDLRF

## Base Mounting Hardware

## Ordering Information

Hardware for surface mounting of circuit breakers is supplied only on request. Hardware consists of mounting screws and lockwashers. Order hardware for circuit breaker pole configurations as required.

## Mounting Hardware

Screw Length in Inches (mm)	Catalog Number
<b>G-Frame</b>	
0.138–32 x 2.63 (3.5 x 66.7 mm) Std.	624B375G23
0.138–32 x 3.00 (3.5 x 76.2 mm)	8703C80G05

## Notes

- <sup>①</sup> When catalog number starts with a 3, it indicates a kit with three terminals in each kit. Catalog number beginning with a TA indicates one terminal.
- <sup>②</sup> GD breakers require special tapping for multiwire lugs, as described in the IL or use with standard aluminum collars.

## Imperial Thread Mounting Hardware

Number of Poles	Description	Type of Mounting	Catalog Number
<b>F-Frame</b>			
1	0.164-32 x 3.188-inch pan-head steel screws, lockwashers and clamps	Individual	<b>624B375G01</b>
		Group ①	<b>624B375G02</b>
2	0.164-32 x 1.5-inch pan-head steel screws and lockwashers	Individual	<b>4218B80G01</b>
3, 4	0.164-32 x 1.5-inch pan-head steel screws and lockwashers	Individual	<b>BMH1</b>
<b>J-Frame</b>			
2, 3, 4	0.250-20 x 2.75 inch pan-head steel screws and lockwashers	Individual	<b>BMH2</b>
<b>K-Frame</b>			
2, 3, 4	0.250-20 x 1.5 inch pan-head steel screws and lockwashers	Individual	<b>BMH3</b>
<b>L-Frame</b>			
2, 3, 4	0.250-20 x 1.5 inch filister-head steel screws and lockwashers and flat washers	Individual	<b>BMH4</b>
<b>M-Frame</b>			
2, 3	0.3125-18 x 1.25 inch filister-head steel screws and lockwashers and flat washers	Individual	<b>BMH5</b>
<b>N-Frame</b>			
2, 3, 4	0.3125-18 x 1.25 inch pan-head steel screws and lockwashers	Individual	<b>BMH5</b>
<b>R-Frame</b>			
Supplied by customer			

## Metric Thread Mounting Hardware

Number of Poles	Description	Type of Mounting	Catalog Number
<b>F-Frame</b>			
1	M4-0.7 x 80 mm pan-head steel screws, lockwashers, and clamps	Individual	<b>4218B80G09</b>
		Group ①	<b>4218B80G10</b>
2	M4-0.7 x 38 mm pan-head steel screws and lockwashers	Individual	<b>4218B80G11</b>
3, 4	M4-0.7 x 38 mm pan-head steel screws and lockwashers	Individual	<b>BMH1M</b>
<b>J-Frame</b>			
2, 3, 4	M6-0.7 x 70 mm pan-head steel screws and lockwashers	Individual	<b>BMH2M</b>
<b>K-Frame</b>			
2, 3, 4	M6-0.7 x 38 mm pan-head steel screws and lockwashers	Individual	<b>BMH3M</b>
<b>L-Frame</b>			
2, 3	—	Individual	<b>BMH4M</b>
<b>M-Frame</b>			
2, 3	—	Individual	<b>BMH4M</b>
<b>N-Frame</b>			
2, 3	—	Individual	<b>BMH5M</b>
<b>R-Frame</b>			
Supplied by customer			

**Note**

① One set of hardware for two circuit breakers.

#### Terminal Shields

2

#### G-Frame Terminal Shield

Number Units in Package	Catalog Number
10	GTSK3

#### F-Frame



#### F-Frame Terminal Shield

Number of Poles	Location	Standard (Package of 10) (Priced Individually)	Special—For Use When Electrical Operator is Mounted on Circuit Breaker
		Catalog Number	Catalog Number
1	Line	625B229G06	—
2	Line	625B229G07	—
3	Line	625B229G08	4210B95G01
4	Line	625B229G09	4210B95G02

#### J-Frame



#### J-Frame Terminal Shield

Number of Poles	Location	Catalog Number (Package of 10)
2, 3	Line End	1266C07G01
4	Line End	6631C01G01
2, 3	Load End	6641C16G01
4	Load End	6641C16G02

**K-Frame**



**K-Frame Terminal Shield**

Number of Poles	Location	Catalog Number (Package of 10)
2, 3	Line	TS33LN
4	Line	TS34LN
3	Load	TS33LD

**L-Frame Terminal Shield**

Catalog Number (Package of 1)
314C420G05

**M-Frame Terminal Shield**

Catalog Number (Package of 1)
208B966G01

**N-Frame Terminal Shield**

Catalog Number (Package of 1)
NTS3K

**Terminal End Covers**

**Ordering Information**

The terminal end cover is available for three-pole circuit breakers only. Two conductor opening sizes are available. Specify quantity (one per circuit breaker) when ordering.

**F-Frame**



**F-Frame Terminal End Covers**

Conductor Opening Diameter in Inches (mm)	Catalog Number
0.25 (6.35 mm)	TEC1
0.41 (10.41 mm)	TEC2

**Interphase Barriers**

**Ordering Information**

Two per package.

**Interphase Barrier**



**Interphase Barriers**

Frame	Catalog Number
F	IPB1
J, K	IPB3
L	IPB4
M	IPB4
N	IPB5

**Base Mounting Plate**

**Base Mounting Plate**



**Base Mounting Plate G-Frame GD/GHC**

Number of Units in Package	Catalog Number
1	207B513G01

**DIN Rail Adapter**

**DIN Rail Adapter**



**DIN Rail Adapter G-Frame GD/GHC**

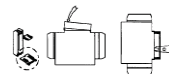
Number of Poles	Number of Units in Package	Catalog Number
1, 2	10	1225C79G01
3	10	1225C79G02 ①

**All Metal DIN Rail Adapter G-Frame GD/GHC**

Number of Poles	Number of Units in Package	Catalog Number
3	1	EGGDIN

**Key Operated Attachment**

**Key Operated Attachment**



**Key Operated Attachment G-Frame GD/GHC**

Number of Units in Package	Catalog Number
10	GKOA

**Note**

① For use on three-pole breakers only.



# 2.4

## Molded Case Circuit Breakers

### Series C

2

#### Lock Dog (Non-Padlockable)

##### Lock Dog (Non-Padlockable)



##### Lock Dog (Non-Padlockable) G-Frame GD/GHC/GHB/GMCP

Number of Units in Package	Catalog Number
1	1294C01H01

#### Handle Ties

##### Handle Tie—Series C, F-Frame

Number of Poles	Number of Units in Package	Catalog Number
2	10	HTBFD2P
3	10	HTBFD3P

##### Handle Tie—Series C, G-Frame

Number of Poles	Number of Units in Package	Catalog Number
2	10	HTBGD2P
3	10	HTBGD3P

#### Non-Padlockable Handle Block

##### Non-Padlockable Handle Block



##### Non-Padlockable Handle Block

Frame	Catalog Number
F	LKD1
J, K	LKD3
L, M, N	LKD4

#### Padlockable Handle

##### Padlockable Handle



##### Padlockable G-Frame GD/GHC/GHB

Number of Units in Package	Catalog Number <sup>①</sup>
10	1223C77G03
10	1223C77G05 <sup>②</sup>
10	1223C77G06 <sup>②</sup>

#### Padlockable Handle Lock

##### Padlockable Handle Lock



##### Padlockable Handle Lock

Frame	Catalog Number
G	GPHBOFF
J, K	PHB3

#### Snap-On Padlockable Handle Lock Hasp

##### Snap-On Padlockable Handle Lock Hasp



##### Snap-On Padlockable Handle Lock Hasp

Frame	Catalog Number
F	PHL1

#### Notes

- ① Accepts 0.285 Lock Shank.
- ② Padlockable in the OFF position only.

**Padlockable Handle Lock Hasp****Padlockable Handle Lock Hasp****Padlockable Handle Lock Hasp**

Description	Catalog Number
<b>F-Frame</b>	
Single-pole breakers	<b>PHL1</b>
Two-, three- and four-pole breakers	<b>PLK1</b>
For left side mounting	<b>PLK1LOFF</b>
For right side mounting	<b>PLK1ROFF</b>
<b>J, K-Frames</b>	
Two-, three- and four-pole breakers	<b>PLK3</b>
For left side mounting	<b>PLK3LOFF</b> ①
For right side mounting	<b>PLK3ROFF</b> ①
<b>L-Frame (Side Mounted)</b>	
Lock ON or OFF	<b>HLK4</b>
Lock OFF only (left-hand mount)	<b>HLK4LOFF</b> ①
<b>L-Frame (Top Mounted)</b>	
Lock ON or OFF	<b>HLK4S</b>
Lock OFF only	<b>HLK4SOFF</b> ①
<b>M-Frame</b>	
Lock ON or OFF	<b>HLK4</b>
Lock OFF only (left-hand mount)	<b>HLK4LOFF</b> ①
<b>M-Frame (Vertical Mounting)</b>	
Lock ON/OFF	<b>HLK4S</b>
Lock OFF only	<b>HLK4SOFF</b>
<b>N-Frame</b>	
Side mounted	<b>PLK5</b>
Top mounted (ON/OFF)	<b>PLK5S</b>
Top mounted (OFF only)	<b>PLK5SOFF</b> ①
<b>R-Frame</b>	
Lock ON/OFF	<b>HLK6</b>
Lock OFF only	<b>HLK6OFF</b> ①

**Cylinder Lock****Cylinder Lock****Cylinder Lock**

Frame	Catalog Number
F, J, K	Order by description

**Note**

- ① For padlockable handle lock hasp to padlock handle in OFF position only, order either catalog number.

**Key Interlock Kit****Ordering Information**

Key interlock kits contain the necessary interface and hardware to install a trapped key interlock from one of the listed manufacturers. Key interlocks are not installed or supplied as part of the breaker, and must be obtained separately from the lock manufacturer or through the manufacturer of the equipment on which the breaker will be installed. Select the mounting kit catalog number to match the type of lock used.

**Key Interlock Kit****Key Interlock Kit (Trapped Key Interlock)**

Lock Manufacturer	Lock Type	Bolt Projection in Withdrawn Position in Inches (mm)	Kit Catalog Number
<b>F-Frame</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYK1</b>
Kirk®	F	0.38 (9.5)	<b>KYK1</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTK1</b>
<b>J, K-Frames</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYK3</b>
Kirk	F	0.38 (9.5)	<b>KYK3</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTK3</b>
<b>L-, M-, N-Frames</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYK4</b>
Kirk	F	0.38 (9.5)	<b>KYK4</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTK4</b>
<b>R-Frame</b>			
Superior	B-4003-1	1.0 (25.4)	<b>KYK6</b>
Kirk	F	1.0 (25.4)	<b>KYK6</b>
Castell ①	K or QK	1.0 (25.4)	<b>CTK6</b>
<b>JG-Frame</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYKJG</b>
Kirk	F	0.38 (9.5)	<b>KYKJG</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTKJG</b>
<b>LG-Frame</b>			
Superior	B-4003-1	0.38 (9.5)	<b>KYKLG</b>
Kirk	F	0.38 (9.5)	<b>KYKLG</b>
Castell ①	K or QK	0.38 (9.5)	<b>CTKLG</b>

**Note**

① When ordering Castell Interlock, it is necessary for customer to specify that the mounting bolt holes must be 10 mm in diameter

**Sliding Bar Interlock****Ordering Information**

The sliding bar interlock is available for mounting between two adjacent three-pole circuit breakers with circuit breakers centerline

spacing as indicated in table and enclosure front panel thickness of 1/8 or 3/16 inch (3.2 or 4.8 mm). (For field installation only.)

**Sliding Bar Interlock****Sliding Bar Interlock**

Frame	Centerline Spacing in Inches (mm)	Catalog Number
F	4.19 (106.4)	<b>SBK1</b>
J	4.38 (111.3)	<b>SBK2</b>
K	5.75 (146.0)	<b>SBK3</b>
L, M	8.50 (215.9)	<b>SBK4</b>
N	8.50 (215.9)	<b>SBK5</b>

**Walking Beam Interlock****Ordering Information**

The walking beam interlock is available for mounting between two adjacent circuit breakers spaced 1/4-inch (6.4 mm) apart and having the same pole configuration. The two circuit breakers must be factory modified to accept the walking beam interlock assembly (suitable for use with either two-, three- or four-pole circuit breakers).

With properly modified circuit breakers, the walking beam interlock is suitable for field installation. Order circuit breakers specifying modification for walking beam (20% price adder) and select walking beam interlock from table below. Circuit breakers and walking beam interlock are boxed and shipped separately.

**Walking Beam Interlock****Walking Beam Interlock**

Frame	Catalog Number
F	<b>WBL1</b>
K	<b>WBL3</b>
L, M	<b>WBL4A</b>
N	<b>WBL5</b>
R ①	<b>WBL6</b>

**Note**

① Three-pole only.

**Electrical Operator**

2

**F-Frame Electrical (Solenoid) Operator**

Voltage	Frequency	Terminal Block	18-Inch (457.2 mm) Pigtail Lead
		Catalog Number	Catalog Number
120	AC	EOP1T07	EOP1P07
240	AC	EOP1T11	EOP1P11

**F-Frame Electrical (Motor) Operator** <sup>①</sup>

Voltage	Frequency	18-Inch (457.2 mm) Pigtail Lead
		Catalog Number
120	50/60 Hz AC	MOPFD120C
24	DC	MOPFD24D
125	DC	MOPFD120C
208–240	50/60 Hz	MOPFD240C
220–250	DC	MOPFD240C

**J-Frame Electrical (Solenoid) Operator**

Operating Voltage	Frequency	Terminal Block
		Catalog Number
120	50/60 Hz AC	EOP2T07
240	50/60 Hz AC	EOP2T11

**K-Frame Electrical (Solenoid) Operator**

Operating Voltage	Frequency	Terminal Block
		Catalog Number
120	50/60 Hz AC	EOP3MT07
240	50/60 Hz AC	EOP3MT11

**K-Frame Electrical (Solenoid) Operator Base Mounting Kit**

Frame	Catalog Number
K	BBMK3

**L- and M-Frame Electrical (Motor) Operator (310 and OPTIM)**

Operating Voltage	Frequency	Terminal Block
		Catalog Number
120	50/60 Hz	EOP4MT07
208	50/60 Hz	EOP4MT11
240	50/60 Hz	EOP4MT11A
480	50/60 Hz	EOP4MT15
125	DC	EOP4MT26
24	DC	EOP4MT21

**Note**

<sup>①</sup> Motor operators MOP1P07, MOP1P03DC, MOP1P05DC and MOP1P07DC are replaced by MOPFD motor operators listed in table.

**N-Frame Electrical (Motor) Operator**

Operating Voltage	Frequency	Pigtail Leads
		Catalog Number
120	50/60 Hz	<b>EOP5T07</b>
208	50/60 Hz	<b>EOP5T09</b>
240	50/60 Hz	<b>EOP5T11</b>
480	50/60 Hz	<b>EOP5T15</b>
24	DC	<b>EOP5T21</b>
48	DC	<b>EOP5T22</b>
125	DC	<b>EOP5T26</b>

**R-Frame Electrical (Motor) Operator**

Operating Voltage	Frequency	Factory-Installed Terminal Block
		Catalog Number
120	50/60 Hz	<b>EOP6T08K</b>
240	50/60 Hz	<b>EOP6T11K</b>
48	DC	<b>EOP6T21K</b>

**Plug-In Adapters****F-Frame Ordering Information (Flat Bar Type)**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
100–225	<b>1480D13G01</b>	<b>1480D13G02</b>	<b>1480D13G07</b> <sup>①</sup>
Mounting plate	<b>176C511H01</b>	<b>507C047H01</b>	—

**J-Frame Ordering Information (Flat Bar Type)**

Continuous Current Rating (Amperes)	Terminal End	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
250	Line	<b>1260C86G05</b>	<b>1260C86G06</b>	<b>1231C67G01</b>
	Load	<b>1260C86G07</b>	<b>1260C86G08</b>	<b>1231C67G02</b>
	One line and one load	<b>506C144G27</b>	<b>506C144G28</b>	—
Mounting plate	—	<sup>②</sup>	<b>PMP23</b>	—

**K-Frame Ordering Information (Flat Bar Type)—600 Vac Maximum**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
400	<b>PAD32</b>	<b>PAD33</b>	—
Mounting plate	<sup>②</sup>	<b>PMP33</b>	—

**Notes**

<sup>①</sup> 100 ampere maximum.

<sup>②</sup> Use three-pole mounting plate for two-pole circuit breaker.

**L-Frame (Threaded Stud Type)**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
600 (threaded stud type)	506C059G03	506C059G04	PAD44
600 (flat bar type)	1288C19G01	1288C19G02	6636C55H01
Mounting plate	504C824H01	504C824H01	—

**M-Frame (Flat Bar Type)—600 Vac Maximum**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number
800	2614D53G05	2614D53G06
Mounting plate	1290C73H01	1290C73H01

**N-Frame (Flat Bar Type)**

Continuous Current Rating (Amperes)	Two-Pole Catalog Number	Three-Pole Catalog Number
1200	2614D53G03	2614D53G04
Mounting plate	1290C73H01	1290C73H01

**Plug-In Adapters**

Frame	Number of Poles	Standard Certification	Catalog Number
FD	3	IEC	PAD3F
FD	4	IEC	PAD4F
JD	3	IEC	PAD3JD
KD	3	IEC	PAD3K
LD	3	IEC	PAD3LD
LD	4	IEC	PAD4LD

**Rear Connecting Studs****F-Frame** <sup>①</sup>

Stud Ampere Rating	Stud Catalog Number	Tube Catalog Number
<b>For 15 to 100 Ampere Circuit Breakers</b>		
100 A short	451D874G01	32B9446H20
100 A short	451D874G01	32B9446H21
100 A short	451D874G01	32B9446H22
100 A short	451D874G01	32B9446H23
100 A long	451D874G02	32B9446H24
100 A long	451D874G02	32B9446H25
100 A long	451D874G02	32B9446H26
100 A long	451D874G02	32B9446H27
<b>For 110 to 225 Ampere Circuit Breakers</b>		
225A short	374D883G01	374D883H06
225A short	374D883G01	374D883H07
225A short	374D883G01	374D883H08
225A short	374D883G01	374D883H09
225A long	374D883G02	374D883H10
225A long	374D883G02	374D883H11
225A long	374D883G02	374D883H12
225A long	374D883G02	374D883H13

**J-Frame** <sup>①</sup>

Stud Ampere Rating	Stud Catalog Number	Tube Catalog Number
250A short	5010D23G01	456D983H05
250A short	5010D23G01	456D983H06
250A short	5010D23G01	456D983H07
250A long	5010D23G02	5010D23H05
250A long	5010D23G02	5010D23H06
250A long	5010D23G02	5010D23H07

**K-Frame** <sup>①</sup>

Stud Ampere Rating	Stud Catalog Number	Standard Tube Catalog Number
400 A short	6642C14G02	313C909H17
400 A short	6642C14G04	313C909H18
400 A short	6642C14G06	313C909H19
400 A long	6642C14G03	313C909H20
400 A long	6642C14G05	313C909H21
400 A long	6642C14G07	313C909H22

**L-Frame Ordering Information**

Stud Catalog Number
314C960G07
314C960G08
314C960G09

**M-Frame Ordering Information** <sup>①</sup>

Stud Ampere Rating	Stud Catalog Number
225	314C960G01
400	314C960G04
400	314C960G05
400	314C960G06
600	314C960G07
600	314C960G08
600	314C960G09
800	314C960G10
800	314C960G11
800	314C960G12

**N-Frame Ordering Information** <sup>①</sup>

Stud Ampere Rating	Stud Catalog Number
800	623B222G01
800	623B222G02
800	623B222G03
1200	373B375G04
1200	373B375G03

**Note**

<sup>①</sup> Not UL listed.



**Panelboard Connecting Straps**

2

**F-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Center Catalog Number	Outside Catalog Number
2.75 (69.9)	50	673B142G02	673B142G09
2.75 (69.9)	100	673B142G02	673B142G10
2.75 (69.9)	150	673B142G04	673B142G03
3.50 (88.9)	50	1253C72G01	1253C72G03
3.50 (88.9)	100	1253C73G03	1253C73G06
3.50 (88.9)	150	1253C73G01	1253C73G05

**F-Frame Mounting Bracket**

Number of Poles	Catalog Number
2	624B600H02
3	624B600H01

**J-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Center Catalog Number	Outside Catalog Number
3.50 (88.9)	250	2600D26G01	2600D26G02

**K-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Center Catalog Number	Outside Catalog Number
3.50 (88.9)	400	4212B78G02	4212B77G01

**K-Frame Mounting Bracket**

Number of Poles	Catalog Number
2, 3	208B264H01

**L-Frame Panelboard Connecting Straps**

Continuous Current Rating (Amperes)	Pole Connector Type	
	Center Catalog Number	Outside Catalog Number
600	624B609G01	506C052G01

**L-Frame Mounting Bracket**

Number of Poles	Catalog Number
2, 3	208B297H01

**M-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Connector Type	Catalog Number
3.50 (88.9)	800	Short	314C996G01
		Medium	314C996G02
		Long	314C996G03

**M-Frame Mounting Bracket**

Catalog Number
315C270H01

**N-Frame Panelboard Connecting Straps**

Bus Spacing in Inches (mm)	Continuous Current Rating (Amperes)	Pole Connector Type	
		Connector Type	Catalog Number
3.50 (88.9)	1200	Short	505C606G04
		Medium	505C606G05
		Long	505C606G06

**N-Frame Mounting Bracket (Four Required)**

Catalog Number
315C270H01

### Type LFD Current Limiter

The LFD current limiter is an accessory that bolts to the load end of a standard FDB or FD thermal-magnetic and electronic circuit breaker, providing 200,000 A

interrupting capacity at up to 600 Vac. LFD current limiters for thermal-magnetic circuit breakers are listed with Underwriters Laboratories under File E47239.

#### Type LFD Current Limiter



#### Type LFD Current Limiter

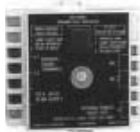
Circuit Breaker Rating Amperes	Catalog Number
15–70	LFD3070R
80–160	LFD3150R

### Ground Fault Alarm Unit

The ground fault alarm unit is a remotely mounted device with a combination indicating light/test button that will light when the breaker trips or alarms on ground fault. The ground fault alarm unit requires a separate 120 Vac power source to power the

light and the internal relay, which has 1NO and 1NC contacts for remote indication. The ground fault alarm unit can be panel mounted for ordering with an optional face mounting bracket. For use on Digitrip 310 only, K- through N-Frame.

#### Ground Fault Alarm Unit



#### GF Alarm Unit

Description	Catalog Number
Ground fault alarm unit	GFAU
Face mounting bracket	1264C67G01

### IQ Energy Sentinel

The IQ Energy Sentinel is a highly accurate, microprocessor-based, breaker-mounted device designed to monitor power and energy readings. It represents an alternative to watt meters, watt-hour meters, and watt demand meters. Key advantages include savings in space, lower installation costs, and remote monitoring capability.

The IQ Energy Sentinel mounts on the load side of a Series C F-Frame (150 ampere) circuit breaker. It can be applied on three-phase, four-wire systems, or single-phase, three-wire systems with voltage connected through Phases A and C.

For more information, see Descriptive Bulletin 8178.

### Potential Transformer Module

The potential transformer module is required for the Digitrip OPTIM 1050 to provide a voltage input to allow the trip unit to monitor power and energy as well as power factor. The potential transformer module is a 6 VA transformer with a primary voltage input of up to 600 volt

line to line. Three 0.1 ampere fuses are provided on the primary of the transformer and can be used for isolation purposes during dielectric testing. The device is normally panel mounted and can feed up to 16 OPTIM trip units.

#### Potential Transformer Module



#### Potential Transformer Module

Description	Catalog Number
Potential transformer module	DOPTMLN

### Solid-State (Electronic) Portable Test Kit

The solid-state (electronic) portable test kit provides verification of performance of all ratings of Digitrip 310 electronic trip units installed in circuit breakers while in service under varying load and/or phase imbalance. The test kit operates on 120-volt,

50/60 Hz power; it includes complete instructions and test times for testing long time, short time/instantaneous operation and optional ground fault operation of the circuit breaker.

#### Portable Test Kit

Description	Catalog Number
Solid-state (electronic) portable test kit	STK2

**Breaker Interface Module (BIM)**

The Breaker Interface Module (BIM) is a panel mounted user interface device that is mounted on the front of an electrical assembly or at a remote location. The BIM is used to access, configure, test and display information for OPTIM trip units and other devices. The BIM consists of four display windows, eight function buttons, 18 LEDs, and a graphical time/current curve to provide breaker status, operational information, protection status and energy monitoring. A 24

Vdc power supply is required to provide power to the BIM. This is supplied by the switchboard builder to Eaton's specifications. The BIM is a member of Eaton's PowerNet family of communicating devices that connects OPTIM trip units, Digitrip RMS 810/910 trip units and energy sentinels as a subnetwork system. The BIM can also be connected to a main network via a PONI module to PowerNet software.

**Breaker Interface Module (BIM)****Breaker Interface Module (BIM)**

**Catalog Number**  
**BIMII**

**Digitrip OPTIMizer**

The Digitrip OPTIMizer is a hand-held programmer that is used to access, configure, test and display information from OPTIM trip units. The OPTIMizer plugs into the front of an OPTIM trip unit via an eight-pin telephone jack and is powered by a nine-volt battery or the auxiliary power module. One highlighted feature is the "Copy" and "Download" commands.

Setting up multiple OPTIM trips can be finished in minutes and with no errors. An Auxiliary Power Module connection provides a trip test when control power is not present at the breaker. The OPTIMizer is supplied as a standard package to include

the programmer, the eight-pin connection cord, battery and carrying case. The auxiliary power module is optional.

**Note: 24 Vdc Power Supply**

A 24 Vdc power supply is required for all Digitrip OPTIM trip units that are required to communicate either on the main Eaton PowerNet network or as a subnetwork to a BIM. The breaker's load is 45 mA of current. Typically one power supply is required per switchboard and can provide control power to a BIM and the OPTIM trip units. The 24 Vdc power supply should be an "isolated high quality" power supply with a "CE" label, and is normally provided by the switchboard manufacturer to Eaton's recommendations.

**Digitrip OPTIMizer****Digitrip OPTIMizer**

**Catalog Number**  
**OPTIMizer—standard package**

**Auxiliary Power Module**

The auxiliary power module is a power supply requiring 120 Vac input at 50 or 60 Hz that provides a 32 Vdc output. The auxiliary power module provides control power for testing an OPTIM trip unit when other means of control power is not available or for continuous OPTIMizer operation versus temporary with a battery. The auxiliary

power module connects into the top of the Digitrip OPTIMizer via a keyed receptacle. The main application for the auxiliary power module would be for the testing of a standalone non-communicating OPTIM breaker that ordinarily would not have control power.

**Auxiliary Power Module****Auxiliary Power Module**

**Catalog Number**  
**PRTBAPMDV**

**Cause of Trip Display/Remote Mount Cause of Trip Display**

The Cause of Trip Display can be field-installed on any Digitrip RMS 310+ trip unit. The device provides breaker information through an LCD screen, such as cause of trip, phrase current, ground current and low loads. The display is ideal for troubleshooting common trips such as ground fault, long delay, and instantaneous/short delay.

The DIGIVIEW version will provide a local display at the breaker without additional wiring by connecting directly onto the trip unit. The DIGIVIEWR06 version has a 6 foot cable that allows users to mount the display on the outside of an enclosure door and connect to the trip unit that is contained inside the enclosure.

**Cause of Trip Display/Remote Mount Cause of Trip Display**

**Catalog Number**  
**DIGIVIEW**  
**DIGIVIEWR06**

**Cause of Trip LED Module**

The Cause of Trip LED Module can be field-installed on any Digitrip RMS 310+ trip unit. The device provides a cause of trip indication via LED. The Cause of Trip LED Module connects directly onto the trip unit. When the

breaker trips, the module indicates the cause of trip (long delay, short delay, instantaneous and ground) via LED indication. The module is reset after the breaker is reset.

**Cause of Trip LED Module**

**Catalog Number**  
**TRIP-LED**

## Accessories

2

### Flex Shaft Accessories (F- through R-Frame)

#### NEMA 12 Safety Door Hardware for Flex Shaft and C371 <sup>①</sup>

Handle Length in Inches (mm)	Catalog Number <sup>②</sup>
4 (101.6)	C361KJ4
6 (152.4)	C361KJ6
Roller Latch <sup>③</sup>	C361KR

#### Series C Rotary Accessories

As an option, an auxiliary switch is offered so that the control panel builder may electrically indicate the status of the breaker.

This accessory would be mounted on the mechanism and comes with 24-inch (609.6 mm) pigtail leads.

#### Series C Auxiliary Switch

Catalog Number
5108A61G01

#### Wire Seal

The wire seal can be used to secure the cover on the trip unit to prevent adjustments after settings are confirmed.

#### Wire Seal

Description	Catalog Number
Wire seal	5108A03H01

#### Notes

- ① Customer: Consult with box manufacturer for correct door hardware and any adapters required for assembly.
- ② The 1/4-inch x 1/2-inch (6.35 x 12.7 mm) standard mill rectangular locking bar is not supplied with these kits.
- ③ Third roller latch for use with 4- or 6-inch (101.6 or 152.4 mm) handle when 3 point latching is required.

## Technical Data and Specifications

### Electrical Operator

#### F-Frame Electrical (Solenoid) Operator Rating Data <sup>①②</sup>

Voltage <sup>③</sup>	Frequency	Inrush Current Amperes	Maximum Operating Time	Fuse Amperes <sup>④</sup>
120	50/60 Hz AC	10	5 cycles (80 ms)	3
240	50/60 Hz AC	5	5 cycles (80 ms)	2

#### F-Frame Electrical (Motor) Operator Rating Data <sup>②③⑥⑦</sup>

Voltage <sup>③</sup>	Frequency	Inrush Current Amperes
120	AC	2
24	DC	5
48	DC	3
125	DC	2

#### J-Frame Electrical (Solenoid) Operator Rating Data <sup>①⑥⑧⑨</sup>

Voltage <sup>③</sup>	Inrush Current Amperes	Fuse Amperes
120	30	6
240	16	4

#### K-Frame Electrical (Solenoid) Operator Rating Data <sup>①⑥⑧⑨</sup>

Operating Voltage <sup>③</sup>	Inrush Current Amperes	Fuse Amperes
120	30	6
240	16	4

#### L- and M-Frame Electrical (Motor) Operator Rating Data

<sup>①⑥⑧⑩</sup>

Operating Voltage <sup>③</sup>	Inrush Current Amperes
120 AC	31
208 AC	13
240 AC	12
125 DC	21
24 DC	50

#### N-Frame Electrical (Motor) Operator Rating Data <sup>①⑥⑩⑫</sup>

Operating Voltage <sup>③</sup>	Frequency	Inrush Current Amperes	Fuse Amperes
120	50/60 Hz	31	6
208	50/60 Hz	21	—
240	50/60 Hz	19	4
480	50/60 Hz	—	—
24	DC	50	—
48	DC	80	—
125	DC	21	—

#### R-Frame Electrical (Motor) Operator Rating Data <sup>③④⑫⑬</sup>

Operating Voltage <sup>⑦</sup>	Frequency	Motor Inrush Current Amperes
120	50/60 Hz	40
240	50/60 Hz	27
48	DC	53
24	DC	58

#### Notes

- ① UL listed under UL File E64983.
  - ② The electrical operator design is endurance tested for 8000 electrical operations.
  - ③ Tolerance: +10%, -15% of nominal voltage.
  - ④ Use current-limiting type fuse where required.
  - ⑤ UL listed under UL File E64124.
  - ⑥ Frequency: 50/60 Hz.
  - ⑦ Maximum operating time: 3 seconds max. Operator is an intermittent duty device. The safe duty cycle (OFF to ON to OFF) should not exceed one per minute.
  - ⑧ The electrical operator design has been endurance tested for 6000 electrical operations.
  - ⑨ Maximum operating time: 5 cycles (80 ms).
  - ⑩ Maximum operating time: 12 cycles.
  - ⑪ The electrical operator design has been endurance tested for 2,500 electrical operations.
  - ⑫ Maximum operating time: 12 cycles max. Operator is an intermittent duty device. The safe duty cycle (OFF to ON to OFF) should not exceed one per minute.
  - ⑬ Operator is an intermittent duty service. The safe duty cycle (OFF to ON to OFF) should not exceed one per minute.
  - ⑭ Electric Operating time at rated voltage; (a) To turn breaker ON—1/2 second max. (b) To turn breaker OFF—1/2 second max.
  - ⑮ Motor operating temperature; Class "A" temperature limits apply.
  - ⑯ A minimum 1 kVA power source is recommended for motor operation.
  - ⑰ Applied voltage should be no less than 85% or no more than 110% of rated voltage.
- For OPTIM trip, OPEOPCK kit required.

### Dimensions

Approximate Dimensions in Inches (mm)

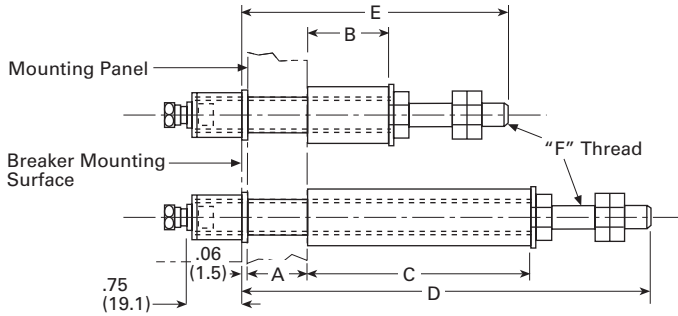
2

#### Rear Connecting Studs

#### F-Frame <sup>①</sup>

Stud Ampere Rating	Stud Catalog Number	Panel Thickness		Tube Length		Tube Catalog Number	Dimensions		
		A		B	C		D	E	F
<b>For 15 to 100 Ampere Circuit Breakers</b>									
100 A short	<b>451D874G01</b>	1.00 (25.4)		1.06 (26.9)	—	<b>32B9446H20</b>	—	3.63 (92.1)	0.31 (7.9)–18
100 A short	<b>451D874G01</b>	0.69–0.94 (17.5 to 23.8)		1.38 (34.9)	—	<b>32B9446H21</b>	—	3.63 (92.1)	0.31 (7.9)–18
100 A short	<b>451D874G01</b>	0.38–0.63 (9.5 to 15.9)		1.69 (42.9)	—	<b>32B9446H22</b>	—	3.63 (92.1)	0.31 (7.9)–18
100 A short	<b>451D874G01</b>	0.25–0.31 (6.4 to 7.9)		2.00 (50.8)	—	<b>32B9446H23</b>	—	3.63 (92.1)	0.31 (7.9)–18
100 A long	<b>451D874G02</b>	1.00 (25.4)		—	3.44 (87.3)	<b>32B9446H24</b>	6.13 (155.6)	—	0.31 (7.9)–18
100 A long	<b>451D874G02</b>	0.69–0.94 (17.5 to 23.8)		—	3.75 (95.2)	<b>32B9446H25</b>	6.13 (155.6)	—	0.31 (7.9)–18
100 A long	<b>451D874G02</b>	0.38–0.63 (9.5 to 15.9)		—	4.06 (103.1)	<b>32B9446H26</b>	6.13 (155.6)	—	0.31 (7.9)–18
100 A long	<b>451D874G02</b>	0.25–0.31 (6.4 to 7.9)		—	4.38 (111.3)	<b>32B9446H27</b>	6.13 (155.6)	—	0.31 (7.9)–18
<b>For 110 to 225 Ampere Circuit Breakers</b>									
225A short	<b>374D883G01</b>	1.00 (25.4)		1.06 (26.9)	—	<b>374D883H06</b>	—	4.25 (108.0)	0.44 (11.1)–14
225A short	<b>374D883G01</b>	0.69–0.94 (17.5 to 23.8)		1.38 (34.9)	—	<b>374D883H07</b>	—	4.25 (108.0)	0.44 (11.1)–14
225A short	<b>374D883G01</b>	0.38–0.63 (9.5 to 15.9)		1.69 (42.9)	—	<b>374D883H08</b>	—	4.25 (108.0)	0.44 (11.1)–14
225A short	<b>374D883G01</b>	0.25–0.31 (6.4 to 7.9)		2.00 (50.8)	—	<b>374D883H09</b>	—	4.25 (108.0)	0.44 (11.1)–14
225A long	<b>374D883G02</b>	1.00 (25.4)		—	3.44 (87.3)	<b>374D883H10</b>	7.50 (190.5)	—	0.44 (11.1)–14
225A long	<b>374D883G02</b>	0.69–0.94 (17.5 to 23.8)		—	3.75 (95.2)	<b>374D883H11</b>	7.50 (190.5)	—	0.44 (11.1)–14
225A long	<b>374D883G02</b>	0.38–0.63 (9.5 to 15.9)		—	4.06 (103.1)	<b>374D883H12</b>	7.50 (190.5)	—	0.44 (11.1)–14
225A long	<b>374D883G02</b>	0.25–0.31 (6.4 to 7.9)		—	4.38 (111.3)	<b>374D883H13</b>	7.50 (190.5)	—	0.44 (11.1)–14

#### F-Frame



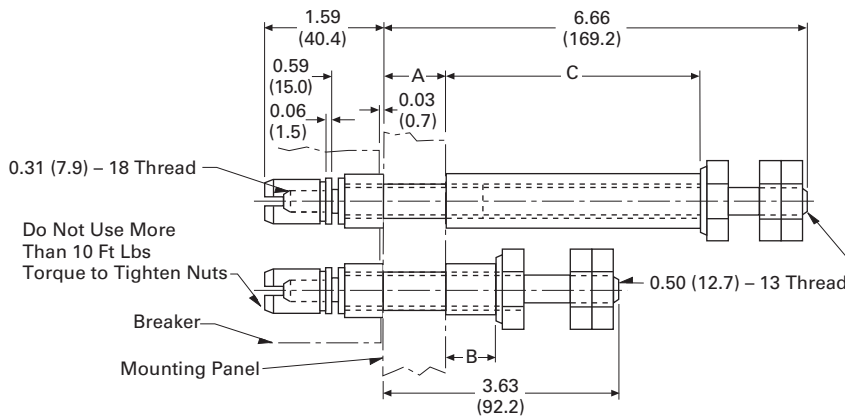
#### Note

<sup>①</sup> Not UL listed.

Approximate Dimensions in Inches (mm)

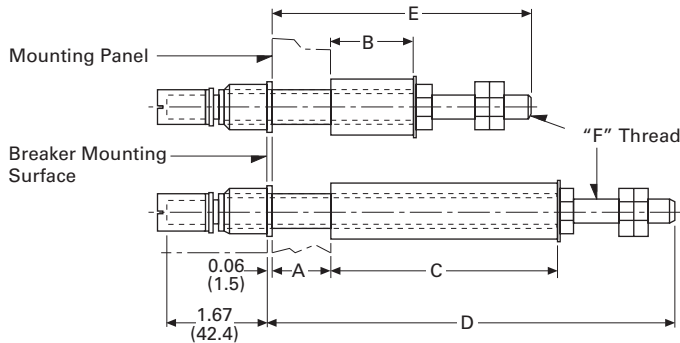
**J-Frame**

Stud Ampere Rating	Stud Catalog Number	Panel Thickness		Tube Length		Tube Catalog Number
		A		B	C	
250A short	5010D23G01	0.75–1.00 (19.1–25.4)		0.84 (21.4)	—	456D983H05
250A short	5010D23G01	0.50–0.75 (12.7–19.1)		1.09 (27.7)	—	456D983H06
250A short	5010D23G01	0.25–0.50 (6.4–12.7)		1.03 (26.2)	—	456D983H07
250A long	5010D23G02	0.75–1.00 (19.1–25.4)		—	3.88 (98.6)	5010D23H05
250A long	5010D23G02	0.50–0.75 (12.7–19.1)		—	4.13 (104.9)	5010D23H06
250A long	5010D23G02	0.25–0.50 (6.4–12.7)		—	4.38 (111.3)	5010D23H07



**K-Frame** <sup>Ⓢ</sup>

Stud Ampere Rating	Stud Catalog Number	Panel Thickness		Tube Length		Standard Tube Catalog Number	Dimensions		
		A		B	C		D	E	F
400 A short	6642C14G02	0.75–1 (19.1–25.4)		0.84 (21.3)	—	313C909H17	—	3.66 (93.0)	0.75–16 (19.1–406.4)
400 A short	6642C14G04	0.50–0.75 (12.7–18.4)		1.09 (27.69)	—	313C909H18	—	—	—
400 A short	6642C14G06	0.25–0.5 (6.35–12.7)		1.03 (26.16)	—	313C909H19	—	—	—
400 A long	6642C14G03	0.75–1 (19.1–25.4)		—	3.78 (96.0)	313C909H20	—	—	—
400 A long	6642C14G05	0.50–0.75 (12.7–18.4)		—	4.03 (102.4)	313C909H21	6.58 (167.1)	—	—
400 A long	6642C14G07	0.25–0.5 (6.35–12.7)		—	4.28 (108.7)	313C909H22	—	—	—



**Note**

Ⓢ Not UL listed.



# 2.4

## Molded Case Circuit Breakers

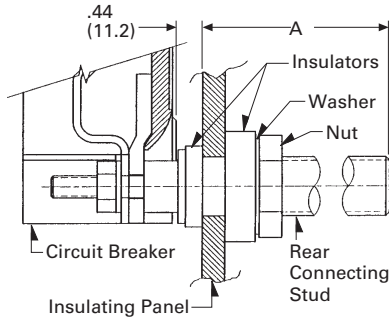
### Series C

Approximate Dimensions in Inches (mm)

2

#### L-Frame

Stud Length (A)	Stud Catalog Number
5.47 (138.9)	314C960G07
7.97 (202.4)	314C960G08
10.47 (265.9)	314C960G09



#### M-Frame

Stud Ampere Rating	Diameter and Thread	Extension Back of Breaker	Stud Catalog Number
225	0.50 (12.7)–13	3.66 (93.0)	314C960G01
400	0.75 (19.1)–16	5.91 (150.1)	314C960G04
400	0.75 (19.1)–16	8.41 (213.6)	314C960G05
400	0.75 (19.1)–16	10.91 (277.0)	314C960G06
600	1.00 (25.4)–12	5.91 (150.1)	314C960G07
600	1.00 (25.4)–12	8.41 (213.6)	314C960G08
600	1.00 (25.4)–12	10.91 (277.0)	314C960G09
800	1.13 (28.7)–12	5.91 (150.1)	314C960G10
800	1.13 (28.7)–12	8.41 (213.6)	314C960G11
800	1.13 (28.7)–12	10.91 (277.0)	314C960G12

#### N-Frame

Stud Ampere Rating	Diameter and Thread	Extension Back of Breaker	Stud Catalog Number
800	1.13 (28.7)–12	5.5 (139.7)	623B222G01
800	1.13 (28.7)–12	8.0 (203.2)	623B222G02
800	1.13 (28.7)–12	10.5 (266.7)	623B222G03
1200	1.25 (31.8)–12	5.5 (139.7)	373B375G04
1200	1.25 (31.8)–12	10.5 (266.7)	373B375G03

## Engine Generator Circuit Breakers



## Engine Generator Circuit Breakers

## Product Description

Eaton's engine generator molded case circuit breakers are designed specifically for application on diesel engine powered standby generators where high interrupting circuit breakers are not required. The JG through NG breakers are equipped with a special trip unit, that includes standard thermal (overload) protection and special low magnetic pickup range (FG includes a fixed thermal-magnetic pickup). The standard thermal trip unit provides overload protection for conductors per the National Electrical Code®. The low magnetic pickup range is approximately two to five times the continuous rating and provides closer low-level short-circuit protection when applied on generators that have very low short-circuit capacity. This combination allows the user to customize the breaker to the generator output.

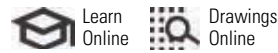
## Application Description

Engine generator circuit breakers are suitable for reverse feed application.

## Contents

## Description

	<i>Page</i>
Engine Generator Circuit Breakers	
Catalog Number Selection . . . . .	V4-T2-438
Product Selection . . . . .	V4-T2-439
Accessories Selection Guide and Ordering Information . . . . .	V4-T2-441
Options and Accessories . . . . .	V4-T2-441
Technical Data and Specifications . . . . .	V4-T2-442
Dimensions and Weights . . . . .	V4-T2-442
Direct Current Circuit Breakers . . . . .	V4-T2-443
PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series . . . . .	V4-T2-457
E <sup>2</sup> Mining Service Circuit Breakers . . . . .	V4-T2-470



## Standards and Certifications

Engine generator molded case circuit breakers are designed to conform with the following standards:

- Underwriters Laboratories Standard UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures File E7819
- Canadian Standards Association Standard C22.2 No. 5, Service Entrance and Branch Circuit Breakers
- International Electrotechnical Commission Recommendations IEC 947-2, Circuit Breakers



Conformance with these standards satisfies most local and international codes, assuming user acceptability and simplified application.

# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

2

#### Catalog Number Selection

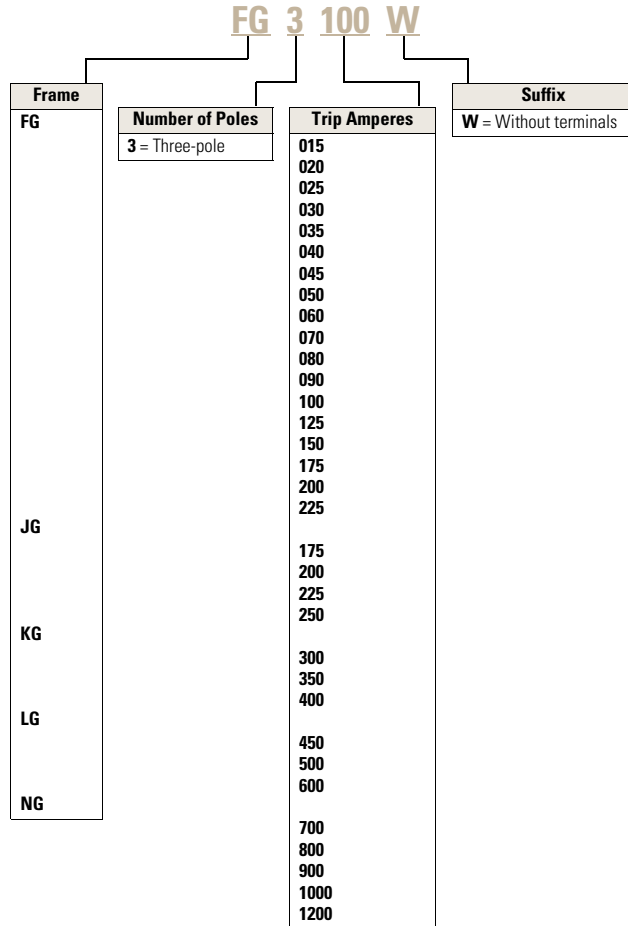
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers.

- FG breakers include both line and load side terminals

- JG, KG, LG and NG breakers with **W** catalog number suffix do not include any terminals
- JG, KG, LG and NG breakers without **W** catalog number suffix include both line and load terminals

- Contact Eaton for additional ratings and internal/external accessories
- Reverse feed

#### Circuit Breakers FG, JG, KG, LG and NG



### Product Selection

The following table lists FG through NG engine generator breakers with the maximum generator kVA and kW rating. Engine generator breakers are applied at 115% of the

generator full load current rating (FLA). The maximum kW rating is based on three-phase generators at 80% power factor.

### Thermal-Magnetic

Magnetic Pickup Range	Maximum Generator Rating 60 Hz				Engine Generator Breaker <sup>③</sup>		
	240 Vac kVA <sup>①</sup>	kW <sup>②</sup>	480 Vac kVA <sup>①</sup>	kW <sup>②</sup>	600 Vac kVA <sup>①</sup>	kW <sup>②</sup>	Catalog Number
Fixed	5	4	11	9	14	11	FG3015 <sup>④</sup>
Fixed	7	6	14	12	18	14	FG3020 <sup>④</sup>
Fixed	9	7	18	14	23	18	FG3025 <sup>④</sup>
Fixed	11	9	22	17	27	22	FG3030 <sup>④</sup>
Fixed	13	10	25	20	32	25	FG3035 <sup>④</sup>
Fixed	14	12	29	23	36	29	FG3040 <sup>④</sup>
Fixed	16	13	32	26	41	32	FG3045 <sup>④</sup>
Fixed	18	14	36	29	45	36	FG3050 <sup>④</sup>
Fixed	22	17	43	35	54	43	FG3060 <sup>④</sup>
Fixed	25	20	51	40	63	51	FG3070 <sup>④</sup>
Fixed	29	23	58	46	72	58	FG3080 <sup>④</sup>
Fixed	32	26	65	52	81	65	FG3090 <sup>④</sup>
Fixed	36	29	72	58	90	72	FG3100 <sup>④</sup>
Fixed	40	32	79	64	99	79	FG3110 <sup>④</sup>
Fixed	45	36	90	72	113	90	FG3125 <sup>④</sup>
Fixed	54	43	108	87	135	108	FG3150 <sup>④</sup>
Fixed	63	51	126	101	158	126	FG3175 <sup>④</sup>
Fixed	72	58	144	116	181	144	FG3200 <sup>④</sup>
Fixed	81	65	162	130	203	162	FG3225 <sup>④</sup>
350–700	63	51	126	101	158	126	JG3175W <sup>⑤</sup>
350–700	63	51	126	101	158	126	JG3175 <sup>④</sup>
350–700	72	58	144	116	181	144	JG3200W <sup>⑤</sup>
350–700	72	58	144	116	181	144	JG3200 <sup>④</sup>
350–700	81	65	162	130	203	162	JG3225W <sup>⑤</sup>
350–700	81	65	162	130	203	162	JG3225 <sup>④</sup>
350–700	90	72	181	144	226	181	JG3250W <sup>⑤</sup>
350–700	90	72	181	144	226	181	JG3250 <sup>④</sup>
500–1000	108	87	217	173	271	217	KG3300W <sup>⑤</sup>
500–1000	108	87	217	173	271	217	KG3300 <sup>④</sup>
500–1000	126	101	253	202	316	253	KG3350W <sup>⑤</sup>
500–1000	126	101	253	202	316	253	KG3350 <sup>④</sup>
1000–2000	144	116	289	231	361	289	KG3400 <sup>④</sup>

#### Notes

- ① Breaker continuous current is based on 115% of the generator full load ampere rating.
- ② Based on three-phase generators at 80% power factor.
- ③ FG, JG, KG include thermal-magnetic trip units, LG and NG include electronic trip units.
- ④ Breaker includes line and load terminals.
- ⑤ Without terminals.

The following catalog numbers have center tap studs for dual voltage applications: JG3070CT, JG3100CT, JG3125CT, KG3175CT, LG3300CTW.

## Electronic

2

Magnetic Pickup Range	Maximum Generator Rating 60 Hz		480 Vac		600 Vac		Engine Generator Breaker <sup>③</sup>
	240 Vac kVA <sup>①</sup>	kW <sup>②</sup>	kVA <sup>①</sup>	kW <sup>②</sup>	kVA <sup>①</sup>	kW <sup>②</sup>	Catalog Number
500–2500	162	130	325	260	406	325	<b>LG3450</b> <sup>④</sup>
500–2500	181	144	361	289	451	361	<b>LG3500</b> <sup>④</sup>
500–2500	217	173	433	347	542	433	<b>LG3600</b> <sup>④</sup>
500–2500	253	202	505	404	632	505	<b>NG3700</b> <sup>④</sup>
500–2500	289	231	578	462	722	578	<b>NG3800</b> <sup>④</sup>
1250–5000	325	260	650	520	812	650	<b>NG3900</b> <sup>④</sup>
1250–5000	361	289	722	578	903	722	<b>NG31000</b> <sup>④</sup>
1250–5000	433	347	867	693	1083	867	<b>NG31200</b> <sup>④</sup>

**Notes**

- ① Breaker continuous current is based on 115% of the generator full load ampere rating.
- ② Based on three-phase generators at 80% power factor.
- ③ FG, JG, KG include thermal-magnetic trip units, LG and NG include electronic trip units.
- ④ Breaker includes line and load terminals.

The following catalog numbers have center tap studs for dual voltage applications: JG3070CT, JG3100CT, JG3125CT, KG3175CT, LG3300CTW.

## Accessories Selection Guide and Ordering Information

### Enclosures

#### Type 1 General Purpose

- Surface or flush mounting
- 15–1200 ampere range
- 600 Vac, 500 Vdc

Type 1 enclosed breakers are designed for use in commercial buildings, apartment buildings and other areas where a general purpose enclosure is applicable. The breaker is front operable and is capable of being padlocked in either the ON or OFF position. Ratings through 1200 amperes are listed with Underwriters Laboratories as approved for service entrance application. Both surface and flush mounted enclosures are available.

#### Type 3R Rainproof Surface Mounting

- Interchangeable hubs (through 400 amperes)
- 15–1200 ampere range
- 600 Vac, 500 Vdc

This general purpose outdoor service center employs a circuit breaker inside a weatherproof sheet steel breaker enclosure to serve

as a main disconnect and protective device for feeder circuits. Ratings through 1200 amperes are listed by Underwriters Laboratories as suitable for service entrance application.

#### Type 12 Dustproof Surface Mounting

- No knockouts or other openings
- 15–1200 ampere range
- 600 Vac, 500 Vdc

The Type 12 enclosure is designed in line with specifications for special industry applications where unusually severe conditions involving oil, coolant, dust and other foreign materials exist in the operating atmosphere. The handle padlocks in the OFF position and the cover is interlocked with the handle mechanism to prevent opening the cover with the circuit breaker in the ON position. Ratings through 1200 amperes are listed by Underwriters Laboratories as suitable for service entrance application.

### Enclosure Selection Data

Breaker Frame Amperes	Enclosure Type Class	Catalog Number
FG 15–225	Type 1	SFDN225
	Type 3R	RFDN225
	Type 12	JFDN225
JG 175–250	Type 1	SJDN250
	Type 3R	RJDN250
	Type 12	JJDN250
KG 300–400	Type 1	SKDN400
	Type 3R	RKDN400
	Type 12	JKDN400
LG 450–600	Type 1	SLDN600
	Type 3R	RLDN600
	Type 12	JLDN600
NG 700–1200	Type 1	SNDN1200
	Type 3R	RNDN1200
	Type 12	JNDN1200

## Options and Accessories

### Standard Terminals

Breaker Frame	Max. Amp Rating	AWG Wire Range	Metric Wire Range mm <sup>2</sup>	Catalog Number
FG	100	14–1/0	2.5–50	3T100FB ①
FG	150	4–4/0	25–95	3TA225FD ①
JG	250	4–350 kcmil	25–185	TA250KB
KG	350	250–500 kcmil	120–240	TA350K
KG	400	3/0–250 kcmil (2)	95–120	3TA400K ①
LG	600	250–500 kcmil (2)	120–240	3TA603LDK
NG	700	1–500 kcmil (2)	50–300	TA700NB1
NG	1000	3/0–400 kcmil (3)	95–185	TA1000NB1
NG	1200	4/0–500 kcmil (4)	120–300	TA1200NB1

### Neutral Kits, Insulated and Groundable

Max. Enclosure Rating (Amperes)	Main Lug Number Size Cu/Al	Ground Lug Size Cu/Al	Catalog Number
100	(1) 14–1/0	(1) 14–1/0	INK100
250	(1) 6–350 kcmil	(1) 4–300 kcmil	INK250
400	(1) 4–750 kcmil or (2) 1/0–250 kcmil	(1) 4–300 kcmil	INK400
600	(2) 250–500 kcmil	(1) 4–300 kcmil	INK600
1200	(3) 1/0 to 750 kcmil or (4) 1/0 to 750 kcmil	(1) 6–250 kcmil	INK1200

### Internal Accessories

#### Auxiliary Switch ②

Breaker Frame	Factory Mounted	1A-1B		2A-2B	
		Field Kit Catalog Number	Factory Mounted	Field Kit Catalog Number	Factory Mounted
FG ③	A06	A1X1PK	A13	A2X1RPK	A13
JG	A06	A1X2PK	A13	A2X2PK	A13
KG	A06	A1X3PK	A13	A2X3PK	A13
LG	A06	A1X4PK	A13	A2X4PK	A13
NG	A06	A1X5PK	A13	A2X5PK	A13

#### Shunt Trip ②

Breaker Frame	Rating	Factory Mounted	Field Kit Catalog Number
FG ③	12–24 Vdc	S02	SNT1LP03K
JG	12–24 Vdc	S42	SNT2P04K
KG	12–24 Vdc	S42	SNT3P04K
LG	12–24 Vdc	S02	SNT4LP03K
NG	12–24 Vdc	S02	SNT5LP03K

#### Notes

- ① Package of three terminals.
- ② Other accessories are available. Same as standard frame breakers.
- ③ Field installation on the FG Frame is not UL listed.

# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

#### Technical Data and Specifications

2

#### UL 489 Interrupting Capacity Ratings

Volts AC (50/60 Hz)	Interrupting Capacity (Symmetrical Amperes)
240	18,000
480	14,000
600	10,000

#### IEC 947-2 Interrupting Capacity Ratings

Volts AC (50/60 Hz)	Interrupting Capacity (Symmetrical Amperes)
220, 240	18,000/9,000
380, 415	14,000/7,000
660, 690	18,000/9,000 14,000/7,000 10,000/5,000

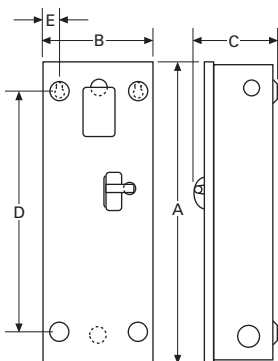
#### Dimensions and Weights

Approximate Dimensions in Inches (mm)

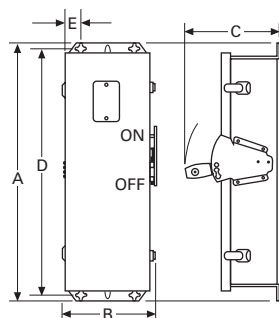
#### Enclosure Selection Data

Breaker Frame Amperes	Enclosure Type Class	A	B	C	D	E	Approx. Weight Lbs (kg)	Conduit Sizes, Inches	Catalog Number
FG 15–225	Type 1	23.25 (590.6)	8.41 (213.6)	6.28 (159.5)	18.75 (476.3)	1.20 (30.5)	15 (7)	0.25, 0.50, 0.75, 1, 1.25, 1.50, 2, 2.50	SFDN225
	Type 3R	25.66 (651.8)	8.84 (224.7)	9.31 (236.5)	24.28 (616.7)	1.70 (43.2)	19 (9)	0.25, 0.50, 0.75, 1, 1.25, 1.50, 2, 2.50	RFDN225
	Type 12	25.66 (651.8)	8.84 (224.7)	9.31 (236.5)	24.28 (616.7)	1.70 (43.2)	18 (8)	—	JFDN225
JG 175–250	Type 1	34.70 (881.4)	10.92 (277.4)	7.20 (182.9)	30.00 (762.0)	1.88 (47.8)	31 (14)	0.25, 0.50, 2, 2.50, 3	SJDN250
	Type 3R	37.50 (952.5)	11.56 (293.6)	10.22 (259.6)	35.77 (908.6)	1.94 (49.3)	40 (18)	0.25, 0.50, 2, 2.50, 3	RJDN250
	Type 12	37.53 (953.3)	11.56 (293.6)	10.22 (259.6)	35.77 (908.6)	1.94 (49.3)	37 (17)	—	JJDN250
KG 300–400	Type 1	38.81 (985.8)	11.06 (280.9)	10.94 (277.9)	34.00 (863.6)	2.28 (57.9)	53 (24)	0.25, 0.50, 0.75, 1.50, 2, 2.50, 3, 3.50	SKDN400
	Type 3R	41.69 (1058.9)	11.75 (298.5)	14.06 (357.1)	39.90 (1013.5)	1.97 (50.0)	60 (27)	0.25, 0.50, 0.75, 2.50, 3, 3.50	RKDN400
	Type 12	41.69 (1058.9)	11.75 (298.5)	14.06 (357.1)	39.90 (1013.5)	1.97 (50.0)	53 (24)	—	JKDN400
LG 450–600	Type 1	45.88 (1165.4)	14.31 (363.5)	12.38 (314.5)	46.56 (1182.6)	1.91 (48.5)	81 (37)	0.25, 0.50, 0.75, 3, 3.50, 4	SLDN600
	Type 3R	48.31 (1227.1)	14.91 (378.7)	15.50 (393.7)	46.56 (1182.6)	1.92 (48.8)	84 (38)	0.25, 0.50, 0.75, 3, 3.50, 4	RLDN600
	Type 12	48.31 (1227.1)	14.91 (378.7)	15.50 (393.7)	46.56 (1182.6)	1.92 (48.8)	81 (37)	—	JLDN600
NG 700–1200	Type 1	61.22 (1555.0)	21.44 (544.6)	15.41 (391.4)	61.84 (1570.7)	1.97 (50.0)	178 (81)	—	SNDN1200
	Type 3R	63.59 (1615.2)	22.00 (558.8)	17.63 (447.8)	61.84 (1570.7)	1.97 (50.0)	175 (79)	—	RNDN1200
	Type 12	63.59 (1615.2)	22.00 (558.8)	17.63 (447.8)	61.84 (1570.7)	1.97 (50.0)	170 (77)	—	JNDN1200

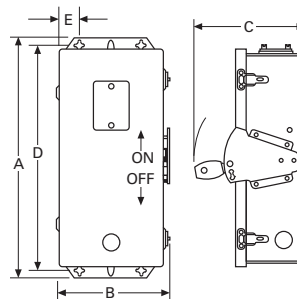
#### Type 1 Surface Mounted



#### Type 3R Rainproof



#### Type 12, 12K Dustproof



## Direct Current Circuit Breakers



## Direct Current Circuit Breakers

## Product Description

DC (direct current) systems and applications are becoming commonplace as alternative energy sources have expanded and the number of DC devices and data centers using DC power has swelled.

Eaton offers molded case circuit breakers and switches to meet circuit protection and switching requirements for a host of different DC end user requirements. Applications include UPS battery supply circuits, solar systems and electric vehicle charging, as well as commercial and industrial distribution.

Current ratings are available from 15 to 3000 A, with a full scale of voltage and interrupting ratings to address needs ranging from standard to the highest performance. Optional internal accessories provide remote tripping and indication of breaker status.

The DC breaker family is UL 489 listed and exceeds the requirements in UL 489 Supplement SC for UPS applications. Eaton breakers may be applied in both ungrounded and select grounded applications, with poles connected in series to operate at the maximum voltages shown on **Page V4-T2-444**. To use DC circuit breakers on 600 V grounded systems, three poles in series must be connected on the ungrounded leg.

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All DC breakers use the same internal and external accessories as their corresponding Series C and Series G AC frame equivalents, except for the NBDC breaker, which uses the same internal and external accessories as the standard NB frame.

The HFDDC through HMDLDC and EG to RG DC breakers use the same internal and external accessories as their corresponding Series C and Series G AC Frame equivalents. NBDC uses the same internal and external accessories as standard NB breakers.

Many of the Eaton AC molded case circuit breakers carry 250 Vdc ratings for ungrounded systems. Refer to **Pages V4-T2-113** and **V4-T2-222** for these interrupting tables.



## Quick Reference Direct Current Circuit Breakers

## UL 489 Interrupting Capacity Ratings

Interrupting Capacity (kA)  
Volts DC <sup>①</sup>

Circuit Breaker Type	Maximum Amperes	Interrupting Capacity (kA)								
		125	Poles in Series	250 <sup>②</sup>	Poles in Series	500	600	Poles in Series	750 <sup>②</sup>	Poles in Series
EGEDC	100	10	1	35	2	35	—	3	—	—
EGSDC	100	35	1	42	2	50	—	3	—	—
EGHDC	100	42	1	50	2	65	—	3	—	—
HFDDC	225	42	1	50	2	—	42	3	42	4
JGEDC	250	35	1	35	2	—	35	3	—	—
JGSDC	250	42	1	42	2	—	50	3	—	—
JGHDC	250	50	1	50	2	—	65	3	—	—
HJDDC	250	42	1	50	2	—	42	3	—	—
HKDDC	400	42	1	50	2	—	42	3	—	—
LGEDC	600	22	1	22	2	—	35	3	—	—
LGSDC	600	22	1	22	2	—	50	3	—	—
LGHDC	600	50	1	50	2	—	65	3	—	—
HLDDC	600	42	1	50	2	—	35	3	—	—
HLDDC <sup>③</sup>	1200	42	1	50	2	—	—	—	—	—
HMDLDC	800	42	1	50	2	—	35	3	—	—
NBDC	1200	42	1	50	2	—	50	3	—	—
RGHDC	3000	42	1	50	2	—	65	3	—	—

## IEC 60947-2 Interrupting Capacity Ratings

Circuit Breaker Type	Maximum Amperes	125 Volts DC		Poles in Series	250 Volts DC		Poles in Series	600 Volts DC		Poles in Series
		I <sub>cu</sub>	I <sub>cs</sub>		I <sub>cu</sub>	I <sub>cs</sub>		I <sub>cu</sub>	I <sub>cs</sub>	
EGEDC	100	10	10	1	10	10	2	—	—	—
EGSDC	100	35	35	1	35	35	2	—	—	—
EGHDC	100	42	42	1	42	42	2	—	—	—
JGEDC	250	22	22	1	22	22	2	—	—	—
JGSDC	250	22	22	1	22	22	2	—	—	—
JGHDC	250	42	42	1	42	42	2	—	—	—
HJDDC	250	—	—	—	—	—	—	20	10	3
LGEDC	600	22	22	1	22	22	2	—	—	—
LGSDC	600	22	22	1	22	22	2	—	—	—
LGHDC	600	42	42	1	42	42	2	—	—	—
HLDDC	600	—	—	—	—	—	—	20	10	3
HMDLDC	800	—	—	—	—	—	—	20	10	3

**Notes**

<sup>①</sup> DC ratings apply to substantially non-inductive circuits. Time constants per UL 489.

<sup>②</sup> EGEDC through HMDLDC have been tested up to 300 Vdc to allow for battery charging voltages. 750 Vdc is common in transportation applications. HFDDC, four-pole 750 Vdc is available up to 150 A maximum. 300 Vdc and 750 Vdc are not UL 489 listed voltage ratings.

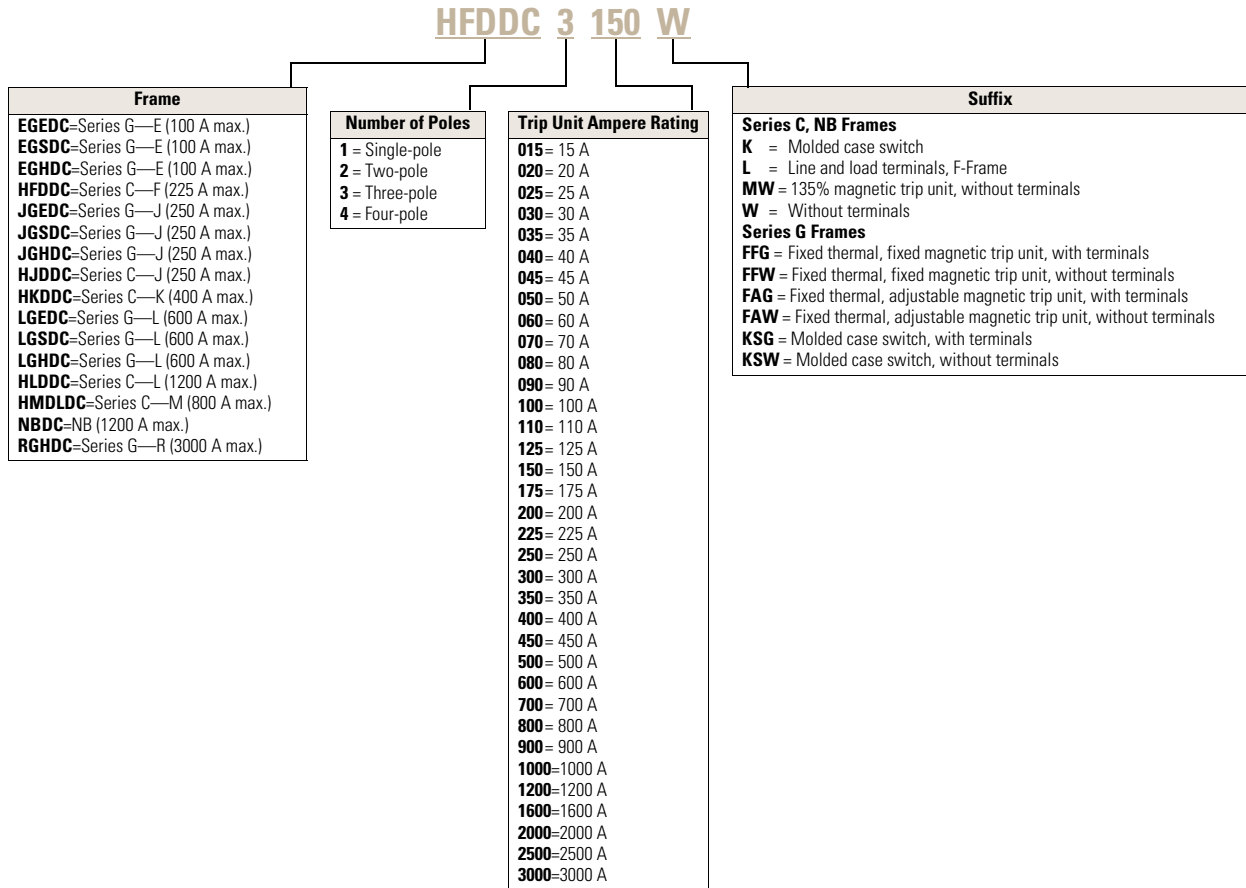
<sup>③</sup> Four-pole frame with two-poles connected in parallel.

See **Page V4-T2-455** for series connection diagrams. Use NEC rated cable to connect/short poles in series as shown.

### Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

#### DC Circuit Breaker



## Product Selection

2

**Type EGEDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 500 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker with Terminals Catalog Number	Complete Circuit Breaker without Terminals Catalog Number
25	EGEDC3025FFG	EGEDC3025FFW
30	EGEDC3030FFG	EGEDC3030FFW
35	EGEDC3035FFG	EGEDC3035FFW
40	EGEDC3040FFG	EGEDC3040FFW
45	EGEDC3045FFG	EGEDC3045FFW
50	EGEDC3050FFG	EGEDC3050FFW
60	EGEDC3060FFG	EGEDC3060FFW
70	EGEDC3070FFG	EGEDC3070FFW
80	EGEDC3080FFG	EGEDC3080FFW
90	EGEDC3090FFG	EGEDC3090FFW
100	EGEDC3100FFG	EGEDC3100FFW

**Type EGSDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 50 kAIC at 500 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker with Terminals Catalog Number	Complete Circuit Breaker without Terminals Catalog Number
25	EGSDC3025FFG	EGSDC3025FFW
30	EGSDC3030FFG	EGSDC3030FFW
35	EGSDC3035FFG	EGSDC3035FFW
40	EGSDC3040FFG	EGSDC3040FFW
45	EGSDC3045FFG	EGSDC3045FFW
50	EGSDC3050FFG	EGSDC3050FFW
60	EGSDC3060FFG	EGSDC3060FFW
70	EGSDC3070FFG	EGSDC3070FFW
80	EGSDC3080FFG	EGSDC3080FFW
90	EGSDC3090FFG	EGSDC3090FFW
100	EGSDC3100FFG	EGSDC3100FFW

**Type EGHDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 65 kAIC at 500 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker with Terminals Catalog Number	Complete Circuit Breaker without Terminals Catalog Number
25	EGHDC3025FFG	EGHDC3025FFW
30	EGHDC3030FFG	EGHDC3030FFW
35	EGHDC3035FFG	EGHDC3035FFW
40	EGHDC3040FFG	EGHDC3040FFW
45	EGHDC3045FFG	EGHDC3045FFW
50	EGHDC3050FFG	EGHDC3050FFW
60	EGHDC3060FFG	EGHDC3060FFW
70	EGHDC3070FFG	EGHDC3070FFW
80	EGHDC3080FFG	EGHDC3080FFW
90	EGHDC3090FFG	EGHDC3090FFW
100	EGHDC3100FFG	EGHDC3100FFW

## HFDDC


**Type HFDDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 42 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker with Line and Load Terminals <sup>①</sup>			
	Single-Pole Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number	Four-Pole Catalog Number
15	HFDDC1015L	HFDDC2015L	HFDDC3015L	HFDDC4015L
20	HFDDC1020L	HFDDC2020L	HFDDC3020L	HFDDC4020L
25	HFDDC1025L	HFDDC2025L	HFDDC3025L	HFDDC4025L
30	HFDDC1030L	HFDDC2030L	HFDDC3030L	HFDDC4030L
35	HFDDC1035L	HFDDC2035L	HFDDC3035L	HFDDC4035L
40	HFDDC1040L	HFDDC2040L	HFDDC3040L	HFDDC4040L
45	HFDDC1045L	HFDDC2045L	HFDDC3045L	HFDDC4045L
50	HFDDC1050L	HFDDC2050L	HFDDC3050L	HFDDC4050L
60	HFDDC1060L	HFDDC2060L	HFDDC3060L	HFDDC4060L
70	HFDDC1070L	HFDDC2070L	HFDDC3070L	HFDDC4070L
80	HFDDC1080L	HFDDC2080L	HFDDC3080L	HFDDC4080L
90	HFDDC1090L	HFDDC2090L	HFDDC3090L	HFDDC4090L
100	HFDDC1100L	HFDDC2100L	HFDDC3100L	HFDDC4100L
110	HFDDC1110L	HFDDC2110L	HFDDC3110L	HFDDC4110L
125	HFDDC1125L	HFDDC2125L	HFDDC3125L	HFDDC4125L
150	HFDDC1150L	HFDDC2150L	HFDDC3150L	HFDDC4150L
175	—	HFDDC2175L	HFDDC3175L	—
200	—	HFDDC2200L	HFDDC3200L	—
225	—	HFDDC2225L	HFDDC3225L	—

**Type JGEDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>②</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	JGEDC3070FAG	JGEDC3250NN	JT3070FA	T250FJ
90	JGEDC3090FAG	JGEDC3250NN	JT3090FA	T250FJ
100	JGEDC3100FAG	JGEDC3250NN	JT3100FA	T250FJ
125	JGEDC3125FAG	JGEDC3250NN	JT3125FA	T250FJ
150	JGEDC3150FAG	JGEDC3250NN	JT3150FA	T250FJ
175	JGEDC3175FAG	JGEDC3250NN	JT3175FA	T250FJ
200	JGEDC3200FAG	JGEDC3250NN	JT3200FA	T250FJ
225	JGEDC3225FAG	JGEDC3250NN	JT3225FA	T250FJ
250	JGEDC3250FAG	JGEDC3250NN	JT3250FA	T250FJ

**Notes**

① For breaker without terminals, replace "L" with "W" at end of catalog number.

② For complete breaker, order individual frame, trip unit and terminals for field installation.

### Type JGSDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 50 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	JGSDC3070FAG	JGSDC3250NN	JT3070FA	T250FJ
90	JGSDC3090FAG	JGSDC3250NN	JT3090FA	T250FJ
100	JGSDC3100FAG	JGSDC3250NN	JT3100FA	T250FJ
125	JGSDC3125FAG	JGSDC3250NN	JT3125FA	T250FJ
150	JGSDC3150FAG	JGSDC3250NN	JT3150FA	T250FJ
175	JGSDC3175FAG	JGSDC3250NN	JT3175FA	T250FJ
200	JGSDC3200FAG	JGSDC3250NN	JT3200FA	T250FJ
225	JGSDC3225FAG	JGSDC3250NN	JT3225FA	T250FJ
250	JGSDC3250FAG	JGSDC3250NN	JT3250FA	T250FJ

### JGHDC3250NN



### Type JGHDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 65 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	JGHDC3070FAG	JGHDC3250NN	JT3070FA	T250FJ
90	JGHDC3090FAG	JGHDC3250NN	JT3090FA	T250FJ
100	JGHDC3100FAG	JGHDC3250NN	JT3100FA	T250FJ
125	JGHDC3125FAG	JGHDC3250NN	JT3125FA	T250FJ
150	JGHDC3150FAG	JGHDC3250NN	JT3150FA	T250FJ
175	JGHDC3175FAG	JGHDC3250NN	JT3175FA	T250FJ
200	JGHDC3200FAG	JGHDC3250NN	JT3200FA	T250FJ
225	JGHDC3225FAG	JGHDC3250NN	JT3225FA	T250FJ
250	JGHDC3250FAG	JGHDC3250NN	JT3250FA	T250FJ

### HJDDC3250



### Type HJDDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 42 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
70	HJDDC3250F	JT3070T	TA250KB
90	HJDDC3250F	JT3090T	TA250KB
100	HJDDC3250F	JT3100T	TA250KB
125	HJDDC3250F	JT3125T	TA250KB
150	HJDDC3250F	JT3150T	TA250KB
175	HJDDC3250F	JT3175T	TA250KB
200	HJDDC3250F	JT3200T	TA250KB
225	HJDDC3250F	JT3225T	TA250KB
250	HJDDC3250F	JT3250T	TA250KB

#### Note

<sup>①</sup> For complete breaker, order individual frame, trip unit and terminals for field installation.

## HKDDC3400


**Type HKDDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 42 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
100	HKDDC3400F	KT3100T	TA300K
125	HKDDC3400F	KT3125T	TA300K
150	HKDDC3400F	KT3150T	TA300K
175	HKDDC3400F	KT3175T	TA300K
200	HKDDC3400F	KT3200T	TA300K
225	HKDDC3400F	KT3225T	TA300K
250	HKDDC3400F	KT3250T	TA350K
300	HKDDC3400F	KT3300T	TA350K
350	HKDDC3400F	KT3350T	TA350K
400	HKDDC3400F	KT3400T	3TA400K <sup>②</sup>

## LGEDC3630NN


**Type LGEDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
250	LGEDC3250FAG	LGEDC3630NN	LT3250FA	TA350LK
300	LGEDC3300FAG	LGEDC3630NN	LT3300FA	TA350LK
350	LGEDC3350FAG	LGEDC3630NN	LT3350FA	TA350LK
400	LGEDC3400FAG	LGEDC3630NN	LT3400FA	TA350LK
500	LGEDC3500FAG	LGEDC3630NN	LT4500FA	3TA632LK <sup>②</sup>
600	LGEDC3600FAG	LGEDC3630NN	LT3600FA	3TA632LK <sup>②</sup>

**Type LGSDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 50 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
250	LGSDC3250FAG	LGSDC3630NN	LT3250FA	TA350LK
300	LGSDC3300FAG	LGSDC3630NN	LT3300FA	TA350LK
350	LGSDC3350FAG	LGSDC3630NN	LT3350FA	TA350LK
400	LGSDC3400FAG	LGSDC3630NN	LT3400FA	TA350LK
500	LGSDC3500FAG	LGSDC3630NN	LT4500FA	3TA632LK <sup>②</sup>
600	LGSDC3600FAG	LGSDC3630NN	LT3600FA	3TA632LK <sup>②</sup>

**Notes**

- ① For complete breaker, order individual frame, trip unit and terminals for field installation.  
② Three-pole kit.

### Type LGHDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 65 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
250	LGHDC3250FAG	LGHDC3630NN	LT3250FA	TA350LK
300	LGHDC3300FAG	LGHDC3630NN	LT3300FA	TA350LK
350	LGHDC3350FAG	LGHDC3630NN	LT3350FA	TA350LK
400	LGHDC3400FAG	LGHDC3630NN	LT3400FA	TA350LK
500	LGHDC3500FAG	LGHDC3630NN	LT4500FA	3TA632LK <sup>②</sup>
600	LGHDC3600FAG	LGHDC3630NN	LT3600FA	3TA632LK <sup>②</sup>

### HLDDC



### Type HLDDC DC Circuit Breakers— Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
300	HLDDC3600F	LT3300T	TA602LD
350	HLDDC3600F	LT3350T	TA602LD
400	HLDDC3600F	LT3400T	TA602LD
450	HLDDC3600F	LT3450T	TA602LD
500	HLDDC3600F	LT3500T	TA602LD
600	HLDDC3600F	LT3600T	3TA603LDK <sup>②</sup>

### Type HLDDC DC Circuit Breakers— Two-Pole High Interrupting Capacity 50 kAIC at 250 Vdc <sup>③④</sup>

Maximum Continuous Ampere Rating at 40 °C	Complete Breaker Catalog Number
600	HLDDC20600
700	HLDDC20700
800	HLDDC20800
900	HLDDC20900
1000	HLDDC21000
1200	HLDDC21200

#### Notes

- ① For complete breaker, order individual frame, trip unit and terminals for field installation.
- ② Three-pole kit.
- ③ Includes breaker frame, trip unit and terminals.
- ④ Four-pole breaker with two poles wired in parallel.

## HMDLDC3800F


**Type HMDLDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 35 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Circuit Breaker Frame Only <sup>①</sup> Catalog Number	Thermal-Magnetic Trip Unit Catalog Number	Standard Terminals Catalog Number
300	HMDLDC3800F	MT3300T	TA700MA1
350	HMDLDC3800F	MT3350T	TA700MA1
400	HMDLDC3800F	MT3400T	TA700MA1
450	HMDLDC3800F	MT3450T	TA700MA1
500	HMDLDC3800F	MT3500T	TA700MA1
600	HMDLDC3800F	MT3600T	TA700MA1
700	HMDLDC3800F	MT3700T	TA700MA1
800	HMDLDC3800F	MT3800T	TA800MA2

**Type NBDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 50 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker Factory Assembled without Terminals <sup>②</sup> Catalog Number	Includes Magnetic Trip Unit Calibrated at 135%	Standard Terminals Catalog Number
700	NBDC3700MW	Included	TA1000NB1
800	NBDC3800MW	Included	TA1000NB1
900	NBDC3900MW	Included	TA1000NB1
1000	NBDC31000MW	Included	TA1000NB1
1200	NBDC31200MW	Included	TA1200NB1

## RGHDC3300FFWM


**Type RGHDC DC Circuit Breakers—  
Three-Pole High Interrupting Capacity 65 kAIC at 600 Vdc**

Maximum Continuous Ampere Rating at 40 °C	Complete Circuit Breaker Factory Assembled <sup>②</sup>		Includes Magnetic Trip Unit Calibrated at 135%
	Imperial Termination Threading Catalog Number	Metric Termination Threading Catalog Number	
1600	RGHDC3160FFWE	RGHDC3160FFWM	Included
2000	RGHDC3200FFWE	RGHDC3200FFWM	Included
2500	RGHDC3250FFWE	RGHDC3250FFWM	Included
3000	RGHDC3300FFWE	RGHDC3300FFWM	Included

**Notes**

<sup>①</sup> Includes frame and trip unit. Order terminals or connectors separately.

<sup>②</sup> Six rear connectors included as standard that match terminal threading.



## DC Breaker Terminal Wire Ranges

Breaker Frame	Maximum Breaker Ampacity	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range mm <sup>2</sup>	Number of Terminals Included	Standard Terminal Catalog Number
EGEDC, EGSDC, EGHDC	100	Aluminum	Cu/Al	14–1/0	2.5–50	3	3TA125EF
HFDDC	20	Steel	Cu/Al	14–10 (1)	2.5–4 (1)	3	3T20FB
	100	Steel	Cu/Al	14–1/0 (1)	2.5–50 (1)	3	3T100FB
	225	Aluminum	Cu/Al	4–4/0 (1)	25–95 (1)	3	3TA225FD
	250	Stainless steel	Cu	4–350 (1)	25–185 (1)	1	T250FJ
HJDDC	250	Aluminum	Cu/Al	4–350 kcmil (1)	25–185 (1)	1	TA250KB
HKDDC	225	Aluminum	Cu/Al	3–350 kcmil (1)	35–185 (1)	1	TA300K
	350	Aluminum	Cu/Al	250–500 kcmil (1)	120–240 (1)	1	TA350K
	400	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	3	3TA400K
LGEDC, LGSDC, LGHDC	400	Aluminum	Cu/Al	2–500 (1)	35–240 (1)	1	TA350LK
	630	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	1	TA632L
	630	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	3	3TA632LK
HLDDC	500	Aluminum	Cu/Al	3/0–350 kcmil (2)	95–150 (2)	1	TA602LD
	600	Aluminum	Cu/Al	400–500 kcmil (2)	185–240 (2)	3	3TA603LDK
HMDLDC	600	Aluminum	Cu/Al	1–500 kcmil (2)	—	1	TA700MA1
	800	Aluminum	Cu/Al	3/0–400 kcmil (3)	—	1	TA800MA2
NBDC	700	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	800	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	900	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	1000	Aluminum	Cu/Al	3/0–400 kcmil (3)	95–185 (3)	1	TA1000NB1
	1200	Aluminum	Cu/Al	4/0–500 kcmil (4)	120–240 (4)	1	TA1200NB1

**Note:** RGHDC breakers include six rear connectors as standard.

**Molded Case Switches**

Eaton's DC molded case switches are used in applications requiring a compact, high-capacity disconnect. They are UL 489 listed and have automatic high instantaneous current protection. These devices do not provide overload protection.

**Molded Case Switches**

Maximum Continuous Ampere Rating at 40 °C	Interrupting Capacity (Volts DC)	Poles in Series	With Line and Load Terminals	Without Line and Load Terminals
			Catalog Number	Catalog Number
<b>600 Vdc Maximum</b>				
100	42	3	HFDDC3100KL	HFDDC3100KW
150	42	3	HFDDC3150KL	HFDDC3150KW
225	42	3	HFDDC3225KL	HFDDC3225KW
250	65	3	JGKDC3250KSG	JGKDC3250KSW
250	42	3	HJDDC3250K	HJDDC3250KW
	35	3	HKDDC3400K	HKDDC3400KW
400	65	3	LGKDC3400KSG	LGKDC3400KSW
	65	3	LGKDC3630KSG	LGKDC3630KSW
600	35	3	HLDDC3600K	HLDDC3600WK
	35	3	HMDLDC3800K	HMDLDC3800WK
<b>500 Vdc Maximum</b>				
100	65	3	EGK3100KSG	EGK3100KSW
<b>250 Vdc Maximum</b>				
100	50	2	HFDDC2100KL	HFDDC2100KW
150	50	2	HFDDC2150KL	HFDDC2150KW
225	50	2	HFDDC2225KL	HFDDC2225KW
1200	50	①	HLDDC21200K ①	HLDDC21200WK ①

**Note**

① Four-pole frame with two-pole connected in parallel.

## Accessories

## Internal Accessories

Description	Factory Installation (HFDDC)	Field Installation Kits								
		HFDDC ①	EGEDC, EGSDC, EGHDC	JGEDC, JGSDC, JGHDC	LGEDC, LGSDC, LGHDC	HJDDC	HKDDC	HLDDC	HMDLDC	NBDC
<b>Right-Pole Mounting</b>										
Auxiliary switch										
1A-1B	A06	A1X1PK	AUX1A1BPK	AUX1A1BPK	A1X2PK	A1X3PK	A1X4PK	A1X4PK	4980D16G05	—
2A-2B	A13	A2X1RPK	AUX2A2BPK	AUX2A2BPK	A2X2PK	A2X3PK	A2X4PK	A2X4PK	4980D16G06	A2X6RPK
Alarm switch										
1 make/1 break	B06	A1L1RPK	ALM1M1BEPK	ALM1M1BJPK	A1L2RPK	A1L3RPK	A1L4RPK	A1L4RPK	—	A1L6RPK
Auxiliary and alarm combo										
1A-1B, 1 make/1 break	C05	AAL1RPK	AUXALRMEPK	AUXALRMJPK	AAL2RPK	AAL3RPK	AA114RPK	AA114RPK	—	—
<b>Left-Pole Mounting</b>										
Shunt trip										
12 Vdc	S02	SNT1LP03K	SNT012CPK	SNT012CPK	SNT2P04K	SNT3P04K	SNT4LP03K	SNT4LP03K	2606D58G14	—
24 Vdc	S02	SNT1LP03K	SNT024CPK	SNT024CPK	SNT2P04K	SNT3P04K	SNT4LP03K	SNT4LP03K	2606D58G13	SNT6P03K ②
48 Vdc	S06	SNT1LP08K	SNT4860CPK	SNT4860CPK	SNT2P06K	SNT3P06K	SNT4LP23K	SNT4LP23K	2606D58G12	SNT6P23K ②
60 Vdc	S06	SNT1LP08K	SNT4860CPK	SNT4860CPK	SNT2P06K	SNT3P06K	SNT4LP23K	SNT4LP23K	2606D58G11	SNT6P23K ②
125 Vdc	S10	SNT1LP12K	SNT120CPK	SNT120CPK	SNT2P11K	SNT3P11K	SNT4LP26K	SNT4LP26K	2606D58G10	SNT6P23K ②
250 Vdc	S14	SNT1LP18K	—	—	SNT2P14K	SNT3P14K	SNT4LP14K	SNT4LP14K	2606D58G09	SNT6P14K
120 Vac	S06	SNT1LP12K	SNT120CPK	SNT120CPK	SNT2P11K	SNT3P11K	SNT4LP11K	SNT4LP11K	2060D58G05	SNT6P11K ②
Undervoltage release										
12 Vdc	U30	UVH1LP20K	UVR012DPK	UVR012DPK	UVH2LP20K	UVH3LP20K	UVH4LP20K	UVH4LP20K	372D032G06	UVH6RP20K ②
24 Vdc	U34	UVH1LP21K	UVR024DPK	UVR024DPK	UVH2LP21K	UVH3LP21K	UVH4LP21K	UVH4LP21K	372D032G07	UVH6RP21K ②
48 Vdc	U38	UVH1LP22K	UVR048DPK	UVR048DPK	UVH2LP22K	UVH3LP22K	UVH4LP22K	UVH4LP22K	372D032G08	UVH6RP23K ②
125 Vdc	U42	UVH1LP26K	UVR125DPK	UVR125DPK	UVH2LP26K	UVH3LP26K	UVH4LP26K	UVH4LP26K	372D032G09	UVH6RP26K ②
250 Vdc	U46	UVH1LP28K	UVR250DPK	UVR250DPK	UVH2LP28K	UVH3LP28K	UVH4LP28K	UVH4LP28K	372D032G10	UVH6RP28K ②
120 Vac	U14	UVH1LP08K	UVR120APK	UVR120APK	UVH2LP08K	UVH3LP08K	UVH4LP08K	UVH4LP08K	373D632G05	UVH6RP08K ②

**Notes**

① F-Frame circuit breakers are factory sealed. Underwriters Laboratories requires that internal accessories be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

② Right-pole mounted.

One accessory can be mounted per pole, per breaker. Factory installation of accessories is available. Contact Eaton for assistance with part number configuration.

**Jumpers**

Jumpers must be ordered separately. Priced individually.

2

**HFDDC Frame**

Description	Maximum Amperes	Catalog Number
Single copper jumper	60	DC1F060 <sup>①</sup>
	100	DC1F100 <sup>①</sup>
	125	DC1F125 <sup>①</sup>
	225	DC1F225 <sup>①</sup>
Package of 2 aluminum jumpers	100	DC2FD100A
Package of 3 aluminum jumpers	100	DC3FD100A

**JGEDC, JGSDC, JGHDC Frames**

Description	Maximum Amperes	Catalog Number
Single aluminum jumper	250	DC1JG250A <sup>①</sup>
Package of 2 aluminum jumpers	250	DC2JG250A <sup>①</sup>
Package of 20 aluminum jumpers	250	DC20JG250A <sup>①</sup>

**HKDDC Frame**

Description	Maximum Amperes	Catalog Number
Single copper jumper	400	DC1K400 <sup>①</sup>
Package of 2 aluminum jumpers	400	DC2KD400A <sup>①</sup>
Package of 3 aluminum jumpers	400	DC3KD400A <sup>①</sup>

**LGEDC, LGSDC, LGHDC Frames**

Description	Maximum Amperes	Catalog Number
Package of 2 aluminum jumpers	400	DC2LG400A
Package of 3 aluminum jumpers	400	DC3LG400A
Package of 30 aluminum jumpers	400	DC30LG400A

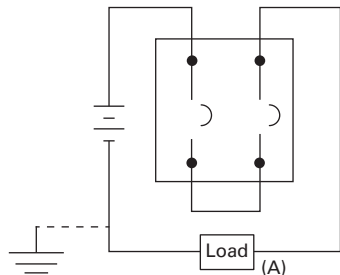
**Note**

<sup>①</sup> Not UL Listed; Non UL listed jumpers used in a UL application may need to be qualified by the OEM in their assembly. This may take place with UL or another certified testing agency.

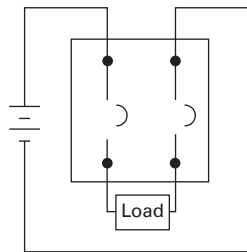
**Wiring Diagrams**

**Series Connection Diagrams for DC Application ①②**

**250 Vdc Maximum—Two Poles in Series**

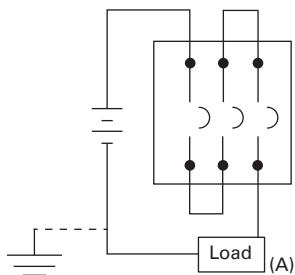


Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

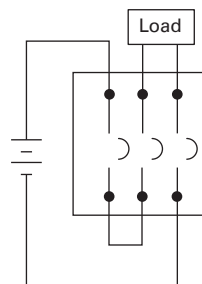


Suitable for use on ungrounded systems only.

**500 Vdc or 600 Vdc Maximum—Three Poles in Series**

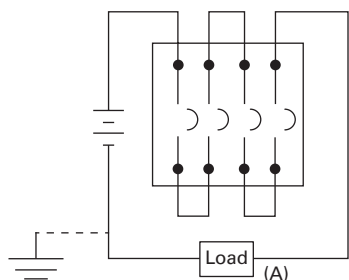


Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

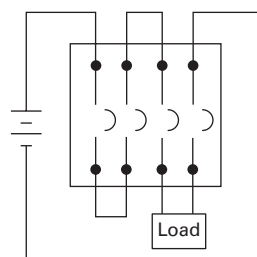


Suitable for use on ungrounded systems only.

**750 Vdc Maximum—Four Poles in Series**



Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.



Suitable for use on ungrounded systems only.

**Notes**

- ① Poles in series connection is customer supplied. Use rated cable per NEC.
- ② For grounded systems, all poles in series must be connected on non-grounded terminal, with load connected to grounded terminal.

**Dimensions**

Approximate Dimensions in Inches (mm)

**2****DC Breaker Dimensions**

Frame	Number of Poles	Width	Height	Depth
EGEDC, EGSDC, EGHDC	3	3.00 (76.2)	5.50 (139.7)	2.99 (75.9)
HFDDC	1	1.38 (35.1)	6.00 (152.4)	3.38 (86.0)
	2	2.75 (70.0)	6.00 (152.4)	3.38 (86.0)
	3	4.13 (105.0)	6.00 (152.4)	3.38 (86.0)
	4	5.50 (139.7)	6.00 (152.4)	3.38 (86.0)
JGEDC, JGSDC, JGHDC	3	4.13 (104.9)	7.00 (177.8)	3.57 (90.7)
HJDDC	2, 3	4.13 (105.0)	10.00 (254.0)	4.06 (103.1)
HKDDC	2, 3	5.50 (139.7)	10.13 (257.3)	4.10 (104.1)
LGEDC, LGSDC, LGHDC	3	5.48 (139.2)	10.13 (257.3)	4.09 (103.9)
600 A Max. HLDDC	2, 3	8.25 (209.6)	10.75 (273.1)	4.06 (103.1)
1200 A Max. HLDDC	4	11.00 (279.4)	10.75 (273.1)	4.06 (103.1)
HMDLDC	2, 3	8.25 (209.6)	16.00 (406.4)	4.06 (103.1)
NBDC	3	8.25 (209.6)	16.00 (406.4)	5.50 (139.7)
RGHDC	3	15.50 (393.7)	16.00 (406.4)	9.75 (247.7)

## PVGard Solar Photovoltaic Circuit Breakers



600 Vdc Per-Pole



1000 Vdc Poles-in-Series

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Dimensions . . . . .	<b>V4-T2-468</b>
Wiring Diagrams . . . . .	<b>V4-T2-469</b>
E <sup>2</sup> Mining Service Circuit Breakers . . . . .	<b>V4-T2-470</b>

**PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series****Product Overview**

- Two PVGard lineups
  - 600 Vdc per-pole breaker and switch. Each pole rated 600 Vdc
  - 1000 Vdc poles-in-series breaker and switch. Requires poles in series connection
- Both options UL 489B listed for solar photovoltaic circuit protection
- 50 °C calibration
- Offers both 100% and 80% rated breakers
- Handle bi-directional current flow

**Product Description**

Photovoltaic (PV) systems convert the energy of the sun into electrical power that is fed directly into the electric grid. Within the balance of system (BOS), direct current (DC) circuit breakers protect the wiring connected from the PV modules to the combiner or the inverter, while also behaving as a disconnect.

Eaton is a global leader in circuit protection and brings this expertise to bear in the photovoltaic market. PVGard solar circuit breakers are part of a product family that combines a disconnect with circuit protection in a single, compact, resettable device to protect and isolate DC circuits as needed in photovoltaic systems. PVGard breakers can replace fuses, fuse holders and disconnects in combiner box and inverter applications—saving space, streamlining design, purchasing and receiving, and reducing spare parts requirements.

There are two PVGard lineups to choose from: the industry-exclusive, 600 Vdc per-pole breakers and switches designed for residential and light commercial applications and 1000 Vdc poles-in-series breakers and switches for commercial and utility scale applications.

**PVGard 600 Vdc Per-Pole Lineup**

Only Eaton can offer this breakthrough breaker that will save significant space, time and cost. As a single-circuit-per-pole device, it allows space savings of up to 66% when compared to traditional poles-in-series disconnects, switches and breakers. In addition, it eliminates the need for jumpers for poles-in-series connection—saving on installation time, labor and even inventory.

**PVGard 1000 Vdc Poles-in-Series Lineup**

This 1000 Vdc poles-in-series lineup provides reliable and safe disconnect means and overcurrent protection in a single, compact device for commercial and utility scale PV systems. This solution does not require jumpers with the breaker/switch to be a UL 489B listed device, providing reliability and flexibility in design without limitation on implementation of the breaker/switch. If needed, cost-effective Eaton jumpers can be included.

**Application Description**

Photovoltaic (PV) systems convert the energy of the sun into electrical power that is fed directly into the electric grid. PVGuard circuit breakers are used to protect the wiring from the modules to the combiner box or inverter from overcurrents, and to provide an isolation mechanism.

Eaton offers a complete line of UL 489 Listed multi-purpose 600 Vdc poles-in-series breakers and switches, as well as protection for the AC side of the inverter. Refer to **Page V4-T2-443** for 600 Vdc breakers and **Page V4-T2-110** for AC breaker selection.

**Features**

PVGuard breakers are uniquely designed with these features:

- Meets the higher voltage and lower fault current levels of solar systems
- Tested to extreme ambient conditions from  $-40^{\circ}\text{C}$  to  $+90^{\circ}\text{C}$
- Full complement of accessories for status, signalling, and on/off operation remotely
- Can handle bi-directional flow of current
- Can be applied in grounded, ungrounded or bi-polar systems
- Meets and exceeds the standards of UL 489B for photovoltaic molded case circuit breakers and molded case switches
- Available both standard (80%-rated) and 100%-rated breakers
- $50^{\circ}\text{C}$  calibration
- Ability to open on signal from DC arc or ground fault detector
- Wide range of current ratings increases options for matching incoming strings
- Eliminates fuse stocking costs and matching issues

Designed specifically for high- and low-temperature demands of PV installations, PVGuard circuit breakers undergo extreme ambient cycling tests, and carry a robust operating temperature range. Trip units calibrate at 100% and 80% of nameplate current in a  $50^{\circ}\text{C}$  ambient, ensuring continuous operation in higher temperature environments typical to solar.

Rigorous third-party testing includes limited and standard fault current tests, electrical and mechanical endurance, dielectric voltage withstand and temperature tests. Eaton's PVGuard products are stand-alone devices without requiring jumpers to be UL 489B listed devices.

PVGuard breakers are available with a full complement of accessories to provide string status, enable remote trip, on/off operation, and can be customized to site requirements.

**Standards and Certifications**

- Designed to meet UL 489B for solar photovoltaic circuit protection
- UL File E350638, Category Control Number DIUR



**Product Selection**

Catalog number includes breaker frame and trip unit. Order terminals separately. See **Page V4-T2-463**.  
For complete internal and external accessories, see accessory section of each frame.

**JG PVS Frame****JG PVS Frame, 250 A Maximum, 600 Vdc Per Pole, 1.2 kA** <sup>①</sup>

Current Rating Amperes	Number Poles/ 600 Vdc Circuits	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
90	3	Fixed thermal, fixed magnetic	<b>JGPVS3090W</b>	<b>CJGPVS3090W</b>
100	3	Fixed thermal, fixed magnetic	<b>JGPVS3100W</b>	<b>CJGPVS3100W</b>
125	3	Fixed thermal, fixed magnetic	<b>JGPVS3125W</b>	<b>CJGPVS3125W</b>
150	3	Fixed thermal, fixed magnetic	<b>JGPVS3150W</b>	<b>CJGPVS3150W</b>
175	3	Fixed thermal, fixed magnetic	<b>JGPVS3175W</b>	<b>CJGPVS3175W</b>
200	3	Fixed thermal, fixed magnetic	<b>JGPVS3200W</b>	<b>CJGPVS3200W</b>
225	3	Fixed thermal, fixed magnetic	<b>JGPVS3225W</b>	<b>CJGPVS3225W</b>
250	3	Fixed thermal, fixed magnetic	<b>JGPVS3250W</b>	<b>CJGPVS3250W</b>

**KD PVS Frame****KD PVS Frame, 400 A Maximum, 600 Vdc Per Pole, 3 kA** <sup>①</sup>

Current Rating Amperes	Number Poles/ 600 Vdc Circuits	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
100	3	Fixed thermal, fixed magnetic	<b>KDPVS3100W</b>	<b>CKDPVS3100W</b>
125	3	Fixed thermal, fixed magnetic	<b>KDPVS3125W</b>	<b>CKDPVS3125W</b>
150	3	Fixed thermal, fixed magnetic	<b>KDPVS3150W</b>	<b>CKDPVS3150W</b>
175	3	Fixed thermal, fixed magnetic	<b>KDPVS3175W</b>	<b>CKDPVS3175W</b>
200	3	Fixed thermal, fixed magnetic	<b>KDPVS3200W</b>	<b>CKDPVS3200W</b>
225	3	Fixed thermal, fixed magnetic	<b>KDPVS3225W</b>	<b>CKDPVS3225W</b>
250	3	Fixed thermal, fixed magnetic	<b>KDPVS3250W</b>	<b>CKDPVS3250W</b>
300	3	Fixed thermal, fixed magnetic	<b>KDPVS3300W</b>	<b>CKDPVS3300W</b>
350	3	Fixed thermal, fixed magnetic	<b>KDPVS3350W</b>	<b>CKDPVS3350W</b>
400	3	Fixed thermal, fixed magnetic	<b>KDPVS3400W</b>	<b>CKDPVS3400W</b>

**Note**

<sup>①</sup> Terminals not included with frames.



# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

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Catalog number includes breaker frame and trip unit. Order terminals separately. See **Page V4-T2-463**.

#### FD PV Frame



#### FD PV Frame, 100 A Maximum, 1000 Vdc, 3 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
30	4	Fixed thermal, fixed magnetic	FDPV4030W	CFDPV4030W
40	4	Fixed thermal, fixed magnetic	FDPV4040W	CFDPV4040W
50	4	Fixed thermal, fixed magnetic	FDPV4050W	CFDPV4050W
60	4	Fixed thermal, fixed magnetic	FDPV4060W	CFDPV4060W
70	4	Fixed thermal, fixed magnetic	FDPV4070W	CFDPV4070W
80	4	Fixed thermal, fixed magnetic	FDPV4080W	CFDPV4080W
90	4	Fixed thermal, fixed magnetic	FDPV4090W	CFDPV4090W
100	4	Fixed thermal, fixed magnetic	FDPV4100W	CFDPV4100W

#### KD PV Frame



#### KD PV Frame, 350 A Maximum, 1000 Vdc, 5 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
125	4	Fixed thermal, fixed magnetic	KDPV4125W	CKDPV4125W
150	4	Fixed thermal, fixed magnetic	KDPV4150W	CKDPV4150W
175	4	Fixed thermal, fixed magnetic	KDPV4175W	CKDPV4175W
200	4	Fixed thermal, fixed magnetic	KDPV4200W	CKDPV4200W
225	4	Fixed thermal, fixed magnetic	KDPV4225W	CKDPV4225W
250	4	Fixed thermal, fixed magnetic	KDPV4250W	CKDPV4250W
300	4	Fixed thermal, fixed magnetic	KDPV4300W	CKDPV4300W
350	4	Fixed thermal, fixed magnetic	KDPV4350W	CKDPV4350W

#### LG PV Frame



#### LG PV Frame, 400 A Maximum, 1000 Vdc, 5 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
250	4	Fixed thermal, fixed magnetic	LGPV4250W	CLGPV4250W
300	4	Fixed thermal, fixed magnetic	LGPV4300W	CLGPV4300W
350	4	Fixed thermal, fixed magnetic	LGPV4350W	CLGPV4350W
400	4	Fixed thermal, fixed magnetic	LGPV4400W	CLGPV4400W

#### MDL PV Frame



#### MDL PV Frame, 600 A Maximum, 1000 Vdc, 7.5 kA ①

Current Rating Amperes	Poles in Series	Trip Unit	80% Rated Catalog Number	100% Rated Catalog Number
300	3	Fixed thermal, fixed magnetic	MDLPV3300W	CMDLPV3300W
350	3	Fixed thermal, fixed magnetic	MDLPV3350W	CMDLPV3350W
400	3	Fixed thermal, fixed magnetic	MDLPV3400W	CMDLPV3400W
450	3	Fixed thermal, fixed magnetic	MDLPV3450W	CMDLPV3450W
500	3	Fixed thermal, fixed magnetic	MDLPV3500W	CMDLPV3500W
600	3	Fixed thermal, fixed magnetic	MDLPV3600W	CMDLPV3600W

**Note**

① Terminals not included with frames.

## Accessories

### Available Accessories

- Auxiliary switch
- Shunt trip
- Electrical operator
- Alarm lockout
- Undervoltage release
- Terminals
- Lock-off devices
- End cap kits
- Rotary handle mechanisms
- Flexible shaft handle mechanisms

### Optional modifications

- Freeze testing

For complete internal and external accessories, see the accessory section of each frame.

### External Accessories

Description	Frame	Catalog Number
<b>Imperial Base Mounting Hardware</b>		
0.164-32 x 1.5-inch pan-head steel screws and lockwashers	FD PV	<b>BMH1</b>
0.250-20 x 1.5 inch pan-head steel screws and lockwashers	KD PV KD PVS	<b>BMH3</b>
—	JG PVS	N/A
—	LG PV	N/A
0.3125-18 x 1.25 inch filister-head steel screws and lockwashers and flat washers	MDL PV	<b>BMH5</b>
<b>Metric Base Mounting Hardware</b>		
M4-0.7 x 38 mm pan-head steel screws and lockwashers	FD PV	<b>BMH1M</b>
M6-0.7 x 38 mm pan-head steel screws and lockwashers	KD PV KD PVS	<b>BMH3M</b>
—	JG PVS	Included <sup>①</sup>
—	LG PV	Included <sup>①</sup>
M8-1.25 x 35 mm pan-head steel screws and lockwashers	MDL PV	<b>BMH5M</b>
<b>Interphase Barriers</b>		
	FD PV	<b>IPB1</b>
	KD PV KD PVS	<b>IPB3</b>
	JG PVS	<b>FJIPBK</b> <sup>②</sup>
	LG PV	<b>IPB3</b>
	MDL PV	<b>IPB4</b>
<b>Non-Padlockable Handle Block</b>		
	FD PV	<b>LKD1</b>
	KD PV KD PVS	<b>LKD3</b>
	JG PVS	N/A
	LG PV	N/A
	MDL PV	<b>LKD4</b>
<b>Padlockable Handle Lock Hasp</b> <sup>③</sup>		
	FD PV	<b>PLK1</b>
	KD PV KD PVS	<b>PLK3</b>
	JG PVS	<b>FJPHL</b>
	LG PV	<b>LPHL</b>
	MDL PV	<b>HLK4</b>

### Factory Modifications—Freeze Testing to –40°C <sup>④</sup>

Frame	Modification Code
FD PV	F01
JG PVS	F01
KD PV and KD PVS	F01
LG PV	F01
MDL PV	F01
Special calibration—contact Eaton for availability	

### Molded Case Switches

Eaton's DC molded case switches (MCS) are used in applications requiring a compact, high capacity disconnect. PVGuard 1000 Vdc

MCS are UL 489B listed and have automatic instantaneous current protection. These devices do not provide overload protection.

### Molded Case Switches

Maximum Continuous Ampere Rating at 50 °C	Interrupting Capacity Vdc	Poles in Series	Catalog Number
<b>1000 Vdc Maximum</b>			
100	3000	4	<b>FDPV4100KW</b>
200	5000	4	<b>KDPV4200KW</b>
250	5000	4	<b>KDPV4250KW</b>
350	5000	4	<b>KDPV4350KW</b>
400	5000	4	<b>LGPV4400KSW</b>
600	7500	3	<b>MDLPV3600KSW</b>

### Notes

- ① Base mounting hardware is included with a circuit breaker or a molded case switch (included with breaker). If required separately, order 66A2546G02.
- ② Individually priced.
- ③ Locks in ON and OFF position.
- ④ Add 20% to list price.

## Internal Accessories—Right Pole Mounting

	FD PV ①		JG PVS		KD PV KD PVS		LG PV		MDL PV	
	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number
<b>Auxiliary Switch</b>										
1A-1B	A06	A1X1PK	A1	AUX1A1BPK	A06	A1X3PK	A1	AUX1A1BPK	A06	A1X4PK
2A-2B	A13	A2X1RPK	A2	AUX2A2BPK	A13	A2X3PK	A2	AUX2A2BPK	A13	A2X4PK
<b>Alarm Switch</b>										
1 make/1 break	B06	A1L1RPK	B1	ALM1M1BJPKL	B06	A1L3RPK	B1	ALM1M1BJPK	B06	A1L4RPK
<b>Auxiliary and Alarm Combo</b>										
1A-1B, 1 make/1 break	C05	AAL1RPK	B2w	AUXALRMJPK	C05	AAL3RPK	B2	AUXALRMJPK	C05	AA114RPK

## Internal Accessories—Left Pole Mounting

	FD PV ①		JG PVS		KD PV KD PVS		LG PV		MDL PV	
	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number
<b>Shunt Trip</b>										
12 Vdc	S02	SNT1LP03K	S4	SNT012CPK	S42	SNT3P04K	S4	SNT012CPK	S02	SNT4LP03K
24 Vdc	S02	SNT1LP03K	S6	SNT024CPK	S42	SNT3P04K	S6	SNT024CPK	S02	SNT4LP03K
48 Vdc	S06	SNT1LP08K	S7	SNT4860CPK	S50	SNT3P06K	S7	SNT4860CPK	S86	SNT4LP23K
60 Vdc	S06	SNT1LP08K	S7	SNT4860CPK	S50	SNT3P06K	S7	SNT4860CPK	S86	SNT4LP23K
125 Vdc	S10	SNT1LP12K	S5	SNT125DPK	S10	SNT3P11K	S2	SNT120CPK	S42	SNT4LP26K
250 Vdc	S14	SNT1LP18K	—	—	S14	SNT3P14K	—	—	S14	SNT4LP14K
120 Vac	S10	SNT1LP12K	S2	SNT120CPK	S10	SNT3P11K	S2	SNT120CPK	S10	SNT4LP11K
<b>Undervoltage Release</b>										
12 Vdc	U30	UVH1LP20K	—	—	T02	UVH3LP20K	U1	UVR012DPK	T02	UVH4LP20K
24 Vdc	U34	UVH1LP21K	U2	UVR024CPK	T02	UVH3LP21K	U2	UVR024DPK	T06	UVH4LP21K
48 Vdc	U38	UVH1LP22K	U4	UVR048DPK	T10	UVH3LP22K	U4	UVR048DPK	T10	UVH4LP22K
60 Vdc	—	—	U4	UVR048DPK	—	—	—	—	—	—
125 Vdc	U42	UVH1LP26K	U6	UVR125DPK	T14	UVH3LP26K	U6	UVR125DPK	T14	UVH4LP26K
250 Vdc	U46	UVH1LP28K	U8	UVR250DPK	T18	UVH3LP28K	U8	UVR250DPK	T18	UVH4LP28K
120 Vac	U14	UVH1LP08K	U5	UVR120APK	U18	UVH3LP08K	U5	UVR120APK	U18	UVH4LP08K

**Notes**

① Underwriters Laboratories requires that internal accessories for the FD PV be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

One accessory can be mounted per pole, per breaker.

## PVGuard Solar Circuit Breaker Terminal Offering

Breaker Frame	Maximum Breaker Ampacity	Terminal Body Material	Wire Type	AWG Wire Range/ Number of Conductors	Metric Wire Range mm <sup>2</sup>	Number of Terminals Included	Standard Terminal Catalog Number	Comments
FD PV	50	Steel	Cu/Al	14–4 (1)	2.5–25 (1)	3	<b>3TA50FB</b>	
	100	Aluminum	Cu/Al	6–300 kcmil (1)	16–150 (1)	3	<b>3TA225FDK3</b>	Includes 3P terminal cover
	100	Aluminum	Cu/Al	6–300 kcmil (1)	16–150 (1)	3	<b>3TA225FDK</b>	Includes 3P terminal cover Replacement use only
	100	Copper	Cu	4–4/0 (1)	25–95 (1)	3	<b>3T225FD</b>	
JG PVS	250	Aluminum	Cu/Al	#8–350 kcmil (1)	—	—	<b>TA250FJ</b>	
	250	Aluminum	Cu/Al	(2) 2/0–(2) 4/0	—	①	<b>3TA251FJK1</b>	
	250	Aluminum	Cu/Al	(2) 2/0–(2) 4/0	—	②	<b>3TA251FJK2</b>	
	250	Copper	Cu	#4–350 kcmil (1)	—	—	<b>T250FJ</b>	
KD PV KD PVS	225	Aluminum	Cu/Al	3–350 kcmil (1)	35–185 (1)	1	<b>TA300K</b>	
	250	Aluminum	Cu/Al	250–500 kcmil (1)	120–240 (1)	1	<b>TA350K</b>	
	250	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (1)	4	<b>4TA400K</b>	Contains interphase barriers
	250	Aluminum	Cu/Al	2/0–250 kcmil (2) or 2/0–500 kcmil (1)	70–240 (2)	4	<b>4TA401K</b>	
	300	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (2)	4	<b>4TA401K</b>	Contains interphase barriers
	350	Aluminum	Cu/Al	3/0–250 kcmil (2)	95–120 (2)	4	<b>4TA401K</b>	Contains interphase barriers
	225	Copper	Cu	3–350 kcmil (1)	35–185 (1)	1	<b>T300K</b>	
	250	Copper	Cu	250–500 kcmil (1)	120–240 (1)	1	<b>T350K</b>	
	250	Copper	Cu	3/0–250 kcmil (2)	95–120 (1)	4	<b>4T400K</b>	Contains interphase barriers
	300	Copper	Cu	3/0–250 kcmil (2)	95–120 (2)	4	<b>4TA401K</b>	Contains interphase barriers
LG PV	400	Aluminum	Cu/Al	2–500 kcmil (2)	35–240 (2)	4	<b>4TA632LK</b>	Includes 4P terminal cover
	250	Copper	Cu	2–500 kcmil (1)	35–240 (1)	1	<b>T350LK</b>	
	400	Copper	Cu	2–500 kcmil (2)	35–240 (2)	4	<b>4T632LK</b>	Includes 4P terminal cover
MDL PV	300	Aluminum	Cu/Al	1–500 kcmil (2)	—	1	<b>TA700MA1</b>	
	600	Aluminum	Cu/Al	3/0–400 kcmil (3)	—	1	<b>TA800MA2</b>	

## Endcap Kits

Breaker Frame	Number of Poles	Thread Type	Thread Size	Catalog Number
FD PV	4	Imperial	10–32	<b>KPEK14</b>
	4	Metric	M–5	<b>KPEKM14</b>
JG PVS	3	Imperial	—	<b>FJ3RTDK</b>
	3	Metric	—	<b>FJ3RTWK</b>
KD PV	4	Imperial	0.312–18	<b>KPEK34</b>
	4	Metric	M–8	<b>KPEKM34</b>
KD PVS	3	Imperial	—	<b>KPEK3</b>
	3	Metric	—	<b>KPEKM3</b>
LG PV	4	Imperial	—	<b>N/A</b>
	4	Metric	M-10	<b>L4RTWK</b>
MDL PV	3	Imperial	—	—
	3	Metric	—	—

## Notes

- ① Three terminals with terminal shield as a kit.  
 ② Three terminals with two interphase barriers as a kit.

**Jumpers**

Jumpers must be ordered separately. Priced individually.

2

**FD PV Frame**

Description	Maximum Amperes	Catalog Number
Single copper jumper	60	DC1F060 <sup>①</sup>
	100	DC1F100 <sup>①</sup>
	125	DC1F125 <sup>①</sup>
	225	DC1F225 <sup>①</sup>
Package of 2 aluminum jumpers	100	DC2FD100A
Package of 3 aluminum jumpers	100	DC3FD100A

**JG PVM, JG PVMD Frames**

Description	Maximum Amperes	Catalog Number
Single aluminum jumper	250	DC1JG250A <sup>①</sup>
Package of 2 aluminum jumpers	250	DC2JG250A <sup>①</sup>
Package of 20 aluminum jumpers	250	DC20JG250A <sup>①</sup>

**KD PV, KD PVM, KD PVMD Frames**

Description	Maximum Amperes	Catalog Number
Single copper jumper	400	DC1K400 <sup>①</sup>
Package of 2 aluminum jumpers	400	DC2KD400A <sup>①</sup>
Package of 3 aluminum jumpers	400	DC3KD400A <sup>①</sup>

**LG PV Frame**

Description	Maximum Amperes	Catalog Number
Package of 2 aluminum jumpers	400	DC2LG400A
Package of 3 aluminum jumpers	400	DC3LG400A
Package of 30 aluminum jumpers	400	DC30LG400A

**Note**

<sup>①</sup> Not UL Listed; Non UL listed jumpers used in a UL application may need to be qualified by the OEM in their assembly. This may take place with UL or another certified testing agency.

**Technical Data and Specifications**

- Thermal-magnetic circuit breakers
- Designed to meet UL 489B for solar photovoltaic circuit protection
- 100% rated of the continuous current rating
- 50 °C calibrated
- Can be applied in grounded, ungrounded or bi-polar systems
- Ability to open on signal from DC arc or ground fault detector
- Two PVGard lineups
  - UL File EE350638, Category Control Number DIUR
  - 600 Vdc per-pole breaker and switch
    - Each pole rated 600 Vdc
  - 1000 Vdc poles-in-series breaker and switch
    - Requires poles in series connection

**Quick Reference PVGard Solar Circuit Breakers  
600 Vdc Per-Pole****PVGard 600 Vdc Current Ratings by Frame  
UL 489B Interrupting Capacity (kA) 600 Vdc Per-Pole**

Circuit Breaker Type	Minimum Amperes	Maximum Amperes	kA Rating
JG PVS	90	250	1.2
KD PVS	100	400	3

**Quick Reference PVGard Solar Circuit Breakers  
1000 Vdc Poles-in-Series****PVGard 1000 Vdc Current Ratings by Frame  
UL 489B Interrupting Capacity (kA) 1000 Vdc**

Circuit Breaker Type	Minimum Amperes	Maximum Amperes	kA Rating	Poles in Series
FD PV	30	100	3	4
KD PV	125	350	5	4
LG PV	250	400	5	4
MDL PV	300	600	7.5	3

# 2.5

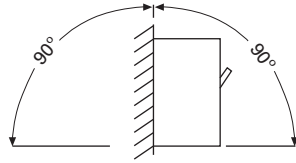
## Molded Case Circuit Breakers

### Specialty Breakers

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#### PVGard 600 Vdc Per-Pole Solar PV Circuit Breakers (100% and 80% Rated Frames)

	JG PVS	KD PVS
Number of 600 Vdc circuits	3	3
Maximum voltage rating	600 Vdc	600 Vdc
Ampere range	90–250 A	100–400 A
Interrupting capacity at 600 Vdc	1.2 kA	3 kA
Time constant	1 ms	1 ms
Trip unit type	Thermal-magnetic	Thermal-magnetic
Rated impulse withstand voltage		
Main conducting paths	8 kV	8 kV
Auxiliary circuits	4 kV	4 kV
Endurance		
Mechanical operations	10,000	6000
Electrical operations	400	400
Maximum switching frequency	240 per hour	240 per hour
Third-party certification	UL 489B	UL 489B
Environment		
Design ambient temperature	50 °C	50 °C
Maximum current at 60 °C, as % of rated current	93%	93%
Maximum current at 70 °C, as % of rated current	85%	85%
Operating temperature range	–20 °C to +50 °C	–20 °C to +50 °C
Storage temperature range	–20 °C to +70 °C	–20 °C to +70 °C
Suitable for freeze temperatures to –40 °C	Option	Option
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing
Suitable for reverse-feed applications	Yes	Yes
Mounting—permissible mounting position		



#### Connection diagrams

##### Terminations

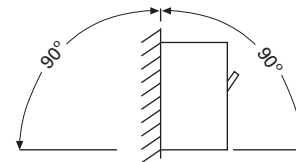
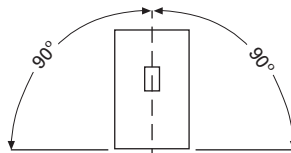
Al/Cu wire	TA250FJ: (1) #8–350 kcmil	TA300K: (1) #3–350 kcmil
	3TA251FJK1: (2) 2/0–(2) 4/0 <sup>①</sup>	TA350K: (1) 250–500 kcmil
	3TA251FJK2: (2) 2/0–(2) 4/0 <sup>②</sup>	TA403K: (2) 1/0–400 kcmil
Cu wire	T250FJ: (1) #4–350 kcmil	3TA402K: (1) 500–750 kcmil <sup>③</sup>
	T300K: (1) #3–350 kcmil	
Dimensions in inches (mm)		
Height	7.00 (177.8)	10.13 (257.3)
Width	4.13 (104.9)	5.50 (139.7)
Depth	3.57 (90.7)	4.10 (104.1)
Weight in lbs	6.6	11.42

#### Notes

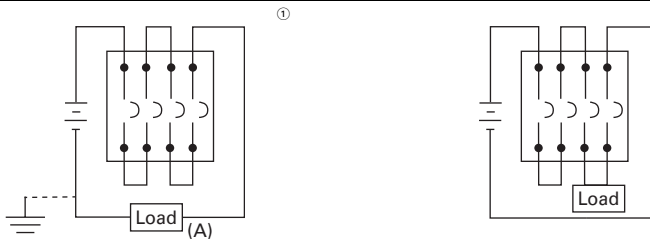
- ① Three terminals with terminal shield as a kit.
- ② Three terminals with two interphase barriers as a kit.
- ③ Not UL 489B recognized size for maximum of 400 A breaker.

### PVGard 1000 Vdc Solar PV Circuit Breakers (100% and 80% Rated Frames)

	FD PV	KD PV	LG PV	MDL PV
Number of poles	4	4	4	3
Maximum voltage rating	1000 Vdc	1000 Vdc	1000 Vdc	1000 Vdc
Maximum current rating	100 A	350 A	400 A	600 A
Interrupting capacity at 1000 Vdc	3 kA	5 kA	5 kA	7.5 kA
Time constant	1 ms	1 ms	1 ms	1 ms
Ampere range	15–100 A	125–350 A	250–400 A	300–600 A
Trip unit type	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Rated impulse withstand voltage				
Main conducting paths	8 kV	8 kV	8 kV	8 kV
Auxiliary circuits	4 kV	4 kV	4 kV	4 kV
Endurance				
Mechanical operations	10,000	10,000	8000	8000
Electrical operations	1000	400	400	400
Maximum switching frequency	300 per hour	240 per hour	240 per hour	240 per hour
Third-party certification	UL 489B	UL 489B	UL 489B	UL 489B
Environment				
Design ambient temperature	50 °C	50 °C	50 °C	50 °C
Maximum current at 60 °C, as % of rated current	91%	91%	93%	93%
Maximum current at 70 °C, as % of rated current	88%	88%	88%	88%
Operating temperature range	–20 °C to +50 °C	–20 °C to +50 °C	–20 °C to +50 °C	–20 °C to +50 °C
Storage temperature range	–20 °C to +70 °C	–20 °C to +70 °C	–20 °C to +70 °C	–20 °C to +70 °C
Suitable for freeze temperatures to –40 °C	Option	Option	Option	Option
Relative humidity	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing	0 to 95% noncondensing
Suitable for reverse-feed applications	Yes	Yes	Yes	Yes
Mounting—permissible mounting position				



Connection diagrams



#### Terminations

Al/Cu wire	#6–300 kcmil	(2) 3/0–250 kcmil	(2) #2–500 kcmil	(3) 3/0–400 kcmil
Cu wire	#4–4/0	(2) 3/0–250 kcmil	(2) #2–500 kcmil	(3) 3/0–300 kcmil
Dimensions in inches (mm)				
Height	6.00 (152.4)	10.13 (257.3)	10.13 (257.3)	16.00 (406.4)
Width	5.50 (139.7)	7.22 (183.4)	7.22 (183.4)	8.25 (209.5)
Depth	3.38 (85.9)	4.09 (103.9)	4.09 (103.9)	4.06 (103.1)
Weight in lbs	6	20	20	29

#### Notes

- ① Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.
- ② Suitable for use on ungrounded systems only.



**Dimensions**

Approximate Dimensions in Inches (mm)

2

**PVGard Solar Circuit Breakers—600 Vdc Per-Pole**

Frame	Number of Circuits in a Frame	Width	Height	Depth
JG PVS	3	4.13 (104.9)	7.00 (177.8)	3.44 (87.4)
KD PVS	3	5.49 (139.4)	10.13 (257.2)	4.31 (109.6)

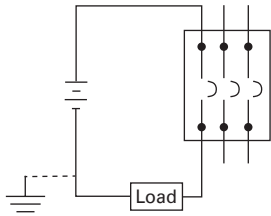
**PVGard Solar Circuit Breakers—1000 Vdc Poles-in-Series**

Frame	Number of Poles	Width	Height	Depth
FD PV	4	5.50 (139.7)	6.00 (152.4)	3.38 (86.0)
KD PV	4	7.22 (183.4)	10.13 (257.3)	4.09 (103.9)
LG PV	4	7.22 (183.4)	10.13 (257.3)	4.09 (103.9)
MDL PV	3	8.25 (209.6)	16.00 (406.4)	4.06 (103.1)

**Wiring Diagrams**

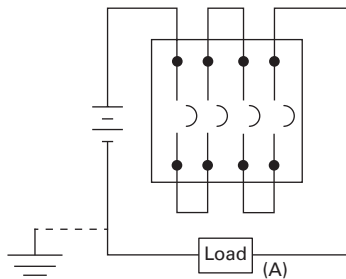
**Series Connection Diagrams for DC Application ①②**

**JF PVS, KD PVS—600 Vdc Per-Pole**

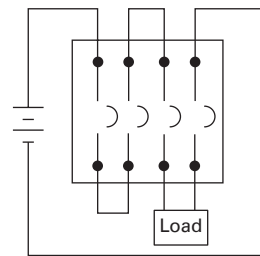


Suitable for grounded or ungrounded systems.  
Suitable for quantity (3) 600 Vdc circuits.

**FD PV, KD PV, LG PV—1000 Vdc Maximum—Four Poles-in-Series**

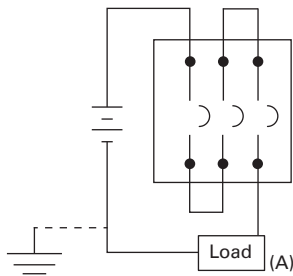


Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.

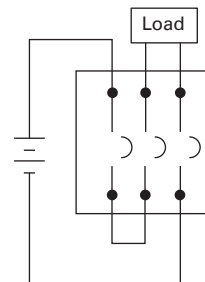


Suitable for use on ungrounded systems only.

**MDL PV—1000 Vdc Maximum—Three Poles in Series**



Suitable for use on ungrounded systems, or grounded systems that have one end of load (A) connected to grounded terminal, opposite poles in series connection.



Suitable for use on ungrounded systems only.

**Notes**

- ① Poles in series connection is customer supplied. Use rated cable per NEC.
- ② For grounded systems, all poles in series must be connected on non-grounded terminal, with load connected to grounded terminal.

#### E<sup>2</sup> Mining Service Breakers

2



### E<sup>2</sup> Mining Service Breakers

#### Product Overview

State-of-the-art E<sup>2</sup> mining service breakers incorporate the rigid specifications and testing procedures developed by a focus group led by engineers from several large coal companies and Eaton design engineers. Additionally, the performance of these breakers was proven and verified during hundreds of hours of field testing in harsh mine environments.

E<sup>2</sup> mining breakers are available in 600 Vac, I000Y/577 Vac and 1200 Vac. Interchangeable trip units can be used on either 600 or 1000 Vac frames.

The E<sup>2</sup> mining breaker family is designed especially for trailing cable application per MSHA 30 CFR 75. Field interchangeable electronic rms sensing trip units are available from 150 to 2000 amperes with instantaneous pickup settings conforming to the code of Federal Regulations 30 CFR 75.601-2. Electromechanical trip units are also available with a wide range of magnetic pickup ranges.

E<sup>2</sup> electronic trip units are the first to provide the mining industry with true rms sensing, made possible by the custom ASIC microprocessor in each electronic trip unit.

E<sup>2</sup> breakers are designed to be physically and electrically interchangeable with Classic Mining Service Breakers and supersede Series C<sup>®</sup> Mining Service Breakers. The table to the right outlines direct replacements.

### Contents

#### Description

	<i>Page</i>
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PVGard Solar Circuit Breakers—600 Vdc Per-Pole and 1000 Vdc Poles-in-Series . . . . .	<b>V4-T2-457</b>
E <sup>2</sup> Mining Service Breakers	
Catalog Number Selection . . . . .	<b>V4-T2-472</b>
Product Selection . . . . .	<b>V4-T2-476</b>
Accessories . . . . .	<b>V4-T2-487</b>
Dimensions . . . . .	<b>V4-T2-490</b>

#### 600 Vac Mining Breaker Replacement Chart

Classic	Series C	E <sup>2</sup>
FBM	FDBM	E <sup>2</sup> F
HFBM	FDM	E <sup>2</sup> F
	HFDM (mag. only)	E <sup>2</sup> F
—	JDM	E <sup>2</sup> J
KAM	KDM	E <sup>2</sup> K
KAMH	KDM	E <sup>2</sup> K
LAM	LDM	E <sup>2</sup> L
LAMH	LDM	E <sup>2</sup> L
LCM	LDM	E <sup>2</sup> L
LCMH	LDM	E <sup>2</sup> L
MAM	—	E <sup>2</sup> M
MAMH	—	E <sup>2</sup> M
MCM	—	E <sup>2</sup> M
MCMH	—	E <sup>2</sup> M
NBM	—	E <sup>2</sup> N
NBMH	—	E <sup>2</sup> N
NCM	—	E <sup>2</sup> N
NCMH	—	E <sup>2</sup> N

#### 1000 Vac Mining Breaker Replacement Chart

Classic	Series C	E <sup>2</sup> M
HFM	—	E <sup>2</sup> FM
—	JDCM	E <sup>2</sup> JM
HKAM	KDCM	E <sup>2</sup> KM
HLAM	LDCM	E <sup>2</sup> LM
HLCM	LDCM	E <sup>2</sup> LM
HMAM	—	E <sup>2</sup> MM
HMCM	—	E <sup>2</sup> MM
HNBM	—	E <sup>2</sup> NM
HNBMH	—	E <sup>2</sup> NM
HNCM	—	E <sup>2</sup> NM
HLCLM	—	E <sup>2</sup> NM
HPBM	—	E <sup>2</sup> RM ①

#### Additional Information on Mining Breakers

Source	Description
TD01217001E	E <sup>2</sup> Mining Circuit Breaker Dimensional Data
BR01217001E	E <sup>2</sup> Mining Circuit Breaker Brochure
TC01217001E	E <sup>2</sup> Mining Circuit Breaker Time Current Curves
www.eaton.com/mining	Mining and Metals

#### Note

① E<sup>2</sup>R/E<sup>2</sup>RM is a new frame physically different than the HPBM. See DS29-170MS.

Eaton's mining service circuit breakers provide short-circuit protection as specified in the code of Federal Regulations 30 CFR 75.601-2.

E<sup>2</sup> 225/400 A K frame and 400/600 A L frame electronic trip units feature specifically designed instantaneous pickup settings to conform exactly with the code of Federal Regulations 30 CFR 75.601-2. Electromechanical trip units are also available with a wide range of magnetic pickup ranges.

The tables below list the conductor size maximum allowable circuit breaker instantaneous setting and the E<sup>2</sup> breaker that meets that setting.

### Interrupting Capacity Rating

Circuit Breaker Type	Interrupting Capacity (Symmetrical kA)					Vdc <sup>①</sup> 250
	Vac (50/60 Hz) 240	480	600	1000Y/577	1200	
E <sup>2</sup> F	65	35	18	—	—	10
E <sup>2</sup> J	65	35	18	—	—	10
E <sup>2</sup> K	65	35	25	—	—	10
E <sup>2</sup> LME	100	65	35	—	—	42
E <sup>2</sup> L	65	35	25	—	—	22
E <sup>2</sup> M	65	35	25	—	—	22
E <sup>2</sup> N	65	50	25	—	—	—
E <sup>2</sup> R	125	65	50	—	—	—
E <sup>2</sup> FM	65	25	18	10	—	10
E <sup>2</sup> JM	65	35	18	10	—	22
E <sup>2</sup> KM	65	35	25	14	—	10
E <sup>2</sup> LMZ	100	65	35	10	—	42
E <sup>2</sup> LM	—	35	25	18	—	22
E <sup>2</sup> MM	—	35	25	18	—	22
E <sup>2</sup> NM <sup>②</sup>	—	50	25	25	—	—
E <sup>2</sup> RM	—	65	50	25	—	—
E <sup>2</sup> KW	—	—	—	10	10	—
E <sup>2</sup> LW	—	—	—	10	10	—
E <sup>2</sup> MW	—	—	—	12	12	—

### Trailing Cable Setting Per 30 CFR 75

Conductor Size	Maximum Breaker Instantaneous Setting	Maximum Ampere 75 °C Insulated Conductor	E <sup>2</sup> /E <sup>2</sup> M/E <sup>2</sup> W Instantaneous Only	Setting
14	50	15	E <sup>2</sup> K 150 A	A
12	75	20	E <sup>2</sup> K 150 A	B
10	150	30	E <sup>2</sup> K 150 A	C
8	200	50	E <sup>2</sup> K 225 A	A
6	300	65	E <sup>2</sup> K 225 A	B
4	500	85	E <sup>2</sup> K 225 A / E2L 400 A	C/A
3	600	100	E <sup>2</sup> K 225 A / E2L 400 A	D/B
2	800	115	E <sup>2</sup> K 225 A / E2L 400 A	E/C
1	1000	130	E <sup>2</sup> K 225 A / E2L 400 A	F/D
1/0	1250	150	E <sup>2</sup> K 225 A / E2L 400 A	G/E
2/0	1500	175	E <sup>2</sup> K 225 A / E2L 400 A	H/F
3/0	2000	200	E <sup>2</sup> L 400 A	G
4/0	2500	230	E <sup>2</sup> L 400 A	H
250	2500	255	E <sup>2</sup> L 400 A	H
300	2500	285	E <sup>2</sup> L 400 A	H
350	2500	310	E <sup>2</sup> L 400 A	H
400	2500	335	E <sup>2</sup> L 400 A	H
500	2500	380	E <sup>2</sup> L 400 A	H

### Auxiliary Switch Electrical Rating Data

Maximum Voltage	Frequency	Maximum Current Amperes
600	50/60 Hz	6.0
125	DC	0.5 (non-inductive load)
250	DC	0.25 (non-inductive load)

### Alarm (Signal/Lockout Switch) Electrical Rating Data

Maximum Voltage	Frequency	Maximum Current Amperes
600	50/60 Hz	6.0
125	DC	0.5 (non-inductive load)
250	DC	0.25 (non-inductive load)

#### Notes

- ① Two poles in series. DC rating applies to breakers with thermal-magnetic trip unit. Breakers with electronic trip units are not DC rated.
- ② Series rated for application with Eaton's E<sup>2</sup>KM and E<sup>2</sup>LM breakers.

# 2.5

## Molded Case Circuit Breakers

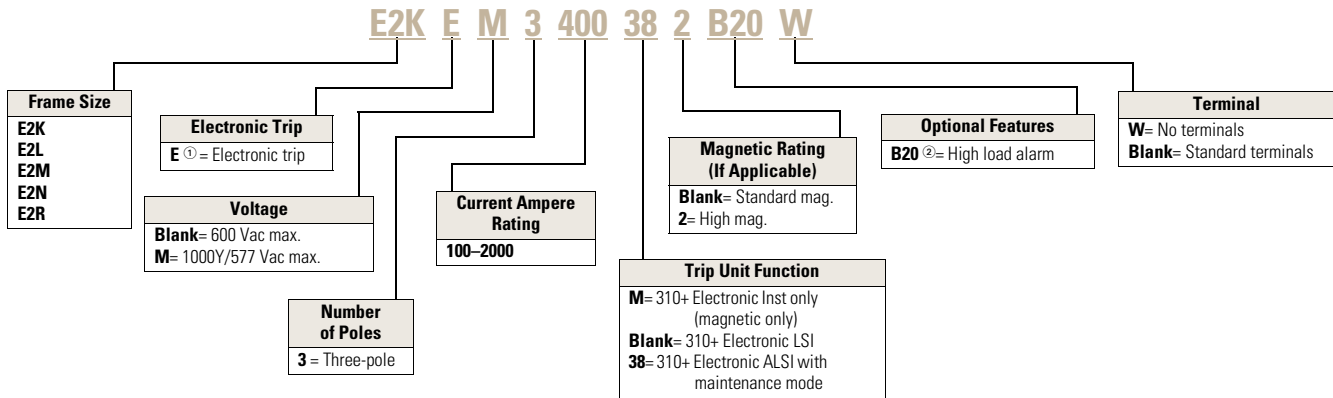
### Specialty Breakers

#### Catalog Number Selection

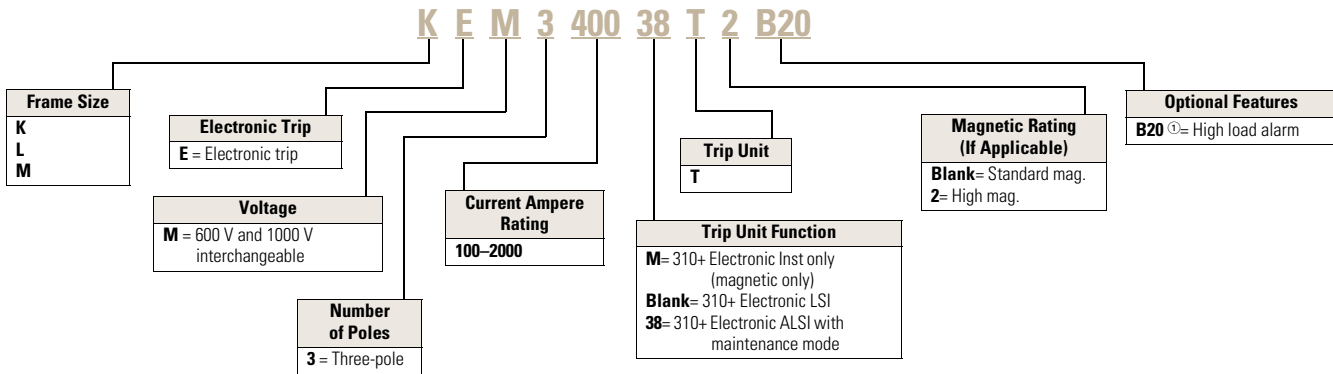
This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

2

#### E<sup>2</sup> Mining Service Breaker with 310+ Electronic Trip Unit Technology



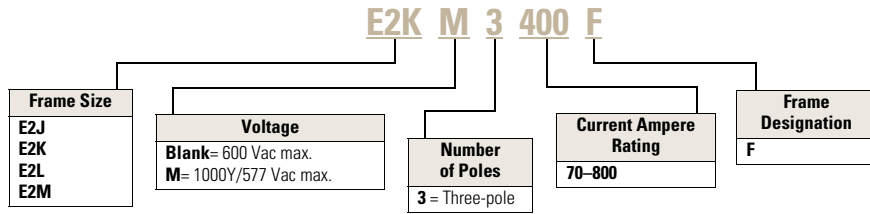
#### E<sup>2</sup> Mining Service 310+ Electronic Trip Unit



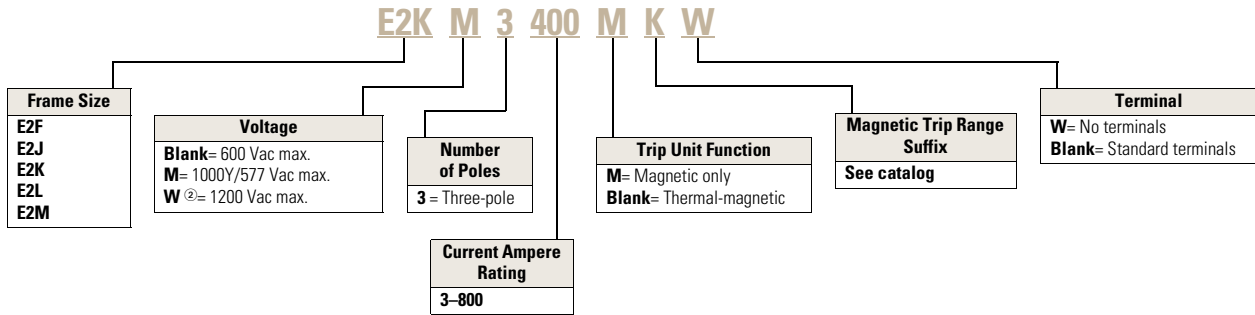
#### Notes

- ① All N- and R-Frame breakers equipped with 310+ Electronic Trip Unit. No "E" suffix required.
- ② Not available with instantaneous only.

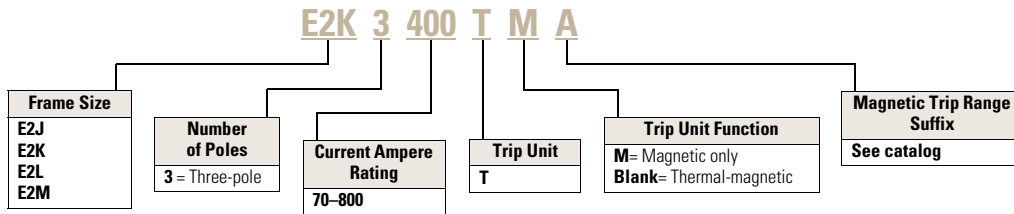
**E<sup>2</sup> Mining Service Breaker Frame Only** ①



**E<sup>2</sup> Mining Service Breaker with Thermal-Magnetic Trip Unit** ①



**E<sup>2</sup> Mining Service Thermal-Magnetic Trip Unit** ①



**Notes**

- ① Does not apply to E2LME/LMZ.
- ② Only available in K-, L- and M-Frames.

## Undervoltage Release Mechanism Electrical Rating Data

2

Breaker Type	Supply Voltage	Dropout Voltage		Pickup Voltage Maximum	VA
		Minimum	Maximum		
E <sup>2</sup> F/E <sup>2</sup> FM	110 Vac	44.5	77	93.5	1.3
	120 Vac				1.5
	127 Vac				1.7
	110 Vdc				1.5
	120 Vdc				1.7
	125 Vdc				1.9
E <sup>2</sup> J/E <sup>2</sup> JM	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> LME/E <sup>2</sup> LMZ	110 Vac	44.5	77	93.5	0.96
	120 Vac				1.13
	127 Vac				1.25
	110 Vdc	43.8	77	93.5	0.94
	120 Vdc				1.12
	125 Vdc				1.21
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW/E <sup>2</sup> M/ E <sup>2</sup> MM/E <sup>2</sup> MW	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> N/E <sup>2</sup> NM	110 Vac	44.5	77	93.5	1.8
	120 Vac				2.1
	127 Vac				2.4
	110 Vdc				1.6
	120 Vdc				1.9
	125 Vdc				2.2
E <sup>2</sup> R/E <sup>2</sup> RM	110 Vac	44.5	77	93.5	3.3
	120 Vac				3.6
	127 Vac				3.8
	110 Vdc	43.8	77	93.5	3.3
	120 Vdc				3.6
	125 Vdc				3.8

## Shunt Trip Electrical Rating Data

Breaker Type	Supply Voltage	Operating Voltage		
		Minimum	VA	
E <sup>2</sup> F/E <sup>2</sup> FM	48 Vac	33.6	92	
	60 Vac		140	
	110 Vac		480	
	120 Vac		570	
	127 Vac		640	
	208 Vac	146	180	
	220 Vac		200	
	230 Vac		240	
	48 Vdc		33.6	100
	60 Vdc			160
	110 Vdc	77		55
	120 Vdc			66
	125 Vdc			71
	E <sup>2</sup> J/E <sup>2</sup> JM	110 Vac	60.5	66
		120 Vac		84
127 Vac		102		
110 Vdc		77	112	
120 Vdc			138	
125 Vdc	150			
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	110 Vac	60	100	
	120 Vac		120	
	127 Vac		140	
	110 Vdc	77	110	
	120 Vdc		130	
	125 Vdc		140	
	24 Vac		41	
	48 Vac	18	139	
	60 Vac		210	
E <sup>2</sup> LME/E <sup>2</sup> LMZ	110 Vac	60	83	
	120 Vac		92	
	127 Vac		117	
	24 Vdc		120	
	48 Vdc	18	475	
	60 Vdc		720	
	110 Vdc		82	99
	120 Vdc	120		
	125 Vdc	121		

Breaker Type	Supply Voltage	Operating Voltage	
		Minimum	VA
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW/E <sup>2</sup> M/ E <sup>2</sup> MM/E <sup>2</sup> MW	48 Vac	34	830
	60 Vac		1280
	110 Vac		100
	120 Vac		120
	127 Vac		140
	48 Vdc	34	710
	60 Vdc		1105
	110 Vdc		77
	120 Vdc	130	
	125 Vdc	140	
E <sup>2</sup> N/E <sup>2</sup> NM	110 Vac	60	100
	120 Vac		120
	127 Vac		140
	110 Vdc	77	110
	120 Vdc		130
125 Vdc	140		
E <sup>2</sup> R/E <sup>2</sup> RM	110 Vac	60.5	330
	120 Vac		390
	127 Vac		430
	110 Vdc	77	370
	120 Vdc		440
125 Vdc	480		



## Product Selection

3 A–150 A

E<sup>2</sup>F/E<sup>2</sup>FM

2

E<sup>2</sup>F/E<sup>2</sup>FMSealed Breakers with Non-Interchangeable Trip Unit—Include Line/Load Terminals, Non-Electronic Trip Units <sup>①</sup>

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole	1000Y/ 577 Vac Maximum 250 Vdc 10 kA at 1000 Vac Three-Pole
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>Thermal-Magnetic</b>				
15	—	—	E2F3015	—
20	—	—	E2F3020	E2FM3020
25	—	—	E2F3025	E2FM3025
30	—	—	E2F3030	—
35	—	—	E2F3035	—
40	—	—	E2F3040	E2FM3040
45	—	—	E2F3045	—
50	—	—	E2F3050	E2FM3050
60	—	—	E2F3060	E2FM3060
70	—	—	E2F3070	E2FM3070
80	—	—	E2F3080	E2FM3080
90	—	—	E2F3090	E2FM3090
100	—	—	E2F3100	E2FM3100
125	—	—	E2F3125	E2FM3125
150	—	—	E2F3150	E2FM3150
<b>Magnetic Only</b>				
3	9–30	—	E2F003AM	—
7	21–70	—	E2F007CM	—
15	45–150	—	E2F015EM	—
30	90–300	—	E2F030HM	—
	50–150	—	E2F030EM	—
50	150–500	—	E2F050KM	E2FM050KM
	66–190	—	E2F050YM	E2FM050YM
70	210–700	—	E2F070MM	E2FM070MM
100	150–500	—	E2F100KM	E2FM100KM
	300–1000	—	E2F100RM	E2FM100RM
150	450–1500	—	E2F150TM	E2FM150TM
	750–2500	—	E2F150UM	E2FM150UM

**Note**<sup>①</sup> For two-pole application, use outer poles.

70 A–250 A

E<sup>2</sup>J/E<sup>2</sup>JME<sup>2</sup>J/E<sup>2</sup>JM

## Circuit Breakers with Interchangeable Non-Electronic Trip Units

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ①	1000Y/ 577 Vac Maximum 250 Vdc 10 kA at 1000 Vac Three-Pole ②
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>Thermal-Magnetic</b>				
70	300–650	E2J3070T	E2J3070W	E2JM3070W
90	450–900	E2J3090T	E2J3090W	E2JM3090W
100	500–1000	E2J3100T	E2J3100W	E2JM3100W
125	625–1250	E2J3125T	E2J3125W	E2JM3125W
150	750–1500	E2J3150T	E2J3150W	E2JM3150W
175	875–1750	E2J3175T	E2J3175W	E2JM3175W
200	1000–2000	E2J3200T	E2J3200W	E2JM3200W
225	300–650	E2J3225TA	E2J3225AW	E2JM3225AW
	500–1000	E2J3225TD	E2J3225DW	E2JM3225DW
	1125–2250	E2J3225T	E2J3225W	E2JM3225W
250	1250–2500	E2J3250T	E2J3250W	E2JM3250W
<b>Magnetic Only</b>				
250	300–650	E2J3250TMA	E2J3250MAW	E2JM3250MAW
	450–900	E2J3250TMC	E2J3250MCW	E2JM250MCW
	500–1000	E2J3250TMD	E2J3250MDW	E2JM3250MDW
	625–1250	E2J3250TMF	E2J3250MFW	E2JM3250MFW
	750–1500	E2J3250TMG	E2J3250MGW	E2JM3250MGW
	875–1750	E2J3250TMJ	E2J3250MJW	E2JM3250MJW
	1000–2000	E2J3250TMK	E2J3250MKW	E2JM3250MKW
	1125–2250	E2J3250TML	E2J3250MLW	E2JM3250MLW
	1250–2500	E2J3250TM	E2J3250MW	E2JM3250MW

**Notes**

- ① Frame only: **E2J3250F**.  
 ② Frame only: **E2JM3250F**.

100 A–400 A

E<sup>2</sup>K/E<sup>2</sup>KM/E<sup>2</sup>KW

2

E<sup>2</sup>K/E<sup>2</sup>KM



#### Circuit Breakers with Interchangeable Non-Electronic Trip Units

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ① Complete Breaker Catalog Number	1000V/ 577 Vac Maximum 250 Vdc 14 kA at 1000 Vac Three-Pole ② Complete Breaker Catalog Number	1200 Vac Maximum 10 kA at 1200 Vac Three-Pole ③④ Complete Breaker Catalog Number
<b>Thermal-Magnetic</b>					
100	500–1000	E2K3100T	E2K3100W	E2KM3100W	E2KW3100W
125	625–1250	E2K3125T	E2K3125W	E2KM3125W	E2KW3125W
150	750–1500	E2K3150T	E2K3150W	E2KM3150W	E2KW3150W
175	875–1750	E2K3175T	E2K3175W	E2KM3175W	E2KW3175W
200	1000–2000	E2K3200T	E2K3200W	E2KM3200W	E2KW3200W
225	300–650	E2K3225TA	E2K3225AW	E2KM3225AW	E2KW3225AW
	500–1000	E2K3225TD	E2K3225DW	E2KM3225DW	E2KW3225DW
	1125–2250	E2K3225T	E2K3225W	E2KM3225W	E2KW3225W
250	1250–2500	E2K3250T	E2K3250W	E2KM3250W	E2KW3250W
300	1500–3000	E2K3300T	E2K3300W	E2KM3300W	E2KW3300W
320	1600–3200	—	—	—	E2KW3320W
350	1750–3500	E2K3350T	E2K3350W	E2KM3350W	E2KW3350W
400	2000–4000	E2K3400T	E2K3400W	E2KM3400W	—
<b>Magnetic Only</b>					
400	300–650	E2K3400TMA	E2K3400MAW	E2KM3250MAW	E2KW3250MAW
	500–1000	E2K3400TMD	E2K3400MDW	E2KM3400MDW	E2KW3350MDW
	625–1250	E2K3400TMF	E2K3400MFW	E2KM3400MFW	E2KW3350MFW
	750–1500	E2K3400TMG	E2K3400MGW	E2KM3400MGW	E2KW3350MGW
	875–1750	E2K3400TMJ	E2K3400MJW	E2KM3400MJW	E2KW3350MJW
	1000–2000	E2K3400TMK	E2K3400MKW	E2KM3400MKW	E2KW3350MKW
	1125–2250	E2K3400TML	E2K3400MLW	E2KM3400MLW	E2KW3350MLW
	1250–2500	E2K3400TMW	E2K3400MWW	E2KM3400MWW	E2KW3350MWW
	1500–3000	E2K3400TMN	E2K3400MNW	E2KM3400MNW	E2KW3350MNW
	1600–3200	—	—	—	E2KW3350MVW
	1750–3500	E2K3400TMR	E2K3400MRW	E2KM3400MRW	E2KW3350MRW
	2000–4000	E2K3400TM	E2K3400MW	E2KM3400MW	—

**Notes**

- ① Frame only: **E2K3400F**.
- ② Frame only: **E2KM3400F**.
- ③ 1200 V breakers are sold as “complete breakers” only.
- ④ Maximum continuous ampere rating at 50 °C.

Please see TD01217001E for detailed dimensions.

100 A–400 A

E<sup>2</sup>KE/E<sup>2</sup>KEME<sup>2</sup>KM

## Circuit Breakers with Interchangeable Electronic Trip Units

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ①	1000V/ 577 Vac Maximum 250 Vdc 14 kA at 1000 Vac Three-Pole ②
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>310+ Electronic Instantaneous Only</b>				
150	50–800	KEM3150TM	E2KE3150MW	E2KEM3150MW
225	200–1500	KEM3225TM	E2KE3225MW	E2KEM3225MW
	500–2500	KEM3225TM2	E2KE3225M2W	E2KEM3225M2W
400	200–1500	KEM3400TM	E2KE3400MW	E2KEM3400MW
	500–2500	KEM3400TM2	E2KE3400M2W	E2KEM3400M2W
<b>310+ Electronic LSI ③</b>				
100	50–800	KEM3100T	E2KE3100W	E2KEM3100W
125	50–800	KEM3125T	E2KE3125W	E2KEM3125W
150	50–800	KEM3150T	E2KE3150W	E2KEM3150W
200	200–1500	KEM3200T	E2KE3200W	E2KEM3200W
225	200–1500	KEM3225T	E2KE3225W	E2KEM3225
	500–2500	KEM3225T2	E2KE32252W	E2KEM32252W
400	200–1500	KEM3400T	E2KE3400W	E2KEM3400W
	500–2500	KEM3400T2	E2KE34002W	E2KEM34002W
<b>310+ Electronic ALSI with Maintenance Mode ③</b>				
100	50–800	KEM310038T	E2KE310038W	E2KEM310038W
125	50–800	KEM312538T	E2KE312538W	E2KEM312538W
150	50–800	KEM315038T	E2KE315038W	E2KEM315038W
200	200–1500	KEM320038T	E2KE320038W	E2KEM320038W
225	200–1500	KEM322538T	E2KE322538W	E2KEM322538
	500–2500	KEM322538T2	E2KE3225238W	E2KEM3225238W
400	200–1500	KEM340038T	E2KE340038W	E2KEM340038W
	500–2500	KEM340038T2	E2KE3400238W	E2KEM3400238W

**Notes**① Frame only: **E2K3400F**.② Frame only: **E2KM3400F**.③ For High Load Alarm option (B20): **E2KE340038B20W, KEM3400TB20**.

Please see TD01217001E for detailed dimensions.

## 160 A–400 A

E<sup>2</sup>LME/E<sup>2</sup>LMZ (Series G)

2

## Circuit Breakers

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ①	1000V/ 577 Vac Maximum 250 Vdc 14 kA at 1000 Vac Three-Pole ②
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>Magnetic Only</b>				
400	3600–4400	LT3400KM	E2LME3400KMW	E2LMZ3400KMW
<b>Interchangeable Electronic Trip Unit</b>				
160	320–1920	LT340031M	E2LME340031W	E2LMZ340031W
200	400–2400	LT340031M	E2LME340031W	E2LMZ340031W
225	450–2700	LT340031M	E2LME340031W	E2LMZ340031W
250	500–3000	LT340031M	E2LME340031W	E2LMZ340031W
300	600–3600	LT340031M	E2LME340031W	E2LMZ340031W
315	630–3780	LT340031M	E2LME340031W	E2LMZ340031W
350	700–4200	LT340031M	E2LME340031W	E2LMZ340031W
400	800–4800	LT340031M	E2LME340031W	E2LMZ340031W

**Notes**① Frame only: **E2LME3400NN**.② Frame only: **E2LMZ3400NN**.

Please see TD01217001E for detailed dimensions.

## 300 A–600 A

E<sup>2</sup>L/E<sup>2</sup>LM/E<sup>2</sup>LW

## Circuit Breakers with Interchangeable Non-Electronic Trip Units

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ①	1000Y/ 577 Vac Maximum 250 Vdc 18 kA at 1000 Vac Three-Pole ②	1200 Vac Maximum 10 kA at 1200 Vac Three-Pole ③
			Complete Breaker Catalog Number	Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>Thermal-Magnetic</b>					
300	1500–3000	E2L3300T	E2L3300W	E2LM3300W	E2LW3300W
320	2250–4500	E2L3450T	E2L3450W	E2LM3450W	E2LW3320W
350	1600–3200	—	—	—	E2LW3350W
400	1750–3500	E2L3350T	E2L3350W	E2LM3350W	E2LW3400W
450	2000–4000	E2L3400T	E2L3400W	E2LM3400W	E2LW3450W
500	2500–5000	E2L3500T	E2L3500W	E2LM3500W	—
600	3000–6000	E2L3600T	E2L3600W	E2LM3600W	—
	1125–2250	E2L3600TL ④	—	—	—
<b>Magnetic Only</b>					
450	1600–3200	—	—	—	E2LW3450MVW
	1125–2250	—	—	—	E2LW3450MLW
	1500–3000	—	—	—	E2LW3450MNW
	1750–3500	—	—	—	E2LW3450MRW
	2000–4000	—	—	—	E2LW3450MXW
	2250–4500	—	—	—	E2LW3450MYW
600	1125–2250	E2L3600TML	E2L3600MLW	E2LM3600MLW	—
	1500–3000	E2L3600TMN	E2L3600MNW	E2LM3600MNW	—
	1750–3500	E2L3600TMR	E2L3600MRW	E2LM3600MRW	—
	2000–4000	E2L3600TMX	E2L3600MXW	E2LM3600MXW	—
	2250–4500	E2L3600TMY	E2L3600MYW	E2LM3600MYW	—
	2500–5000	E2L3600TMP	E2L3600MPW	E2LM3600MPW	—
	3000–6000	E2L3600TM	E2L3600MW	E2LM3600MW	—

**Notes**① Frame only: **E2L3600F**.② Frame only: **E2LM3600F**.

③ Maximum continuous ampere rating at 50 °C.

④ 600 A thermal 1125–2250 T.A.

Please see TD01217001E for detailed dimensions.

300 A–600 A

E<sup>2</sup>LE/E<sup>2</sup>LEM

2

E<sup>2</sup>LM

## Circuit Breakers with Interchangeable Electronic Trip Units



Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ①	1000Y/ 577 Vac Maximum 250 Vdc 18 kA at 1000 Vac Three-Pole ②
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>310+ Electronic Instantaneous Only</b>				
400	500–2500	LEM3400TM	E2LE3400MW	E2LEM3400MW
	1000–4000	LEM3400TM2	E2LE3400M2W	E2LEM3400M2W
600	500–2500	LEM3600TM	E2LE3600MW	E2LEM3600MW
	2500–5000	LEM3600TM2	E2LE3600M2W	E2LEM3600M2W
<b>310+ Electronic LSI ③</b>				
300	500–2500	LEM3300T	E2LE3300W	E2LEM3300W
350	500–2500	LEM3350T	E2LE3350W	E2LEM3350W
400	500–2500	LEM3400T	E2LE3400W	E2LEM3400W
	1000–4000	LEM3400T2	E2LE34002W	E2LEM34002W
600	500–2500	LEM3600T	E2LE3600W	E2LEM3600W
	2500–5000	LEM3600T2	E2LE36002W	E2LEM36002W
<b>310+ Electronic ALSI with Maintenance Mode ③</b>				
300	500–2500	LEM330038T	E2LE330038W	E2LEM330038W
350	500–2500	LEM335038T	E2LE335038W	E2LEM335038W
400	500–2500	LEM340038T	E2LE340038W	E2LEM340038W
	1000–4000	LEM340038T2	E2LE3400238W	E2LEM3400238W
600	500–2500	LEM360038T	E2LE360038W	E2LEM360038W
	2500–5000	LEM360038T2	E2LE3600238W	E2LEM3600238W

**Notes**① Frame only: **E2L3600F**.② Frame only: **E2LM3600F**.③ For High Load Alarm option (B20): **E2LE360038B20W, LEM3600TB20**.

Please see TD01217001E for detailed dimensions.

300 A— 800 A

**E<sup>2</sup>M/E<sup>2</sup>MM/E<sup>2</sup>MW****E<sup>2</sup>M/E<sup>2</sup>MM/E<sup>2</sup>MW****Circuit Breakers with Interchangeable Non-Electronic Trip Units**

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole <sup>①</sup> Complete Breaker Catalog Number	1000Y/ 577 Vac Maximum 250 Vdc 18 kA at 1000 Vac Three-Pole <sup>②</sup> Complete Breaker Catalog Number	1200 Vac Maximum 12 kA at 1200 Vac Three-Pole <sup>③④</sup> Complete Breaker Catalog Number
<b>Thermal-Magnetic</b>					
400	1000–2000	—	—	—	<b>E2MW3400W</b>
500	1250–2500	—	—	—	<b>E2MW3500W</b>
600	1500–3000	<b>E2M3600TN</b>	<b>E2M3600W</b>	<b>E2MM3600W</b>	<b>E2MW3600W</b>
630	1600–3200	—	—	—	<b>E2MW3630W</b>
800	2000–4000	<b>E2M3800TX</b>	<b>E2M3800W</b>	<b>E2MM3800W</b>	<b>E2MW3800W</b>
<b>Magnetic Only</b>					
800	1500–3000	<b>E2M3800TMN</b>	<b>E2M3800MNW</b>	<b>E2MM3800MNW</b>	<b>E2MW3800MNW</b>
	1600–3200	—	—	—	<b>E2MW3800MVW</b>
	2000–4000	<b>E2M3800TMX</b>	<b>E2M3800MXW</b>	<b>E2MM3800MXW</b>	<b>E2MW3800MXW</b>
	2500–5000	<b>E2M3800TMP</b>	<b>E2M3800MPW</b>	<b>E2MM3800MPW</b>	—
	3000–6000	<b>E2M3800TMW</b>	<b>E2M3800MWW</b>	<b>E2MM3800MWW</b>	—

**Notes**

- ① Frame only: **E2M3800F**.
- ② Frame only: **E2MM3800F**.
- ③ 1200 V breakers are sold as “complete breakers” only.
- ④ Maximum continuous ampere rating at 50 °C.

Please see TD01217001E for detailed dimensions.



800 A

**E<sup>2</sup>ME/E<sup>2</sup>MEM**

2

E<sup>2</sup>MN



#### Circuit Breakers with Interchangeable Electronic Trip Units

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole ①	1000Y/ 577 Vac Maximum 250 Vdc 18 kA at 1000 Vac Three-Pole ②
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>310+ Electronic Instantaneous Only</b>				
800	500–2500	<b>MEM3800TM</b>	<b>E2ME3800MW</b>	<b>E2MEM3800MW</b>
	1000–4000	<b>MEM3800TM2</b>	<b>E2ME3800M2W</b>	<b>E2MEM3800M2W</b>
<b>310+ Electronic LSI ③</b>				
800	500–2500	<b>MEM3800T</b>	<b>E2ME3800W</b>	<b>E2MEM3800W</b>
	1000–4000	<b>MEM3800T2</b>	<b>E2ME38002W</b>	<b>E2MEM38002W</b>
<b>310+ Electronic ALSI with Maintenance Mode ③</b>				
800	500–2500	<b>MEM380038T</b>	<b>E2ME380038W</b>	<b>E2MEM380038W</b>
	1000–4000	<b>MEM380038T2</b>	<b>E2ME3800382W</b>	<b>E2MEM3800382W</b>

**Notes**

① Frame only: **E2M3800F**.

② Frame only: **E2MM3800F**.

③ For High Load Alarm option (B20): **E2ME380038B20W, MEM3800TB20**.

Please see TD01217001E for detailed dimensions.

400 A–1200 A

**E<sup>2</sup>N/E<sup>2</sup>NM****E<sup>2</sup>NM****Circuit Breakers with Interchangeable Electronic Trip Units**

Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole	1000Y/ 577 Vac Maximum 250 Vdc 18 kA at 1000 Vac Three-Pole
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>310+ Electronic Instantaneous Only</b>				
800	500–2500	—	<b>E2N3800MW</b>	<b>E2NM3800MW</b>
1200	1250–5000	—	<b>E2N312MW</b>	<b>E2NM312MW</b>
<b>310+ Electronic LSI <sup>①</sup></b>				
400	500–2500	—	<b>E2N3400W</b>	<b>E2NM3400W</b>
500	500–2500	—	<b>E2N3500W</b>	<b>E2NM3500W</b>
600	500–2500	—	<b>E2N3600W</b>	<b>E2NM3600W</b>
700	500–2500	—	<b>E2N3700W</b>	<b>E2NM3700W</b>
800	500–2500	—	<b>E2N3800W</b>	<b>E2NM3800W</b>
900	1250–5000	—	<b>E2N3900W</b>	<b>E2NM3900W</b>
1000	1250–5000	—	<b>E2N310W</b>	<b>E2NM310W</b>
1200	1250–5000	—	<b>E2N312W</b>	<b>E2NM312W</b>
<b>310+ Electronic ALSI with Maintenance Mode <sup>①</sup></b>				
400	500–2500	—	<b>E2N340038W</b>	<b>E2NM340038W</b>
500	500–2500	—	<b>E2N350038W</b>	<b>E2NM350038W</b>
600	500–2500	—	<b>E2N360038W</b>	<b>E2NM360038W</b>
700	500–2500	—	<b>E2N370038W</b>	<b>E2NM370038W</b>
800	500–2500	—	<b>E2N380038W</b>	<b>E2NM380038W</b>
900	1250–5000	—	<b>E2N390038W</b>	<b>E2NM390038W</b>
1000	1250–5000	—	<b>E2N31038W</b>	<b>E2NM31038W</b>
1200	1250–5000	—	<b>E2N31238W</b>	<b>E2NM31238W</b>

**Notes**

<sup>①</sup> For High Load Alarm option (B20): **E2N380038B20W**.

Please see TD01217001E for detailed dimensions.

# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

1600 A–2000 A

E<sup>2</sup>R/E<sup>2</sup>RM

2

E<sup>2</sup>RM

#### Circuit Breakers with Electronic Trip Units



Maximum Continuous Ampere Rating at 40 °C	Magnetic Trip Range	Trip Unit Only Catalog Number	600 Vac Maximum 250 Vdc 35 kA at 480 Vac Three-Pole	1000Y/ 577 Vac Maximum 250 Vdc 18 kA at 1000 Vac Three-Pole
			Complete Breaker Catalog Number	Complete Breaker Catalog Number
<b>310+ Electronic LSI</b> <sup>①</sup>				
1600	2–8 x I <sub>n</sub>	—	<b>E2R316W</b>	<b>E2RM316W</b>
2000	2–8 x I <sub>n</sub>	—	<b>E2R320W</b>	<b>E2RM320W</b>
<b>310+ Electronic ALSI with Maintenance Mode</b> <sup>①</sup>				
1600	2–8 x I <sub>n</sub>	—	<b>E2R31638W</b>	<b>E2RM31638W</b>
2000	2–8 x I <sub>n</sub>	—	<b>E2R32038W</b>	<b>E2RM32038W</b>

**Notes**

<sup>①</sup> For High Load Alarm option (B20): **E2R1638B20W**.

Please see TD01217001E for detailed dimensions.

## Accessories

### Line and Load Terminals

Breaker Type	Maximum Breaker Amperes	Wire Type	AWG Wire Range (No. Conductors)	Catalog Number
E <sup>2</sup> F/E <sup>2</sup> FM	100	Cu/Al	#14–1/0 (1)	<b>3T100FB</b> (package of three)
	150	Cu	#4–4/0 (1)	<b>3T150FB</b> (package of three)
E <sup>2</sup> J/E <sup>2</sup> JM	250	Cu	#4–350 (1)	<b>T250KB</b>
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	225	Cu	#3–350 (1)	<b>T300K</b>
	350	Cu	250–500 (1)	<b>T350K</b>
	400	Cu	2/0–250 (2)	<b>3T400K</b> (three-pole kit)
E <sup>2</sup> LME/E <sup>2</sup> LMZ	400	Cu/Al	500–750 (1)	<b>3TA631LK</b>
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW	400	Cu/Al	4/0–600 (1)	<b>3TA401LDK</b> (three-pole kit)
	600	Cu	250–350 (2)	<b>T602LD</b>
E <sup>2</sup> M/E <sup>2</sup> MM/E <sup>2</sup> MW	600	Cu	(2) 2/0–500 kcmil	<b>T600MA1</b>
	600	Cu/Al	(2) 1–500 kcmil	<b>TA700MA1</b>
	800 std.	Cu/Al	(3) 3/0–400 kcmil	<b>TA800MA2</b>
	800	Cu/Al	(2) 500–750 kcmil	<b>TA801MA</b>
	800	Cu	(3) 3/0–300 kcmil	<b>T800MA1</b>
E <sup>2</sup> N/E <sup>2</sup> NM	700	Cu	2/0–500 (2)	<b>T700NB1</b>
	1000	Cu	3/0–500 (3)	<b>T1000NB1</b>
	1200	Cu	3/0–400 (4)	<b>T1200NB3</b>
	1600	Cu/Al	500–1000 (4)	<b>TA1600RD</b>
	2000	Cu/Al	2–600 (6)	<b>TA2000RD</b>

### End Cap Terminals—For Use with Ring Type Terminals

Breaker Type	Maximum Breaker Amperes	Catalog Number	Metric Catalog Number	Imperial
E <sup>2</sup> F/E <sup>2</sup> FM	150	<b>KPEK1</b>	<b>KPEMK1</b>	—
E <sup>2</sup> J/E <sup>2</sup> JM	250	<b>KPEK2</b>	<b>KPEMK2</b>	—
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	400	<b>KPEK3</b>	<b>KPEMK3</b>	—
E <sup>2</sup> LME/E <sup>2</sup> LMZ	400	—	<b>L3RTWK</b>	—
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW	600	<b>KPEK4</b>	<b>KPEMK4</b>	—

### External Accessories

#### Padlockable Handle Lock Hasp

Breaker Type	Catalog Number
E <sup>2</sup> F/E <sup>2</sup> FM	<b>PLK1</b>
E <sup>2</sup> J/E <sup>2</sup> JM	<b>PLK3</b>
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	<b>PLK3</b>
E <sup>2</sup> LME/E <sup>2</sup> LMZ	<b>LPHL</b>
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW	<b>HLK4</b>
E <sup>2</sup> M/E <sup>2</sup> MM/E <sup>2</sup> MW	<b>HLK4</b>
E <sup>2</sup> N/E <sup>2</sup> NM	<b>PLK5</b>
E <sup>2</sup> R/E <sup>2</sup> RM	<b>HLK6</b>

## Internal Accessories

## 2

## Undervoltage Release ①

Breaker Type	UVR Type	Voltage Rating	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	Handle reset	208–240 Vac	Left pole	<b>UVH1LP11K</b> (thermal/magnetic only) ②	U18
	Handle reset	110–127 Vdc	Left pole	<b>UVH1LP26K</b> (thermal/magnetic only) ②	U42
E <sup>2</sup> J/E <sup>2</sup> JM	Handle reset	110–127 Vac	Left pole	<b>UVH2LP08K</b> ②	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH2LP11K</b> ②	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH2LP26K</b> ②	T14
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM3LP08K</b> ②③	U66
	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM3LP08KT</b> ②④	U68
	Handle reset	110–127 Vac	Left pole	<b>UVH3LP08K</b> ②	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH3LP11K</b> ②	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH3LP26K</b> ②	T14
E <sup>2</sup> LME/E <sup>2</sup> LMZ	Handle reset	110–127 Vac	Left pole	<b>UVR120APK</b>	U5
	Handle reset	110–125 Vdc	Left pole	<b>UVR125DPK</b>	U6
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW/E <sup>2</sup> M/E <sup>2</sup> MM/ E <sup>2</sup> MW	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM4LP08K</b> ②③	U66
	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM4LP08KT</b> ②④	U68
	Handle reset	110–127 Vac	Left pole	<b>UVH4LP08K</b> ②	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH4LP11K</b> ②	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH4LP26K</b> ②	T14
E <sup>2</sup> N/E <sup>2</sup> NM	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM5LP08K</b> ③	U66
	120 volt handle reset with LED	120 Vac	Left pole	<b>UVM5LT08K</b> ④	U68
	Handle reset	110–127 Vac	Left pole	<b>UVH5LP08K</b> ②	U18
	Handle reset	208–240 Vac	Left pole	<b>UVH5LP11K</b> ②	U22
	Handle reset	110–125 Vdc	Left pole	<b>UVH5LP26K</b> ②	T14
E <sup>2</sup> R/E <sup>2</sup> RM	120 volt handle reset with LED	120 Vac	Right pole	<b>UVM6RP08K</b> ③⑤	U58
	Handle reset	110–127 Vac	Right pole	<b>UVH6RP08K</b> ⑤	U49
	Handle reset	208–240 Vac	Right pole	<b>UVH6RP11K</b> ⑤	U53
	Handle reset	110–125 Vdc	Right pole	<b>UVH6RP26K</b> ⑤	T33

**Notes**

- ① Contact Eaton for internal accessory voltage ratings not listed.
- ② LH (RH also available).
- ③ Pigtail leads.
- ④ Terminal blocks.
- ⑤ RH only.

## Shunt Trip ①

Breaker Type	Voltage Rating	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	48–127 Vac or 48–60 Vdc	Left pole	<b>SNT1LP08K</b> ②	S06
	208–230 Vac or 110–127 Vdc	Left pole	<b>SNT1LP12K</b> ②	S10
E <sup>2</sup> J/E <sup>2</sup> JM	110–240 Vac or 110–125 Vdc	Left pole	<b>SNT2P11K</b> ③	S10
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	110–240 Vac or 110–125 Vdc	Left pole	<b>SNT3P11K</b> ③	S10
E2LME/E2LMZ	24 Vac/Vdc	Left pole	<b>SNT024CPK</b>	S6
	48–60 Vac/Vdc	Left pole	<b>SNT4860CPK</b>	S7
	110–240 Vac/Vdc	Left pole	<b>SNT120CPK</b>	S2
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW/E <sup>2</sup> M/ E <sup>2</sup> MM/E <sup>2</sup> MW	48–60 Vac	Left pole	<b>SNT4LP05K</b> ②	S06
	48–60 Vdc	Left pole	<b>SNT4LP23K</b> ②	S86
	110–240 Vac	Left pole	<b>SNT4LP11K</b> ②	S10
	110–125 Vdc	Left pole	<b>SNT4LP26K</b> ②	S42
E <sup>2</sup> N/E <sup>2</sup> NM	110–240 Vac	Left pole	<b>SNT5LP11K</b> ②	S10
	110–125 Vdc	Left pole	<b>SNT5LP26K</b> ②	S42
E <sup>2</sup> R/E <sup>2</sup> RM	110–240 Vac	Right pole	<b>SNT6P11K</b> ④	S29
	110–125 Vdc	Right pole	<b>SNT6P26K</b> ④	S45

## Auxiliary Switch

Breaker Type	Number of Sets of Contacts (1A and 1B)	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	1	Right	<b>A1X1PK</b>	A06
	2	Right	<b>A2X1RPK</b>	A13
E <sup>2</sup> J/E <sup>2</sup> JM	1	Right	<b>A1X2PK</b>	A06
	2	Right	<b>A2X2PK</b>	A13
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	1	Right	<b>A1X3PK</b>	A06
	2	Right	<b>A2X3PK</b>	A13
E <sup>2</sup> LME/E <sup>2</sup> LMZ	1	Right	<b>AUX1A1BPK</b>	A1
	2	Right	<b>AUX2A2BPK</b>	A2
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW/E <sup>2</sup> M/ E <sup>2</sup> MM/E <sup>2</sup> MW	1	Right	<b>A1X4PK</b>	A06
	2	Right	<b>A2X4PK</b>	A13
E <sup>2</sup> N/E <sup>2</sup> NM	1	Right	<b>A1X5PK</b>	A06
	2	Right	<b>A2X5PK</b>	A13
E <sup>2</sup> R/E <sup>2</sup> RM	2	Right	<b>A2X6RPK</b>	A12
	4	Right	<b>A4X6RPK</b>	A19

## Alarm (Signal/Lockout Switch)

Breaker Type	Number of Sets of Contacts (Make and Break)	Mounting Location	Catalog Number	Factory Modification Code
E <sup>2</sup> F/E <sup>2</sup> FM	1	Right	<b>A1L1LPK/A1L1RPK</b>	B06
	2	Right	<b>A2L1LPK/A2L1RPK</b>	B13
E <sup>2</sup> J/E <sup>2</sup> JM	1	Right	<b>A1L2LPK/A1L2RPK</b>	B06
E <sup>2</sup> K/E <sup>2</sup> KM/E <sup>2</sup> KW	1	Right	<b>A1L3LPK/A1L3RPK</b>	B06
	2	Right	<b>A2L3LPK/A2L3RPK</b>	B13
E <sup>2</sup> LME/E <sup>2</sup> LMZ	1	Right	<b>ALM1M1BJPK</b>	B1
	2	Right	<b>ALM2M2BJPK</b>	B3
E <sup>2</sup> L/E <sup>2</sup> LM/E <sup>2</sup> LW/E <sup>2</sup> M/ E <sup>2</sup> MM/E <sup>2</sup> MW	1	Right	<b>A1L4LPK/A1L4RPK</b>	B06
	2	Right	<b>A2L4LPK/A2L4RPK</b>	B13
E <sup>2</sup> N/E <sup>2</sup> NM	1	Right	<b>A1L5LPK/A1L5RPK</b>	B06
	2	Right	<b>A2L5LPK/A2L5RPK</b>	B13
E <sup>2</sup> R/E <sup>2</sup> RM	1	Right	<b>A1L6RPK</b>	B05
	2	Right	<b>A2L6RPK</b>	B12

## Notes

- ① Contact Eaton for internal accessory voltage ratings not listed.
- ② LH (RH also available).
- ③ LH or RH.
- ④ RH only.

# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

#### Dimensions

Approximate Dimensions in Inches (mm)

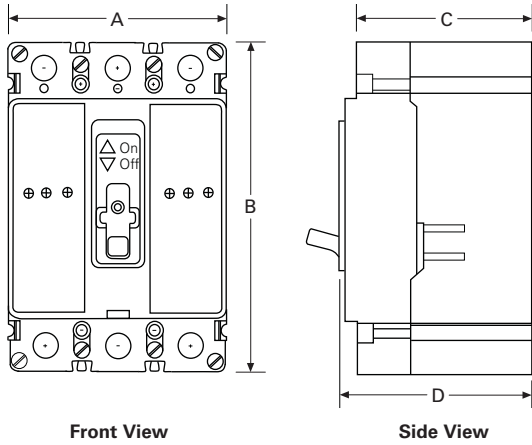
2

Please see TD01217001E for detailed dimensions.

#### 3 A–150 A

##### E<sup>2</sup>F/E<sup>2</sup>FM

Sealed Breakers with Non-Interchangeable Trip Unit—  
Include Line/Load Terminals Non-Electronic Trip Units

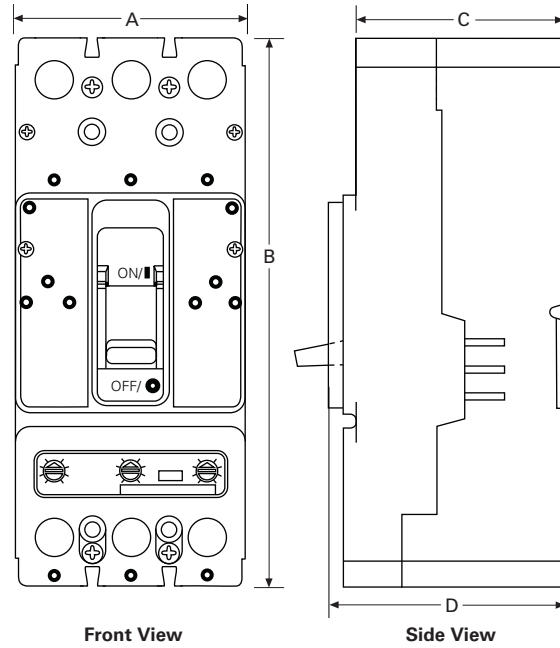


Description	Dimensions in Inches (mm)
A	4.13 (104.9)
B	6.00 (152.4)
C	3.38 (85.9)
D	3.50 (88.9)

#### 70 A–250 A

##### E<sup>2</sup>J/E<sup>2</sup>JM

Circuit Breakers with Interchangeable Non-Electronic  
Trip Units



Description	Dimensions in Inches (mm)
A	4.13 (104.9)
B	10.00 (254.0)
C	4.06 (103.1)
D	4.31 (109.5)

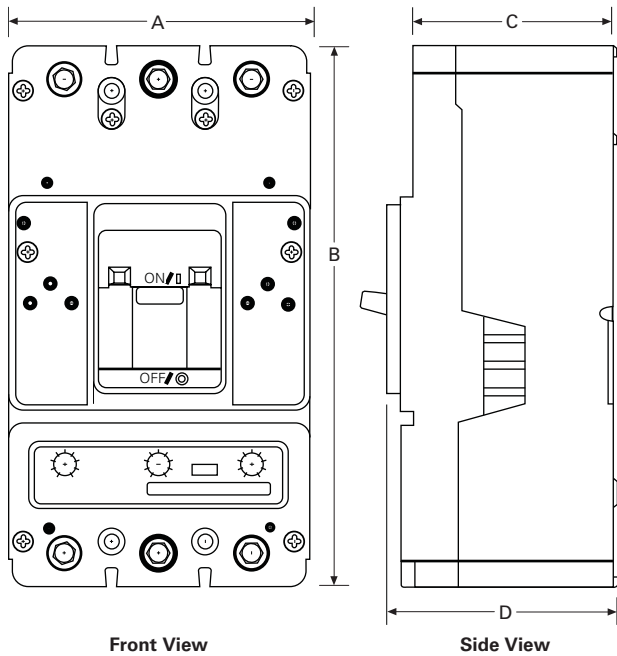
Approximate Dimensions in Inches (mm)

Please see TD01217001E for detailed dimensions.

**100 A–400 A**

**E<sup>2</sup>K/E<sup>2</sup>KM/E<sup>2</sup>KW**

**Circuit Breakers with Interchangeable Non-Electronic Trip Units**

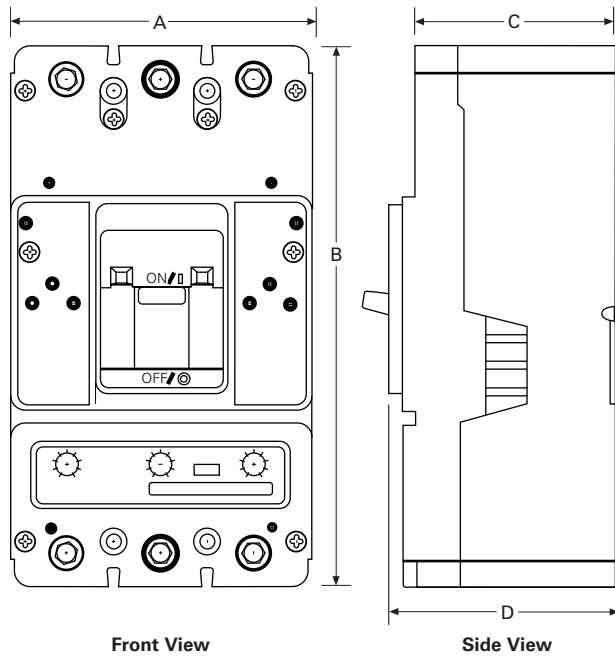


Description	Dimensions in Inches (mm)
A	5.49 (139.4)
B	10.13 (257.3)
C	4.06 (103.1)
D	4.31 (109.5)

**100 A–400 A**

**E<sup>2</sup>KE/E<sup>2</sup>KEM**

**Circuit Breakers with Interchangeable Electronic Trip Units**



Description	Dimensions in Inches (mm)
A	5.49 (139.4)
B	10.13 (257.3)
C	4.06 (103.1)
D	4.31 (109.5)



# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

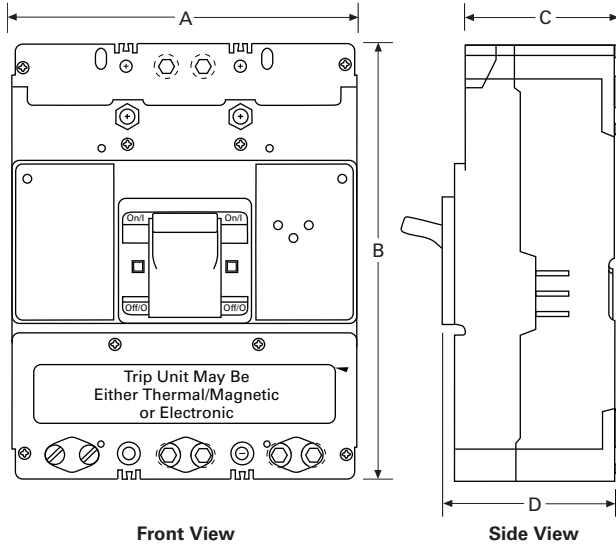
Approximate Dimensions in Inches (mm)

Please see TD01217001E for detailed dimensions.

2

#### 160 A–400 A

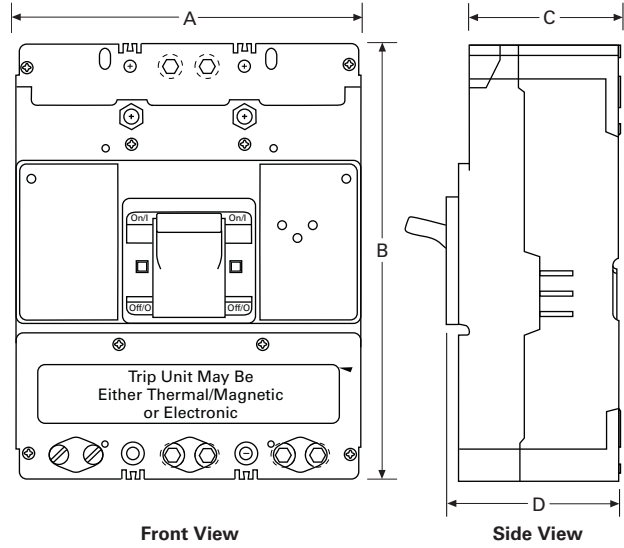
##### E<sup>2</sup>LME/E<sup>2</sup>LMZ Circuit Breakers



Description	Dimensions in Inches (mm)
A	5.48 (139.2)
B	10.13 (257.3)
C	4.00 (101.6)
D	4.22 (107.1)

#### 300 A–600 A

##### E<sup>2</sup>L/E<sup>2</sup>LM/E<sup>2</sup>LW Circuit Breakers with Interchangeable Electronic Trip Units



Description	Dimensions in Inches (mm)
A	8.25 (209.6)
B	10.75 (273.1)
C	4.06 (103.1)
D	4.38 (111.3)

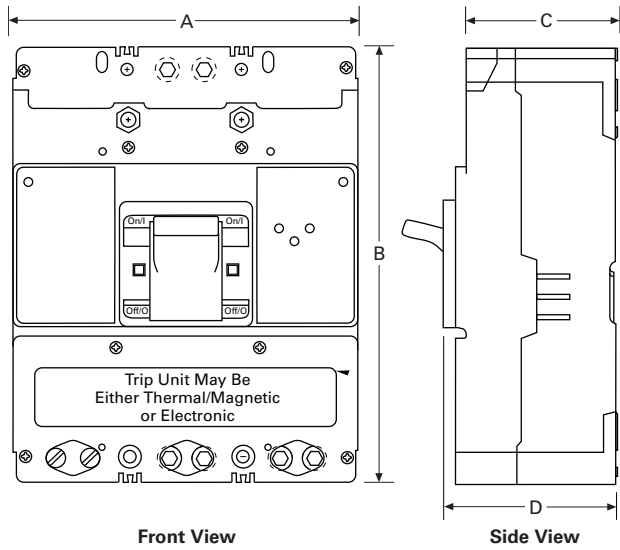
Approximate Dimensions in Inches (mm)

Please see TD01217001E for detailed dimensions.

**300 A–600 A**

**E<sup>2</sup>LE/E<sup>2</sup>LEM**

**Circuit Breakers with Interchangeable Electronic Trip Units**

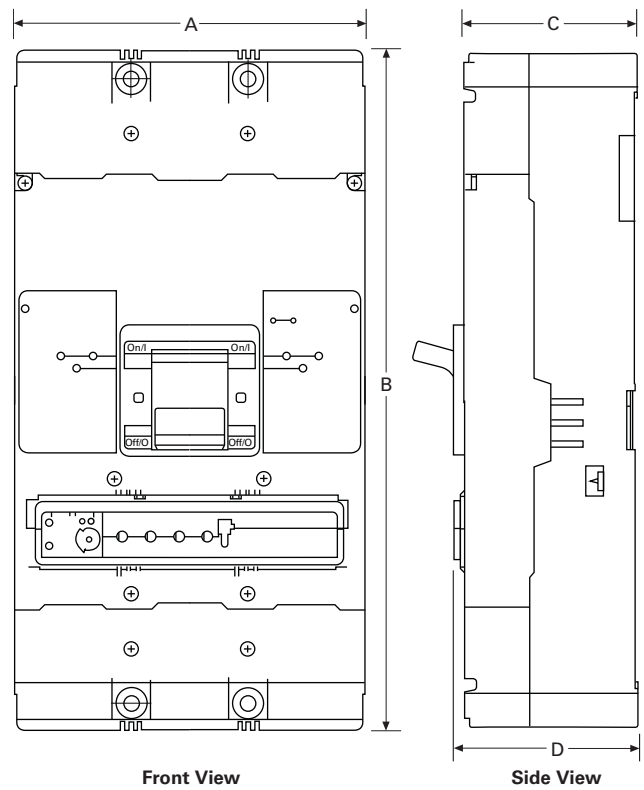


Description	Dimensions in Inches (mm)
A	8.25 (209.6)
B	10.75 (273.1)
C	4.06 (103.1)
D	4.38 (111.3)

**300 A–800 A**

**E<sup>2</sup>M/E<sup>2</sup>MM/E<sup>2</sup>MW**

**Circuit Breakers with Interchangeable Non-Electronic Trip Units**



Description	Dimensions in Inches (mm)
A	8.25 (209.6)
B	16.00 (406.4)
C	4.06 (103.1)
D	4.38 (111.3)

# 2.5

## Molded Case Circuit Breakers

### Specialty Breakers

Approximate Dimensions in Inches (mm)

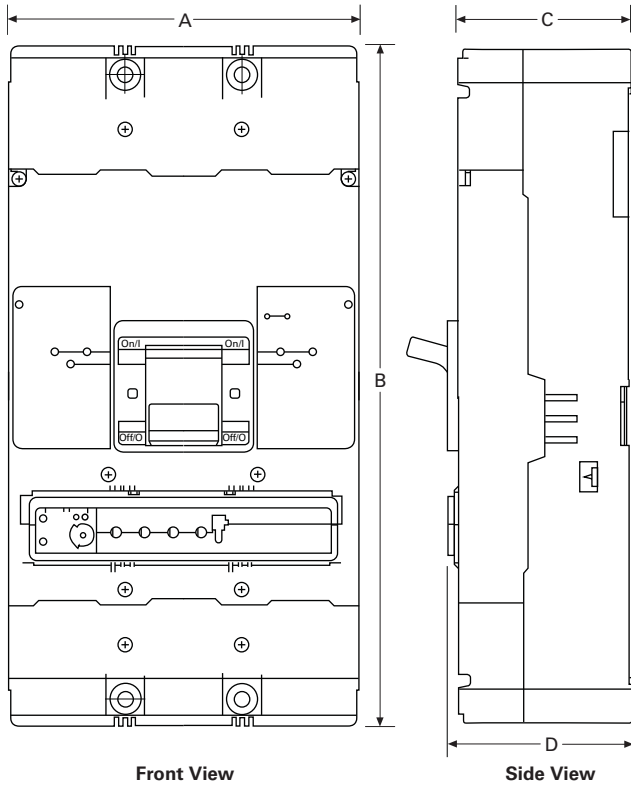
Please see TD01217001E for detailed dimensions.

2

#### 800 A

##### E<sup>2</sup>ME/E<sup>2</sup>MEM

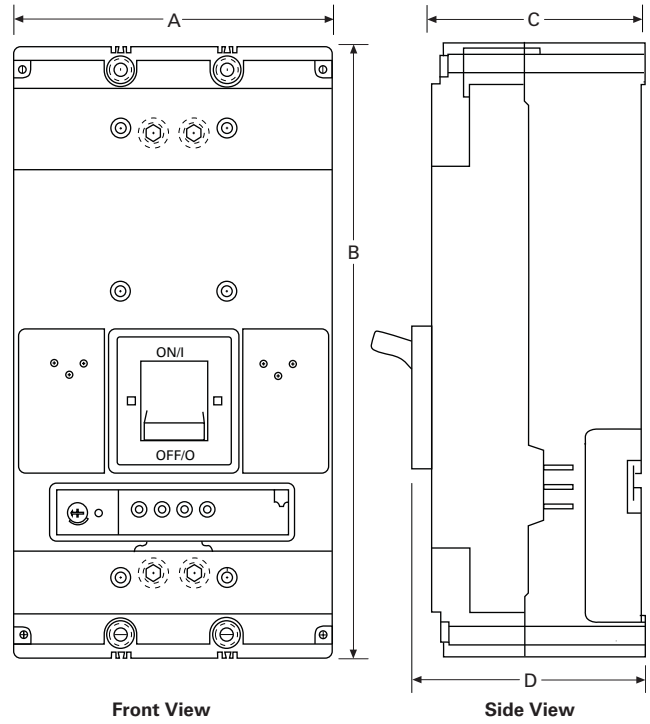
##### Circuit Breakers with Interchangeable Electronic Trip Units



#### 400 A–1200 A

##### E<sup>2</sup>N/E<sup>2</sup>NM

##### Circuit Breakers with Interchangeable Electronic Trip Units



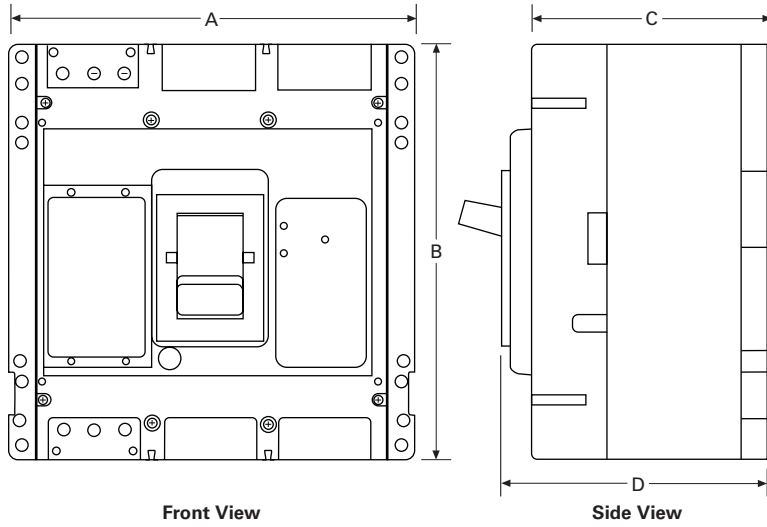
Description	Dimensions in Inches (mm)
A	8.25 (209.6)
B	16.00 (406.4)
C	4.06 (103.1)
D	4.38 (111.3)

Description	Dimensions in Inches (mm)
A	8.25 (209.6)
B	16.00 (406.4)
C	5.50 (139.7)
D	6.00 (152.4)

Approximate Dimensions in Inches (mm)  
 Please see TD01217001E for detailed dimensions.

**1600 A–2000 A**

**E<sup>2</sup>R/ E<sup>2</sup>RM**  
**Circuit Breakers with Electronic Trip Units**



Description	Dimensions in Inches (mm)
A	15.50 (393.7)
B	16.00 (406.4)
C	9.00 (228.6)
D	10.00 (254.0)

#### Handle Mechanisms

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### Handle Mechanisms—Series G

#### Product Overview

Handle mechanisms are used to operate molded case circuit breakers, molded case switches and motor circuit protectors. They are available in three basic configurations—Flange Mounted, Through-the-Door and Direct (Close-Coupled)—providing safe, dependable operation and ease of installation.

#### **Through-the-Door**

- High-Performance Rotary
- Universal Rotary

#### **Direct (Close-Coupled)**

- Universal Direct

#### **Flange Mounted**

- Flex Shaft™

Handle mechanisms are used on enclosed circuit breakers, control panels and motor control centers in many different applications. Eaton has a handle mechanism for virtually any need.

## Handle Mechanisms



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Flex Shaft . . . . .	<b>V4-T2-519</b>
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## High-Performance Rotary Handle Mechanisms

## Product Description

The high-performance rotary handle mechanism uses a simple, yet robust design to make installation and operation easy. The external handle's key functional components are all metallic, ensuring reliability. The metal-on-metal interface between the handle and shaft prevents contaminant buildup that could impede operation, while UV and chemical agent resistant materials protect the handle from heat and fading in direct sunlight, as well as chemicals that may be introduced in harsh environments.

In addition to its robust design features, the handle mechanism has stand-off support that allows for easy operation with a gloved hand. With a shallow profile, the handle can easily be used in applications where an internal or double door is required.

The high-performance external handle can accept padlocks or multi-hasps locks. The door is interlocked when padlocked and cannot be bypassed.

## Features

- NEMA Type 1/3R/12 (IP54) and NEMA Type 4/4X (IP65) ratings
- Black/Blue or Red/Yellow external handle colors
- Three shaft lengths—6, 12 and 24 inches, which can be cut to size to match enclosure depth
- Conveniently packaged as kit containing handle, shaft and mechanism
- Replacement parts are available separately
- Metallic functional components ensure reliability
- Metal-on-metal interface between handle and shaft
- UV and chemical agent-resistant materials protect the handle
- Shallow profile
- Compatible with both Series C and Series G molded case circuit breakers and molded case switch platforms
- Same handle can be used on multiple frame sizes, reducing the number of parts needed
- Red and yellow handles to designate emergency disconnecting means
- All handle mechanisms can accept padlocks or multi-hasps locks for added flexibility
- Fast, easy installation (see video on website for step-by-step instructions)

## Standards and Certifications

The mechanisms for EG, JG and LG breakers have an internal handle that can be operated independent of door position, and locked-out to meet one of the key NFPA requirements (NFPA® 79) and UL 508A disconnect requirements.

- NEMA 1/3R/12, IP54
- NEMA 4/4X, IP65







## Product Selection

## Handle Mechanisms for Series G Frames

2

## Kits Only (Kit Includes Shaft, Mechanism and Handle)—EG-, JG- and LG-Frame





Description	Rating Type		EG-Frame Catalog Number	JG-Frame Catalog Number	LG-Frame Catalog Number	
	NEMA	IP				
<b>S01 Blue Handle</b> 	S01 blue handle, 6-inch shaft	1/3R/12	54	EGHMVD06B0 / 68C6040G25	JGHMVD06B0 / 68C6041G13	—
		4/4X	65	EGHMVD06BX0 / 68C6040G28	JGHMVD06BX0 / 68C6041G16	—
	S01 blue handle, 12-inch shaft	1/3R/12	54	EGHMVD12B0 / 68C6040G26	JGHMVD12B0 / 68C6041G14	—
		4/4X	65	EGHMVD12BX0 / 68C6040G29	JGHMVD12BX0 / 68C6041G17	—
	S01 blue handle, 24-inch shaft ①	1/3R/12	54	EGHMVD24B0 / 68C6040G27	JGHMVD24B0 / 68C6041G15	—
		4/4X	65	EGHMVD24BX0 / 68C6040G30	JGHMVD24BX0 / 68C6041G18	—
<b>S01 Red Handle</b> 	S01 red handle, 6-inch shaft	1/3R/12	54	EGHMVD06R0 / 68C6040G31	JGHMVD06R0 / 68C6041G19	—
		4/4X	65	EGHMVD06RX0 / 68C6040G34	JGHMVD06RX0 / 68C6041G22	—
	S01 red handle, 12-inch shaft	1/3R/12	54	EGHMVD12R0 / 68C6040G32	JGHMVD12R0 / 68C6041G20	—
		4/4X	65	EGHMVD12RX0 / 68C6040G35	JGHMVD12RX0 / 68C6041G23	—
	S01 red handle, 24-inch shaft ①	1/3R/12	54	EGHMVD24R0 / 68C6040G33	JGHMVD24R0 / 68C6041G21	—
		4/4X	65	EGHMVD24RX0 / 68C6040G36	JGHMVD24RX0 / 68C6041G24	—
<b>S2 Blue Handle</b> 	S2 blue handle, 6-inch shaft	1/3R/12	54	EGHMVD06B / 68C6040G13	JGHMVD06B / 68C6041G01	LGHMVD06B / 68C6042G01
		4/4X	65	EGHMVD06BX / 68C6040G16	JGHMVD06BX / 68C6041G04	LGHMVD06BX / 68C6042G04
	S2 blue handle, 12-inch shaft	1/3R/12	54	EGHMVD12B / 68C6040G14	JGHMVD12B / 68C6041G02	LGHMVD12B / 68C6042G02
		4/4X	65	EGHMVD12BX / 68C6040G17	JGHMVD12BX / 68C6041G05	LGHMVD12BX / 68C6042G05
	S2 blue handle, 24-inch shaft ①	1/3R/12	54	EGHMVD24B / 68C6040G15	JGHMVD24B / 68C6041G03	LGHMVD24B / 68C6042G03
		4/4X	65	EGHMVD24BX / 68C6040G18	JGHMVD24BX / 68C6041G06	LGHMVD24BX / 68C6042G06
<b>S2 Red Handle</b> 	S2 red handle, 6-inch shaft	1/3R/12	54	EGHMVD06R / 68C6040G19	JGHMVD06R / 68C6041G07	LGHMVD06R / 68C6042G07
		4/4X	65	EGHMVD06RX / 68C6040G22	JGHMVD06RX / 68C6041G10	LGHMVD06RX / 68C6042G10
	S2 red handle, 12-inch shaft	1/3R/12	54	EGHMVD12R / 68C6040G20	JGHMVD12R / 68C6041G08	LGHMVD12R / 68C6042G08
		4/4X	65	EGHMVD12RX / 68C6040G23	JGHMVD12RX / 68C6041G11	LGHMVD12RX / 68C6042G11
	S2 red handle, 24-inch shaft ①	1/3R/12	54	EGHMVD24R / 68C6040G21	JGHMVD24R / 68C6041G09	LGHMVD24R / 68C6042G09
		4/4X	65	EGHMVD24RX / 68C6040G24	JGHMVD24RX / 68C6041G12	LGHMVD24RX / 68C6042G12

**Notes**

① 24-inch handle comes with support bracket.

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

**Handle Mechanisms for Series G Frames****Kits Only (Kit Includes Shaft, Mechanism and Handle)—NG- and RG-Frame**

	Description	Rating Type		NG-Frame	RG-Frame
		NEMA	IP	Catalog Number	Catalog Number
	S3 blue handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08B / 68C6043G01</b>	—
		4/4X	65	<b>NGHMVD08BX / 68C6043G03</b>	—
	S3 red handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08R / 68C6043G02</b>	—
		4/4X	65	<b>NGHMVD08RX / 68C6043G04</b>	—
	S4 blue handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08BT / 68C6043G05</b>	<b>RGHMVD08B / 68C6044G01</b>
		4/4X	65	<b>NGHMVD08BTX / 68C6043G07</b>	<b>RGHMVD08BX / 68C6044G03</b>
	S4 red handle, 10-inch shaft	1/3R/12	54	<b>NGHMVD08RT / 68C6043G06</b>	<b>RGHMVD08R / 68C6044G02</b>
		4/4X	65	<b>NGHMVD08RTX / 68C6043G08</b>	<b>RGHMVD08RX / 68C6044G04</b>

**Note**

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.



### Separate Components for Series G Frames

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#### Series G Components—Shafts and Mechanisms

Frame	Shaft Width	Shaft Length				Mechanism Only
		6-Inch	10-Inch	12-Inch	24-Inch <sup>①</sup>	
EG	8 mm	66A6010G95	—	66A6010G96	66A6010G97	1498D66G17
JG	8 mm	66A6010G95	—	66A6010G96	66A6010G98	69D6025G17
LG	8 mm	66A6010G95	—	66A6010G96	66A6010G99	69D6051G30
NG	12 mm	—	66A6013H01	—	—	69D9101G30
RG	12 mm	—	66A6013H01	—	—	69D9101G31

#### Series G Components—Handles Only

Frame	Rating Type		Handles Only							
	NEMA	IP	S01 Blue/Black	S01 Red/Yellow	S2 Blue/Black	S2 Red/Yellow	S3 Blue/Black	S3 Red/Yellow	S4 Blue/Black	S4 Red/Yellow
EG	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
JG	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
LG	1/3R/12	54	—	—	68C6048G01	68C6048G02	68C6048G05	68C6048G06	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	68C6048G07	68C6048G08	—	—
NG	1/3R/12	54	—	—	—	—	68C6048G05	68C6048G06	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	68C6048G07	68C6048G08	68C6048G11	68C6048G12
RG	1/3R/12	54	—	—	—	—	—	—	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	—	—	68C6048G11	68C6048G12

#### Series G Components—Optional Caps

As an alternative to blue or red, a black, replaceable cap is available.

			Catalog Number
S01	66A6032H01	Black handle cap	HPHC0DGX
S2	66A6032H02	Black handle cap	HPHC2DGX
S3	66A6032H03	Black handle cap	HPHC3DGX

#### Series G Replacement Hardware

This kit provides replacement parts for Series G high performance handle only.

	Catalog Number
High-performance handle replacement parts kit	66A6029G01

#### Notes

① 24-inch handle comes with support bracket.

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

**Dimensions**

Approximate Dimensions in mm (Inches)

**High-Performance Rotary Handle Mechanisms**

Handle Type	Front Operation Direction of Operation	Door Drilling
Type S01		
Type S2		
Type S3		
Type S4		

Handle Mechanisms



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### Universal Rotary

#### Product Description

Eaton’s Universal Rotary is suitable for use with Type 1 or 12 enclosure types. All rotary handle mechanisms include a handle “lock off” to prevent turning the breaker ON while in the OFF position, and indicate ON/OFF/Tripped/Reset positions. The Universal Rotary has the added feature of international markings for ON (I) and OFF (O). The Universal Rotary is made of molded material.

The Universal Rotary mechanisms for EG-, JG- and LG-Frame MCCBs can be operated by hand with the door open or “locked off” to prevent operation with the door open.

#### Standards and Certifications

Universal Rotary is UL listed and meets CSA requirements. Universal Rotary also meets IEC 60947-1 and IEC 60947-2 for international compliance. Rotary UL File Number is E64983.



### Features

#### Features Comparison of Series C Rotary and Universal Rotary Handle Mechanism

Rotary	Number of Poles	NEMA Enclosure Type				Handle Lock-Off ②	Handle Indication: ON/OFF TRIPPED/RESET	International Markings ON (I) OFF (O)	Handle Material	Available Handle Colors	Handle Rotation	Shaft Lengths (Inches)
		1	3R	12	4/4X ①							
Series C rotary	—	■	■	■	■	■	■	■	Metal	Black	45 deg.	6, 12, 16, 24
Universal rotary	—	■	—	■	—	■	■	■	Molded plastic	Yellow/Red/Black	90 deg.	6, 12, 24

**Notes**

- ① Type 4/4X application requires special handle. See “Ordering Information.”
- ② All rotary handle mechanisms include a handle “Lock Off” to prevent turning the breaker ON while in the OFF position.

## Product Selection

## Universal Rotary



## Universal Rotary Through-the-Door Handle Mechanisms

Handle Color	UL Rating	Shaft Length in Inches (mm)	Complete Catalog Number <sup>①</sup>
<b>EG-Frame</b>			
Black	1, 12	6.00 (152.4)	<b>EHMVD06B</b>
		12.00 (304.8)	<b>EHMVD12B</b>
		24.00 (609.6)	<b>EHMVD24B</b>
Red	1, 12	6.00 (152.4)	<b>EHMVD06R</b>
		12.00 (304.8)	<b>EHMVD12R</b>
		24.00 (609.6)	<b>EHMVD24R</b>
<b>JG-Frame</b>			
Black	1, 12	6.00 (152.4)	<b>FJHMVD06B</b>
		12.00 (304.8)	<b>FJHMVD12B</b>
		24.00 (609.6)	<b>FJHMVD24B</b>
Red	1, 12	6.00 (152.4)	<b>FJHMVD06R</b>
		12.00 (304.8)	<b>FJHMVD12R</b>
		24.00 (609.6)	<b>FJHMVD24R</b>
<b>LG-Frame</b>			
Black	1, 12	6.00 (152.4)	<b>KLHMVD06B</b>
		12.00 (304.8)	<b>KLHMVD12B</b>
		24.00 (609.6)	<b>KLHMVD24B</b>
Red	1, 12	6.00 (152.4)	<b>KLHMVD06R</b>
		12.00 (304.8)	<b>KLHMVD12R</b>
		24.00 (609.6)	<b>KLHMVD24R</b>
<b>NG-Frame</b>			
Black	1	6.00 (152.4)	<b>HMVD5B</b>
<b>RG-Frame</b>			
Black	1	9.00 (228.6)	<b>HMVD6B</b>

## Series G Rotary



## Series G Rotary Ordering Information

Shaft Length Inches (mm)	Complete Catalog Number <sup>②</sup>	Separate Catalog Number		Shaft <sup>⑤</sup>	Catalog Number	
		Standard Handle <sup>③</sup>	Breaker Mechanism <sup>④</sup>		IEC IP65 <sup>⑥⑦</sup>	IEC IP66 <sup>⑥⑦</sup>
<b>N-Frame (ND and NG)</b>						
6.00 (152.4)	<b>HM5R06</b>	<b>6648C22G21</b>	<b>6648C23G08</b>	<b>4217B37G08</b>	<b>WHM5R06</b>	<b>WHM5R06X</b>
12.00 (304.8)	<b>HM5R12</b>	<b>6648C22G21</b>	<b>6648C23G08</b>	<b>4217B37G05</b>	<b>WHM5R12</b>	<b>WHM5R12X</b>
16.00 (406.4)	<b>HM5R16</b>	<b>6648C22G21</b>	<b>6648C23G08</b>	<b>4217B37G06</b>	<b>WHM5R16</b>	<b>WHM5R16X</b>
24.00 (609.6)	<b>HM5R24</b>	<b>6648C22G21</b>	<b>6648C23G08</b>	<b>4217B37G07</b>	<b>WHM5R24</b>	<b>WHM5R24X</b>

## Notes

- ① Complete catalog number includes handle, mechanism, shaft and mounting hardware.
- ② Complete catalog number includes the standard handle, mechanism, shaft and support brace/bracket.
- ③ Handle is designed suitable for NEMA Types 1, 3R and 12 enclosures. Use style number **6648C22G03** for Type 4/4X handle or add **X** Suffix to complete catalog number. Handle is cast aluminum.
- ④ Breaker mechanism includes a shaft support bracket and its parts. Shaft is .50-inch (12.7 mm).
- ⑤ Longer shafts, 16-inch (406.4 mm) and 24-inch (609.6 mm), include an adjustable support extension.
- ⑥ IEC handle mechanism supplied with metric thread mounting hardware.
- ⑦ Complete catalog number includes a handle, mechanism and shaft.

#### Handle Mechanisms

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### Direct (Close-Coupled) Handle Mechanisms

#### Product Description

Direct (close-coupled) handle mechanisms mount directly to the circuit breaker. They are used in shallow enclosures where the standard variable depth Through-the-door type mechanism is not practical or cannot be used.

The Universal Direct handle mechanisms are rated Type 1 and Type 12.

The Universal Direct handle mechanism is available as standard with a door interlock to prevent opening the enclosure while the circuit breaker is in the ON position. It is also available without a door interlock.

#### Application Description

Direct (close-coupled) handle mechanisms are typically used for applications where high volume, standardized enclosures are being fabricated.

#### Standards and Certifications

The Universal Direct handle mechanism is UL listed, IEC 60947-1 and IEC 60947-2 compliant, and meets CSA requirements.



#### Product Selection

Universal Direct (EG-LG)



#### Universal Direct Handle Mechanisms

Frame	Black Handle Color		Red Handle Color	
	With Interlock Catalog Number	Without Interlock Catalog Number	With Interlock Catalog Number	Without Interlock Catalog Number
EG	<b>EHMCCBI</b>	<b>EHMCCB</b>	<b>EHMCCRI</b>	<b>EHMCCR</b>
JG	<b>JHMCCBI</b>	<b>JHMCCB</b>	<b>JHMCCRI</b>	<b>JHMCCR</b>
LG	<b>LHMCCBI</b>	<b>LHMCCB</b>	<b>LHMCCRI</b>	<b>LHMCCR</b>

## Handle Mechanisms



## Flex Shaft

## Product Description

**Flange-Mounted Handle Mechanisms**

Flange-mounted handle mechanisms mount on the flange of an enclosure door. The Flex Shaft is an extra heavy-duty mechanism that includes a flexible shaft in various lengths, 3 feet (0.9m) through 10 feet (3m) for use with various size enclosures.

The Flex Shaft handle will accept up to three padlock shackles, each with a maximum diameter of 3/8 inches (9.5 mm). It can be used with Type 12 fabricated enclosures. An optional handle is available for Flex Shaft that is suitable for use with Type 4 environments.

Flex Shaft comes preset from the factory, requiring only minor field adjustments on installation, which takes about 10 minutes—a significant time savings compared to installation of other types of flange handle mechanisms. The Flex Shaft mechanism also takes up less interior enclosure space than competitive designs, and the handle fits standard flange cutouts. Flex Shaft handle can be remotely mounted from breaker, where an operator can use it by “funneling” the cable through conduit.

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## Standards and Certifications

Flex Shaft is UL listed under File E64983 and meets CSA requirements.



# 2.6

## Molded Case Circuit Breakers

### Handle Mechanisms

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#### Product Selection

**Note:** Type 4X handle mechanisms are available. Add Suffix X to the complete Catalog Number.

**Note:** When selecting the length of shaft, ensure minimum bending radius of 4 inches (101.6 mm) is maintained to operate properly.

**Note:** The standard method of shipment includes the mechanism preset at the factory; however, minor field adjustments may be required.

#### Flex Shaft



#### Flex Shaft Flange-Mounted Handle Mechanisms ①②

Breaker Frame	Flexible Shaft Length in Feet (m)				
	2 (0.6) Catalog Number	3 (0.9) Catalog Number	4 (1.2) Catalog Number	5 (1.3) Catalog Number	6 (1.8) Catalog Number
EG	EHMFS02	EHMFS03	EHMFS04	EHMFS05	EHMFS06
JG	N/A	JHMFS03	JHMFS04	JHMFS05	JHMFS06
LG	N/A	—	LHMFS04	—	—
NG	N/A	N/A	F5S04C	F5S05C	F5S06C
RG	N/A	N/A	F6S04	F6S05	F6S06

Breaker Frame	Flexible Shaft Length in Feet (m)			
	7 (2.1) Catalog Number	8 (2.4) Catalog Number	9 (2.7) Catalog Number	10 (3.1) Catalog Number
EG	EHMFS07	EHMFS08	EHMFS09	EHMFS10
JG	JHMFS07	JHMFS08	JHMFS09	JHMFS10
LG	LHMFS07	—	—	LHMFS10
NG	N/A	N/A	N/A	F5S10C
RG	N/A	N/A	N/A	N/A

#### High-Performance Flex Shaft



#### High-Performance Flex Shaft Flange Mounted Handle Mechanism ①②

Breaker Frame	Flexible Shaft Length in Feet (m)				
	2 (0.6) Catalog Number	3 (0.9) Catalog Number	4 (1.2) Catalog Number	5 (1.3) Catalog Number	6 (1.8) Catalog Number
EG	EGFS02HP	EGFS03HP	EGFS04HP	EGFS05HP	EGFS06HP
JG	N/A	JGFS03HP	JGFS04HP	JGFS05HP	JGFS06HP
LG	N/A	N/A	LGFS04HP	N/A	N/A
NG	N/A	N/A	F5S04HP	F5S05HP	F5S06HP
RG	N/A	N/A	F6S04HP	F6S05HP	F6S06HP

Breaker Frame	Flexible Shaft Length in Feet (m)			
	7 (2.1) Catalog Number	8 (2.4) Catalog Number	9 (2.7) Catalog Number	10 (3.1) Catalog Number
EG	EGFS07HP	EGFS08HP	EGFS09HP	EGFS10HP
JG	JGFS07HP	JGFS08HP	JGFS09HP	JGFS10HP
LG	LGFS07HP	N/A	N/A	LGFS10HP
NG	N/A	N/A	N/A	F5S10HP
RG	N/A	N/A	N/A	N/A

#### Notes

- ① Three-pole only for EG-; three- and four-pole for JG- and LG-Frame.
- ② EG-, JG- and LG-Frame can be left- or right-hand mounted.

## Accessories

### Handle Auxiliary Switch—Early Break Design, 1A–1B Contact for Flex Shaft

Breaker Frame	Catalog Number
EG	AUX1EBFSEG
JG	AUX1EBFSJG
LG	AUX1EBFSLG

Auxiliary contact changes state prior to parting of breaker contacts to allow for shutdown of equipment. Contacts mounted on breaker mechanism customer supplied wiring.

### Type 12 Safety Door Hardware for Flex Shaft (E- through R-Frame) <sup>①</sup>

Catalog Number <sup>②</sup>
C361KJ4
C361KJ6
C361KR

## Dimensions

### Type 12 Safety Door Hardware for Flex Shaft (E- through R-Frame) <sup>①</sup>

Catalog Number <sup>②</sup>	Handle Length in Inches (mm)
C361KJ4	4.00 (101.6)
C361KJ6	6.00 (152.4)
C361KR	Roller latch <sup>③</sup>

#### Notes

- ① Customer: Consult with box manufacturer for correct door hardware and any adapters required for assembly.
- ② The 1/4-inch x 1/2-inch (6.35 x 12.7 mm) standard mill rectangular locking bar is not supplied with these kits.
- ③ Third roller latch for use with 4.00- or 6.00-inch (101.6 or 152.4 mm) handle when three-point latching is required.



#### Handle Mechanisms

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### Handle Mechanisms—Series C

#### Product Overview

Handle mechanisms are used to operate molded case circuit breakers, molded case switches and motor circuit protectors. They are available in three basic configurations—Flange Mounted, Through-the-Door and Direct (Close-Coupled)—providing safe, dependable operation and ease of installation.

#### **Through-the-Door**

- High-Performance Rotary
- Series C Rotary
- Universal Rotary

#### **Direct (Close-Coupled)**

- Universal Direct
- Euro IEC
- G Direct

#### **Flange Mounted**

- Flex Shaft
- C371

Handle mechanisms are used on enclosed circuit breakers, control panels and motor control centers in many different applications. Eaton has a handle mechanism for virtually any need.

**Through-the-Door Handle Mechanisms**

Eaton's through-the-door handle mechanisms mount on the front of an enclosure or cabinet door and externally operate the circuit breaker via a variable depth shaft or a linear operator (Type MC). Each rotary type handle mechanism includes a handle, base operating mechanism and shaft that can be cut to various lengths.

Series C Rotary and Universal Rotary handle mechanisms are for use with molded case circuit breakers (G, F, J, K, L, MDL), molded case switches and motor circuit protectors.

Type 4/4X handles are similar to standard handles except they include an internal neoprene gasket. Type 4/4X handle style number is 6648C22G03. Due to gasketing effect between the handle and the housing, the handle may not indicate a tripped position.

**Universal Rotary F-Frame****Direct (Close-Coupled) Handle Mechanisms**

Direct (close-coupled) handle mechanisms mount directly to the circuit breaker. They are used in shallow enclosures where the standard variable depth Through-the-door type mechanism is not practical or cannot be used. They are typically for applications where high volume, standardized enclosures are being fabricated.

The Euro IEC Direct handle mechanism can be used on F- through R-Frames.

The G Direct is available with a black or the yellow handle, and with or without a shroud. It is suitable for use with NEMA 1 enclosures. It is for use only with the G-Frame (GD, GC, GHC, GMCP).

An escutcheon ring and interlock clip are provided as standard. The standard design includes a lock-off feature.

**Flange-Mounted Handle Mechanisms**

Flange-mounted handle mechanisms mount on the flange of an enclosure door. The Flex Shaft is an extra heavy-duty mechanism that includes a flexible shaft in various lengths, 3 feet (0.9m) through 10 feet (3m) for use with various size enclosures.

The Flex Shaft handle will accept up to three padlock shackles, each with a maximum diameter of 3/8-inch (9.5 mm). Can be used with NEMA 1, 3R and 12 fabricated enclosures. An optional handle is available for Flex Shaft that is suitable for use with NEMA 4 and 4X environments. Flex Shaft comes preset from the factory, requiring only minor field adjustments on installation, which takes about 10 minutes—a significant time savings compared to installation of other types of flange handle mechanisms. The Flex Shaft mechanism also takes up less interior enclosure space than competitive designs and the handle fits standard flange cutouts. Flex Shaft handle can be remotely mounted from breaker, where an operator can use it by “funneling” the cable through conduit.

The Type C371 circuit breaker operating mechanisms are designed for installation in control enclosures where main or branch circuit protective devices are required. All circuit breaker mechanisms are suitable for right-hand mounting.

Auxiliary contacts are not available for mounting on operating mechanisms. Where required, have them installed in circuit breaker.

**Handle Extension**

Handle extension is not included with J, K, L, M and N-Frame breakers. It must be purchased separately.

**Standards and Certifications**

Type C371 is UL Listed under File E62635.

Flex Shaft is UL Listed under File E64983 and meets CSA requirements.

Series C Rotary and Universal Rotary, are UL Listed and meet CSA requirements. Universal Rotary also meets IEC 60947-1 and IEC 60947-2 for international compliance. Rotary UL File Number is E64983.

The Universal Direct handle mechanism is UL 489 Listed, IEC 60947-1 and IEC 60947-2, and meets CSA requirements. The Euro IEC Direct handle mechanism is IEC-240-1. G Direct is UL Listed and meets CSA requirements.



#### Handle Mechanisms

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### High-Performance Rotary Handle Mechanisms

#### Product Description

The high-performance rotary handle mechanism uses a simple, yet robust design to make installation and operation easy. The external handle's key functional components are all metallic, ensuring reliability. The metal-on-metal interface between the handle and shaft prevents contaminant buildup that could impede operation, while UV and chemical agent resistant materials protect the handle from heat and fading in direct sunlight, as well as chemicals that may be introduced in harsh environments.

In addition to its robust design features, the handle mechanism has stand-off support that allows for easy operation with a gloved hand. With a shallow profile, the handle can easily be used in applications where an internal or double door is required.

The high-performance external handle can accept padlocks or multi-hasps locks. The door is interlocked when padlocked and cannot be bypassed.

#### Features

- NEMA Type 1/3R/12 (IP54) and NEMA Type 4/4X (IP65) ratings
- Black/Blue or Red/Yellow external handle colors
- Three shaft lengths—6, 12 and 24 inches, which can be cut to size to match enclosure depth
- Conveniently packaged as kit containing handle, shaft and mechanism
- Replacement parts are available separately
- Metallic functional components ensure reliability
- Metal-on-metal interface between handle and shaft
- UV and chemical agent-resistant materials protect the handle
- Shallow profile
- Compatible with both Series C and Series G molded case circuit breakers and molded case switch platforms
- Same handle can be used on multiple frames sizes reducing the number of parts needed
- Red and yellow handles to designate emergency disconnecting means
- All handle mechanisms can accept padlocks or multi-hasps locks for added flexibility
- Fast, easy installation (see video on website for step-by-step instructions)

#### Standards and Certifications

The mechanisms for EG, JG and LG breakers have an internal handle that can be operated independent of door position, and locked-out to meet one of the key NFPA requirements (NFPA® 79) and UL 508A disconnect requirements.



- NEMA 1/3R/12, IP54
- NEMA 4/4X, IP65



## Product Selection

### Handle Mechanisms for Series C Frames

#### Kits Only (Kit Includes Shaft, Mechanism and Handle)—GC/GD- and GMCP-Frame

	Description	Rating Type		GC/GD-Frame	GMCP-Frame
		NEMA	IP	Catalog Number	Catalog Number
<b>S01 Blue Handle</b> 	S01 blue handle, 12-inch shaft	1/3R/12	54	<b>GCHMVD12B / 68C6039G01</b>	<b>GMHMVD12B / 68C6039G05</b>
		4/4X	65	<b>GCHMVD12BX / 68C6039G03</b>	<b>GMHMVD12BX / 68C6039G07</b>
<b>S01 Red Handle</b> 	S01 red handle, 12-inch shaft	1/3R/12	54	<b>GCHMVD12R / 68C6039G02</b>	<b>GMHMVD12R / 68C6039G06</b>
		4/4X	65	<b>GCHMVD12RX / 68C6039G04</b>	<b>GMHMVD12RX / 68C6039G08</b>

### Separate Components for Series C Frames

#### Series C Components—Shaft and Mechanism

Frame	Shaft Width	Shaft Length			Mechanism Only
		6-Inch	10-Inch	12-Inch	
GC/GD	6 mm	—	—	<b>66A6013H02</b>	<b>GCHMVD / 2A92095G15</b>
GMCP	6 mm	—	—	<b>66A6013H02</b>	<b>GMHMVD / 2A92095G16</b>
GD	8 mm	<b>66A6010G95</b>	—	<b>66A6010G96</b>	<b>1498D34G90</b>
FD	8 mm	<b>66A6010G95</b>	—	<b>66A6010G96</b>	<b>1498D34G91</b>
JD	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G92</b>
KD	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G93</b>
LD	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G94</b>
MDL	10 mm	<b>66A6012G15</b>	—	<b>66A6012G16</b>	<b>1498D34G95</b>
ND	12 mm	—	<b>66A6013H01</b>	—	<b>69D9101G30</b>
RD	12 mm	—	<b>66A6013H01</b>	—	<b>69D9101G31</b>

#### Note

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

# 2.6

## Molded Case Circuit Breakers

### Handle Mechanisms

#### Series C Components—Handles Only

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Frame	Rating Type		Handles Only							
	NEMA	IP	S01 Blue/Black	S01 Red/Yellow	S2 Blue/Black	S2 Red/Yellow	S3 Blue/Black	S3 Red/Yellow	S4 Blue/Black	S4 Red/Yellow
GC/GD	1/3R/12	54	68C6048G41	68C6048G42	—	—	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	—	—	—	—	—	—
GMCP	1/3R/12	54	68C6048G41	68C6048G42	—	—	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	—	—	—	—	—	—
GD	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
FD	1/3R/12	54	68C6048G41	68C6048G42	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	68C6048G43	68C6048G44	68C6048G03	68C6048G04	—	—	—	—
JD	1/3R/12	54	—	—	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	—	—	—	—
KD	1/3R/12	54	—	—	68C6048G01	68C6048G02	—	—	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	—	—	—	—
LD	1/3R/12	54	—	—	68C6048G01	68C6048G02	68C6048G05	68C6048G06	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	68C6048G07	68C6048G08	—	—
MDL	1/3R/12	54	—	—	68C6048G01	68C6048G02	68C6048G05	68C6048G06	—	—
	4/4X	65	—	—	68C6048G03	68C6048G04	68C6048G07	68C6048G08	—	—
ND	1/3R/12	54	—	—	—	—	68C6048G05	68C6048G06	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	68C6048G07	68C6048G08	68C6048G11	68C6048G12
RD	1/3R/12	54	—	—	—	—	—	—	68C6048G09	68C6048G10
	4/4X	65	—	—	—	—	—	—	68C6048G11	68C6048G12

**Note**

Shaft guide (68C6048G49) is optional and can be used with any high-performance handle listed above for greater alignment tolerance.

**Dimensions**

Approximate Dimensions in mm (Inches)

**High-Performance Rotary Handle Mechanisms**

Handle Type	Front Operation Direction of Operation	Door Drilling
Type S01		
Type S2		
Type S3		
Type S4		

Handle Mechanisms



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### Series C Rotary

#### Product Description

Eaton’s through-the-door handle mechanisms mount on the front of an enclosure or a cabinet door and externally operate the circuit breaker via a variable depth shaft or a linear operator (Type MC). Each rotary type handle mechanism includes a handle, a base operating mechanism and a shaft that can be cut to various lengths.

Series C Rotary handle mechanisms are used with molded case circuit breakers (F, J, K, L, MDL), molded case switches and motor circuit protectors.

These rotary handles are robust and durable, made entirely of metal parts. It also has a lock-out tag-out level at the tip of the handle for padlocking.

NEMA Type 4/4X handles are similar to standard handles except they include an internal neoprene gasket. NEMA Type 4/4X handle style number is 6648C22G03. Due to gasketing effect between the handle and the housing, the handle may not indicate a tripped position.

#### Standards and Certifications

Series C Rotary is UL listed and meets CSA requirements.



### Features

#### Features Comparison of Series C Rotary and Universal Rotary Handle Mechanism

Rotary	Number of Poles	NEMA Enclosure Type				Handle Lock-Off ②	Handle Indication: ON/OFF TRIPPED/RESET	International Markings ON (I) OFF (O)	Handle Material	Available Handle Colors	Handle Rotation	Shaft Lengths (Inches)
		1	3R	12	4/4X ①							
Series C rotary	—	■	■	■	■	■	■	■	Metal	Black	45 deg.	6, 12, 16, 24
Universal rotary	—	■	—	■	—	■	■	■	Molded plastic	Yellow/Red/Black	90 deg.	6, 12, 24

#### Notes

- ① Type 4/4X application requires special handle. See “Ordering Information.”
- ② All rotary handle mechanisms include a handle “Lock Off” to prevent turning the breaker ON while in the OFF position.



## Product Selection

## Through-the-Door Handle Mechanisms

## Series C Rotary

## Series C Rotary Ordering Information



Shaft Length Inches (mm)	Complete Catalog Number <sup>①</sup>	Separate Catalog Number		Shaft <sup>④</sup>	Catalog Number	
		Standard Handle <sup>②</sup>	Breaker Mechanism <sup>③</sup>		IEC IP65 <sup>⑤⑥</sup>	IEC IP66 <sup>⑤⑥</sup>
<b>F-Frame</b>						
6.00 (152.4)	HM1R06	6648C22G25	6648C23G11	4217B37G08	WHM1R06	WHM1R06X
12.00 (304.8)	HM1R12	6648C22G25	6648C23G11	4217B37G05	WHM1R12	WHM1R12X
16.00 (406.4)	HM1R16	6648C22G25	6648C23G11	4217B37G06	WHM1R16	WHM1R16X
24.00 (609.6)	HM1R24	6648C22G25	6648C23G11	4217B37G07	WHM1R24	WHM1R24X
<b>J-Frame</b>						
6.00 (152.4)	HM2R06	6648C22G01	6648C23G21	4217B37G08	WHM2R06	WHM2R06X
12.00 (304.8)	HM2R12	6648C22G01	6648C23G21	4217B37G05	WHM2R12	WHM2R12X
16.00 (406.4)	HM2R16	6648C22G01	6648C23G21	4217B37G06	WHM2R16	WHM2R16X
24.00 (609.6)	HM2R24	6648C22G01	6648C23G21	4217B37G07	WHM2R24	WHM2R24X
<b>K-Frame</b>						
6.00 (152.4)	HM3R06	6648C22G01	6648C23G25	4217B37G08	WHM3R06	WHM3R06X
12.00 (304.8)	HM3R12	6648C22G01	6648C23G25	4217B37G05	WHM3R12	WHM3R12X
16.00 (406.4)	HM3R16	6648C22G01	6648C23G25	4217B37G06	WHM3R16	WHM3R16X
24.00 (609.6)	HM3R24	6648C22G01	6648C23G25	4217B37G07	WHM3R24	WHM3R24X
<b>L- and MDL-Frame</b>						
6.00 (152.4)	HM4R06	6648C22G11	6648C23G19	4217B37G08	WHM4R06	WHM4R06X
12.00 (304.8)	HM4R12	6648C22G11	6648C23G19	4217B37G05	WHM4R12	WHM4R12X
16.00 (406.4)	HM4R16	6648C22G11	6648C23G19	4217B37G06	WHM4R16	WHM4R16X
24.00 (609.6)	HM4R24	6648C22G11	6648C23G19	4217B37G07	WHM4R24	WHM4R24X
<b>MD/MDS</b>						
6.00 (152.4)	HM7R06	6648C22G21	6648C23G17	4217B37G08	—	—
12.00 (304.8)	HM7R12	6648C22G21	6648C23G17	4217B37G05	—	—
16.00 (406.4)	HM7R16	6648C22G21	6648C23G17	4217B37G06	—	—
24.00 (609.6)	HM7R24	6648C22G21	6648C23G17	4217B37G07	—	—
<b>N-Frame (ND and NG)</b>						
6.00 (152.4)	HM5R06	6648C22G21	6648C23G08	4217B37G08	WHM5R06	WHM5R06X
12.00 (304.8)	HM5R12	6648C22G21	6648C23G08	4217B37G05	WHM5R12	WHM5R12X
16.00 (406.4)	HM5R16	6648C22G21	6648C23G08	4217B37G06	WHM5R16	WHM5R16X
24.00 (609.6)	HM5R24	6648C22G21	6648C23G08	4217B37G07	WHM5R24	WHM5R24X

**Notes**

- ① Complete catalog number includes the standard handle, mechanism, shaft and support brace/bracket.
- ② Handle is designed suitable for NEMA Types 1, 3R and 12 enclosures. Use style number **6648C22G03** for Type 4/4X handle or add **X** Suffix to complete catalog number. Handle is cast aluminum.
- ③ Breaker mechanism includes a shaft support bracket and its parts. Shaft is .50-inch (12.7 mm).
- ④ Longer shafts, 16-inch (406.4 mm) and 24-inch (609.6 mm), include an adjustable support extension.
- ⑤ IEC handle mechanism supplied with metric thread mounting hardware.
- ⑥ Complete catalog number includes a handle, mechanism and shaft.



Handle Mechanisms



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### Universal Rotary

#### Product Description

Eaton’s Universal Rotary is suitable for use with Type 1 or 12 enclosure types. All rotary handle mechanisms include a handle “lock off” to prevent turning the breaker ON while in the OFF position, and indicate ON/OFF/Tripped/Reset positions. The Universal Rotary has the added feature of international markings for ON (I) and OFF (O). The Universal Rotary is made of molded material.

The Universal Rotary mechanisms for EG-, JG- and LG-Frame MCCBs can be operated by hand with the door open or “locked off” to prevent operation with the door open.

#### Standards and Certifications

Universal Rotary is UL listed and meets CSA requirements. Universal Rotary also meets IEC 60947-1 and IEC 60947-2 for international compliance. Rotary UL File Number is E64983.



### Features

#### Features Comparison of Series C Rotary and Universal Rotary Handle Mechanism

Rotary	Number of Poles	NEMA Enclosure Type				Handle Lock-Off ②	Handle Indication: ON/OFF TRIPPED/RESET	International Markings ON (I) OFF (O)	Handle Material	Available Handle Colors	Handle Rotation	Shaft Lengths (Inches)
		1	3R	12	4/4X ①							
Series C rotary	—	■	■	■	■	■	■	■	Metal	Black	45 deg.	6, 12, 16, 24
Universal rotary	—	■	—	■	—	■	■	■	Molded plastic	Yellow/Red/Black	90 deg.	6, 12, 24

#### Notes

- ① Type 4/4X application requires special handle. See “Ordering Information.”
- ② All rotary handle mechanisms include a handle “Lock Off” to prevent turning the breaker ON while in the OFF position.

## Product Selection

## Universal Rotary F-Frame

Universal Rotary  
F-FrameSeries C Universal Rotary <sup>①</sup>

Handle Color	Shaft Length in Inches (mm)	Complete Catalog Number
<b>G-Frame</b>		
Black	6.00 (152.4)	<b>GHMVD06B</b>
	12.00 (304.8)	<b>GHMVD12B</b>
Red	6.00 (152.4)	<b>GHMVD06R</b>
	12.00 (304.8)	<b>GHMVD12R</b>
<b>F-Frame</b>		
Black	6.00 (152.4)	<b>FHMVD06B</b>
	12.00 (304.8)	<b>FHMVD12B</b>
Red	6.00 (152.4)	<b>FHMVD06R</b>
	12.00 (304.8)	<b>FHMVD12R</b>
	24.00 (609.6)	<b>FHMVD24R</b>
<b>J-Frame</b>		
Black	6.00 (152.4)	<b>JHMVD06B</b>
	12.00 (304.8)	<b>JHMVD12B</b>
Red	6.00 (152.4)	<b>JHMVD06R</b>
	12.00 (304.8)	<b>JHMVD12R</b>
<b>K-Frame</b>		
Black	6.00 (152.4)	<b>KHMVD06B</b>
	12.00 (304.8)	<b>KHMVD12B</b>
Red	6.00 (152.4)	<b>KHMVD06R</b>
	12.00 (304.8)	<b>KHMVD12R</b>
<b>L-Frame</b>		
Black	6.00 (152.4)	<b>LHMVD06B</b>
	12.00 (304.8)	<b>LHMVD12B</b>
Red	6.00 (152.4)	<b>LHMVD06R</b>
	12.00 (304.8)	<b>LHMVD12R</b>

**Note**

<sup>①</sup> Only available as complete handle mechanism. Parts not sold separately.

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### Direct (Close-Coupled) Handle Mechanisms

#### Product Description

Direct (close-coupled) handle mechanisms mount directly to the circuit breaker. They are used in shallow enclosures where the standard variable depth Through-the-door type mechanism is not practical or cannot be used.

The Universal Direct handle mechanisms are rated Type 1 and Type 12.

The Universal Direct handle mechanism is available as standard with a door interlock to prevent opening the enclosure while the circuit breaker is in the ON position. It is also available without a door interlock.

#### Application Description

Direct (close-coupled) handle mechanisms are typically used for applications where high volume, standardized enclosures are being fabricated.

#### Standards and Certifications

The Universal Direct handle mechanism is IEC 60947-1 and IEC 60947-2 compliant.

#### Product Selection

##### *Direct (Close-Coupled) Handle Mechanisms*

##### Euro IEC Direct

Frame	Black Handle
	Catalog Number
F	<b>HMCC1B</b>
J	<b>HMCC2B</b>
K	<b>HMCC3B</b>
L and M	<b>HMCC4B</b>
N	<b>HMVD5B</b>
R	<b>HMVD6B</b>

##### G Direct ①

Frame	Black Handle		Yellow Handle	
	With Shroud Catalog Number	Without Shroud Catalog Number	With Shroud Catalog Number	Without Shroud Catalog Number
GD/GHC	<b>HRGCC1S</b>	<b>HRGCC10</b>	<b>HRGCC3S</b>	<b>HRGCC30</b>
GMCP	<b>HRGMC1S</b>	<b>HRGMC10</b>	<b>HRGMC3S</b>	<b>HRGMC30</b>

#### Note

① Suitable for use on two- or three-pole G-Frame.

## Handle Mechanisms



## Flex Shaft

### Product Description

#### **Flange-Mounted Handle Mechanisms**

Flange-mounted handle mechanisms mount on the flange of an enclosure door. The Flex Shaft is an extra heavy-duty mechanism that includes a flexible shaft in various lengths, 3 feet (0.9m) through 10 feet (3m) for use with various size enclosures.

The Flex Shaft handle will accept up to three padlock shackles, each with a maximum diameter of 3/8 inches (9.5 mm). It can be used with Type 12 fabricated enclosures. An optional handle is available for Flex Shaft that is suitable for use with Type 4 environments.

Flex Shaft comes preset from the factory, requiring only minor field adjustments on installation, which takes about 10 minutes—a significant time savings compared to installation of other types of flange handle mechanisms. The Flex Shaft mechanism also takes up less interior enclosure space than competitive designs, and the handle fits standard flange cutouts. Flex Shaft handle can be remotely mounted from breaker, where an operator can use it by “funneling” the cable through conduit.

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Flex Shaft . . . . .	
Handle Mechanisms—Series C . . . . .	
High-Performance Rotary Handle Mechanisms . . . . .	<b>V4-T2-510</b>
Series C Rotary . . . . .	<b>V4-T2-514</b>
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Handle Extension . . . . .	<b>V4-T2-522</b>

### Standards and Certifications

Flex Shaft is UL listed under File E64983 and meets CSA requirements.



#### Product Selection

#### Handle Mechanisms

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#### Flex Shaft <sup>①②</sup>

Breaker Frame	Flexible Shaft Length in Feet (m)							
	3 (0.9)	4 (1.2)	5 (1.5)	6 (1.8)	7 (2.1)	8 (2.4)	9 (2.7)	10 (3.0)
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
G <sup>①</sup>	F0S03C	F0S04C	F0S05C	F0S06C	—	—	—	—
F	F1S03C	F1S04C	F1S05C	F1S06C	F1S07C	F1S08C	F1S09C	F1S10C
F (dual)	F1S03CD	F1S04CD	F1S05CD	F1S06CD	F1S07CD	F1S08CD	F1S09CD	F1S10CD
J	F2S03C	F2S04C	F2S05C	F2S06C	F2S07C	F2S08C	F2S09C	F2S10C
K	F3S03C	F3S04C	F3S05C	F3S06C	F3S07C	F3S08C	F3S09C	F3S10C
L and MDL	—	F4S04C	F4S05C	F4S06C	—	—	—	F4S10C
N	—	F5S04C	F5S05C	F5S06C	—	—	—	F5S10C
R	—	F6S04	F6S05	F6S06	—	—	—	—
MD, MDS (old)	—	F7S04	F7S05	F7S06	—	—	—	F7S10C

#### High Performance Flex Shaft <sup>①②</sup>

Breaker Frame	Flexible Shaft Length in Feet (m)							
	3 (0.9)	4 (1.2)	5 (1.3)	6 (1.8)	7 (2.1)	8 (2.4)	9 (2.7)	10 (3.1)
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
G	F0S03HP	F0S04HP	F0S05HP	F0S06HP	N/A	N/A	N/A	N/A
F	F1S03HP	F1S04HP	F1S05HP	F1S06HP	F1S07HP	F1S08HP	F1S09HP	F1S10HP
F (dual)	F1S03HPD	F1S04HPD	F1S05HPD	F1S06HPD	F1S07HPD	F1S08HPD	F1S09HPD	F1S10HPD
J	F2S03HP	F2S04HP	F2S05HP	F2S06HP	F2S07HP	F2S08HP	F2S09HP	F2S10HP
K	F3S03HP	F3S04HP	F3S05HP	F3S06HP	F3S07HP	F3S08HP	F3S09HP	F3S10HP
L and MDL	N/A	F4S04HP	F4S05HP	F4S06HP	N/A	N/A	N/A	F4S10HP
N	N/A	F5S04HP	F5S05HP	F5S06HP	N/A	N/A	N/A	F5S10HP
R	N/A	F6S04HP	F6S05HP	F6S06HP	N/A	N/A	N/A	N/A

#### Flange-Mounted Handle Mechanisms

#### Type C371

Circuit Breaker or Motor Circuit Protector	Frame Size	Variable Depth Mounting Range Min./Max. <sup>②③</sup>	Operating Mechanism Only <sup>④</sup> Catalog Number	Operating Mechanism w/ 4-Inch Handle	
				For NEMA 1–12 Enclosure Catalog Number	For NEMA 4/4X Enclosure Catalog Number
HMCP and Series C—EHD, FDB, FD, FDC, HFD, ED	150	6.50–16 (165.1–406.4)	C371E	C371E1	C371E2
HMCP and Series C—HJD, JD, JDB, JDC	250	6.50–16.63 (165.1–422.4)	C371F	C371F5	C371F6
HMCP and Series C—DK, HKD, KD, KDB	400	6.50–16.63 (165.1–422.4)	C371F	C371F5	C371F6
Series C—HLD, LD, LDC	600	8.50–22 (215.9–558.8)	C371G	C371G5	C371G6
Series C MD, MDS—(No MDL)	800	8.75–22 (222.3–558.8)	C371K	C371K5	C371K6
Series C—HND, ND, NDC	1200	9.75–22 (247.7–558.8)	C371K	C371K5	C371K6

#### Notes

- ① Suitable for GC/GD MCCB; not suitable for GMCP.
- ② For increased maximum allowable depth, see connecting rods on **Page V4-T2-521**.
- ③ Dimensions shown are from panel flange surface.
- ④ Does not include handle.

Type 4/4X handle mechanisms are available. Add Suffix **X** to complete catalog number. Add Suffix **I** to complete catalog number for IEC handle. Original narrow handle design (No C Suffix) is available. Remove C from catalog number.

When selecting the length of shaft, ensure minimum bending radius of 4 inches (101.6 mm) (5 inches, 12.7 mm for L-, N- and R-Frames) is maintained to operate properly. The standard method of shipment includes the mechanism preset at the factory; however, minor field adjustments may be required.

Dual breakers operator available on F-Frame only. Only the F, J and K can mount LH and RH all other RH only.

Approximate Dimensions in Inches (mm)

### Handle Only

Circuit Breaker Frame Size (Amperes)	NEMA Enclosure Type	Operating Handle Length	Catalog Number
150	1/3R/3/12	4.00 (101.6)	<b>C371H1</b>
	4/4X	4.00 (101.6)	<b>C371H2</b>
	1/3R/3/12	6.00 (152.4)	<b>C371H3</b>
	4/4X	6.00 (152.4)	<b>C371H4</b>
250–1200	1/3R/3/12	4.00 (101.6)	<b>C371H5</b>
	4/4X	4.00 (101.6)	<b>C371H6</b>
	1/3R/3/12	6.00 (152.4)	<b>C371H7</b>
	4/4X	6.00 (152.4)	<b>C371H8</b>

### Channel Support Kit (Rod Not Supplied)

For use to prevent bending of the operating handle mounting surface. This is especially useful when the operating handle is mounted on a channel in a multi-door enclosure.

Amperes	Catalog Number
600–1200	<b>C371CS6</b>

### Connecting Rods <sup>①</sup>

Application	Catalog Number
Disconnect switches (30, 60, 100, 200 A sizes)	<b>C371CS1</b>
Circuit breakers (150, 250, 400 A sizes)	<b>C371CS1</b>
Circuit breakers (600, 800, 1200 A sizes)	<b>C371CS2</b>

#### Note

<sup>①</sup> Increase maximum allowable depth by 5 inches (127 mm).

# 2.6

## Molded Case Circuit Breakers

### Handle Mechanisms

#### Handle Extension

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Handle Mechanisms—Series C	
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Series C Rotary . . . . .	<b>V4-T2-514</b>
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### Handle Extension

#### Product Description

- Suitable for use on two- or three-pole G-Frame
- Not included with J, K, L, M and N-Frame breakers; it must be purchased separately
- Included with R-Frame breakers

#### Product Selection

##### Handle Extension

##### Handle Extension ①②



Frame	Style Number
J, K	HEX3
L, M	HEX4
N	HEX5
R	HEX6

#### Notes

- ① Handle extension is not included with J, K, L, M and N-Frame breakers. It must be purchased separately.
- ② Handle extension is included with breaker with R-Frame breakers.

# Power Breakers, Contactors and Fuses

Power Breakers, Contactors  
and Fuses Family



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	Magnum IEC Rated Air Circuit Breakers . . . . .	V4-T3-23
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# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Power Circuit Breaker



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### Low Voltage Power Circuit Breakers

#### Product Overview

##### **Magnum Low Voltage Power Circuit Breakers for Global Application**

Magnum® low voltage power circuit breakers enable comprehensive solutions to meet and exceed the unique and wide-ranging requirements of today's global power distribution systems. This powerful circuit breaker offering is designed for ultimate custom configuration and application flexibility, with the needs of the power distribution equipment user and the electrical equipment manufacturer in mind.

##### **Four Product Families**

Magnum consists of four product families; each provides specific ratings, features and approvals to optimize performance when applied in power distribution equipment and custom enclosures.

##### **Magnum DS Low Voltage Power Circuit Breakers for ANSI Rated Switchgear Applications**

- Up to 635 Vac
- 200 to 5000 A continuous
- 42 to 200 kA interrupting



**Magnum DS Low Voltage Power Circuit Breaker Family ANSI Rated for Switchgear Applications**

##### **Magnum IEC Air Circuit Breakers for IEC Rated Switchboards**

- Up to 690 Vac
- 200 to 6300 A continuous
- 40 to 105 kA  $I_{cu}/I_{cs}$



**Magnum IEC Low Voltage Air Circuit Breaker Family**

##### **Magnum SB Low Voltage Insulated Case Circuit Breakers for Switchboard Applications**

- Up to 635 Vac
- 200 to 5000 A continuous
- 50 to 150 kA interrupting



**Magnum SB Low Voltage Insulated Case Circuit Breaker Family UL Rated for Switchboard Applications**

##### **Magnum DC Switches for Direct Current Applications**

- Up to 1000 Vdc
- 800 to 3200 A continuous
- 50 to 65 kA withstand rating



**Magnum DC Switch Family**

**Features, Benefits and Functions**

- **200 kA interruption ratings** with current limiting performance and low current let-through to reduce damaging energy to downstream equipment at high fault levels
- **Withstand ratings up to 100 kA** to maximize system coordination and selectivity
- **Four physical frame sizes** (Narrow, Standard, Double Narrow and Double) to promote breaker application in compact modular enclosures and improve enclosure density
- **Continuous current ratings from 800 to 6300A** with 100% rating at 104 °F (40 °C) and no derating on most ratings up to 122 °F (50 °C)
- **Fixed breaker mounting configurations** with horizontal and optional vertical and front connected terminal connections
- **Drawout breaker mounting configurations** with cassette and optional safety shutters
- **Three- and four-pole breaker configurations**
- **Through-the-door design** for human interface with the breaker compartment door closed
- **DC rated switches** for direct current applications
- **Two-step stored energy mechanism** for manually and electrical operated breakers
- **Digitrip™ RMS Trip Unit family protection** with four models each providing increasing levels of protection and feature options for coordination, information and diagnostics:
  - Microprocessor-based rms sensing
  - Basic to programmable overcurrent protection and alarms
  - Local display for information, status and diagnostics
  - Ampere, voltage and power metering
  - Power quality, harmonics and waveform capture
  - Communications with translators to common protocols
  - Zone selective interlocking for improved coordination
  - Integral Arcflash Reduction Maintenance System™
  - Breaker health monitoring
- **Field-installable accessories** (UL® listed) common across the breaker frames and designed to be easily installed in the field to service or modify the breaker at the point of use
- **Secondary terminal contacts** mounted at the top front of the breaker and away from the primary voltage areas for improved safety and access. Finger-safe terminal blocks accommodate ring-tongue or spade type terminals as standard
- **Arcflash Reduction Maintenance System** Eaton's patented Arcflash Reduction Maintenance System technology provides maintenance staff with improved safety of downstream maintenance locations using a simple and reliable method to reduce fault clearing times and energy during an arc flash event (radiation, sound, pressure, temperature). Arcflash Reduction Maintenance System uses a separate analog trip circuit, providing faster signal processing and interruption times than the standard (digital) "instantaneous" protection. The Arcflash Reduction Maintenance System function is activated either directly on the circuit breaker through a local switch or remotely through communications or a digital input



*Through-the-Door Design for Human Interface with the Breaker Compartment Door Closed*



*High Technology Microprocessor-Based Digitrip RMS 1150+ Trip Units are Available With Advanced Features Like Programmable Overcurrent Settings, Power Metering, Power Quality and Communications*

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

3

#### Breaker Features on Front Cover

The controls and indicators are functionally grouped on the breaker faceplate to optimize the human interface, visibility and ease of use. For maximum safety, a modern, through-the-door design permits access to the breaker levering system, trip unit, controls and indicators with the door closed.

#### Magnum DS Drawout Breaker



- ① Red Mechanical Trip Flag Pop-out Indicator (Optional)—Interlocked Indicator Requiring Manual Reset is also Available
- ② Accessory Viewing Windows for:
  - Shunt Trip Attachment (STA)
  - Spring Release Device (SR)
  - Undervoltage Release (UVR) Device or Second STA
- ③ Digitrip RMS Trip Unit (Model 520M Shown) Protected by Clear Cover
- ④ Contact Status Indicators:
  - OPEN—Green
  - CLOSED—Red
- ⑤ Spring Status Indicators:
  - Charged—Yellow
  - Discharged—White
- ⑥ Push OFF (Open) Pushbutton—Red
- ⑦ Push ON (Close) Pushbutton—Green
- ⑧ Manual Spring Charging Handle for Manually Charging the Stored Energy Springs
- ⑨ Mechanical Operations Counter (Optional)
- ⑩ Key Off Lock (Optional)
- ⑪ Padlockable Levering Device Shutter for Drawout Breakers
- ⑫ Color-Coded Position Indicator for Drawout Breakers:
  - CONNECT—Red
  - TEST—Yellow
  - DISCONNECT—Green



**Accessory Viewing Windows Visibly Confirm the Breaker Shunt Trip, Spring Release, and UVR Installation and Their Control Voltage Rating**



**Through-the-Door Design for Human Interface with the Breaker Compartment Door Closed, for Example, Manually Charging the Stored Energy Springs**



**Drawout Breaker Levering Can be Accomplished With the Compartment Door Closed Without the Need for a Special Levering Tool**

**Breaker Internal Features**

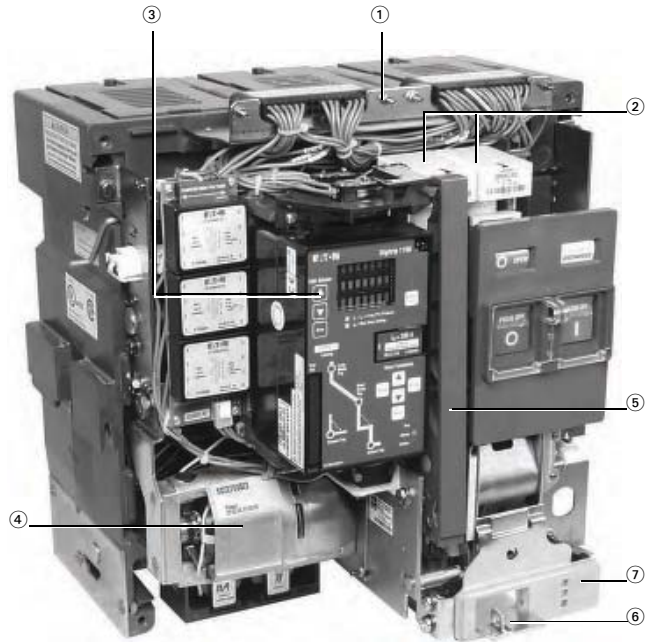
Magnum is designed for ease of access for inspection, modification and maintenance at the point of use. The breaker front cover is easily removed with four captive bolts, revealing the modular internal breaker features.

- ① Secondary Terminal Points for Internal Breaker Wiring Connections
- ② Breaker Accessory Mounting Deck with Three Positions for Mounting:
  - Shunt Trip Attachment (STA)
  - Spring Release Device (SR)
  - Undervoltage Release (UVR) Device or Second STA
- ③ Digitrip RMS Trip Unit (Model 1150+ Shown)
- ④ Spring Charging Motor (Optional) for Electrically Charging the Stored Energy Springs
- ⑤ Manual Spring Charging Handle for Manually Charging the Stored Energy Springs

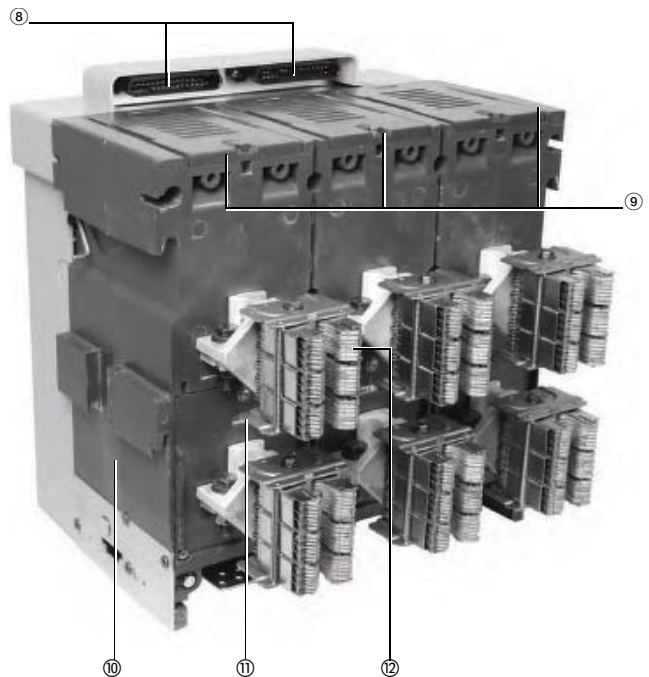
- ⑥ Padlockable Levering Device Shutter for Drawout Breakers
- ⑦ Color-Coded Position Indicator for Drawout Breakers:
  - CONNECT—Red
  - TEST—Yellow
  - DISCONNECT—Green
- ⑧ Secondary Contact Blocks for Connection to External Cell Control Wiring
- ⑨ Removable Arc Chute Covers for Easy Access to Breaker Main Contacts
- ⑩ Primary Finger Cluster Disconnecting Contacts for Drawout Breaker are Mounted on the Breaker Element (Not in the Breaker Compartment) for Ease of Access for Inspection and Maintenance

**Note:** Some competitors mount the primary finger clusters inside the cell, requiring shutdown of the switchgear for inspection and maintenance.

- ⑪ Current Sensor Viewing Windows to View and Confirm Breaker Sensor Rating
- ⑫ Rigid Frame Housing (Thermoset Composite Resin) Providing Increased Strength and Durability



**Magnum Drawout Breaker Front View With Front Cover Removed Showing Easy Access to the Breaker Internal Devices**



**Magnum Drawout Breaker Rear View Showing Primary Disconnecting Finger Clusters Mounted on the Breaker for Ease of Inspection**



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

3

#### Magnum DS, MDSX and MDSL Circuit Breakers



#### Magnum DS Low Voltage Power Circuit Breakers

##### Product Description

Magnum DS is a true UL 1066 listed low voltage power circuit breaker family, designed for the highest performance requirements of switchgear and specialty enclosure applications.

- Magnum DS low voltage power circuit breakers have interruption ratings up to 200 kA at 480 Vac, and short-time withstand ratings up to 100 kA at 635 Vac with continuous current ratings up to 5000 A to maximize system coordination and selectivity
- Magnum MDSX current limiting power circuit breakers have 200 kA interruption ratings at 480 Vac with continuous current ratings up to 5000 A
- Magnum MDSL current limiting power circuit breakers have 200 kA interruption ratings up to 2000 A



*The Magnum MDSL current limiting power circuit breakers have integral current limiters to provide interruption ratings of 200 kA at 600 Vac.*



*The Magnum MDSX current limiting power circuit breakers have fast opening contacts to provide interruption ratings up to 200 kA at 480 Vac without fuses.*

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Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-55</b>

#### Standards and Certifications

##### UL and ANSI Test Certifications

Magnum DS meets or exceeds the applicable ANSI, NEMA®, UL and CSA® standards, including:

- ANSI C37.13 (Low Voltage AC Power Circuit Breakers Used in Enclosures)
- ANSI C37.16 (Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC Power Circuit Breakers)
- ANSI C37.17 (Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers)
- ANSI C37.50 (Test Procedures for Low Voltage AC Power Circuit Breakers Used in Enclosures)
- UL 1066 (Standard for Low Voltage AC and DC Power Circuit Breakers Used in Enclosures)
- NEMA SG3 (This standard adopts ANSI C37.16 in its entirety)

##### Comprehensive Enclosure Solutions

Magnum DS has proven performance in Eaton manufactured switchgear with the following test certifications:

- UL 1558 (Certified Magnum DS Low Voltage Metal-Enclosed Switchgear)
- UL 1008 Standard for Transfer Switch Equipment
- UL, CSA 22.2.31 Low Voltage Assemblies

##### Approvals and Marks

- UL listed: Magnum DS Breaker UL File No. E52096 and Cassette UL File No. E204565
- ABS (American Bureau of Shipping) Type Listed Certificate Number 04-HS422844A-DUB
- Additional Magnum DS approvals and certificates can be found on [www.eaton.com](http://www.eaton.com)



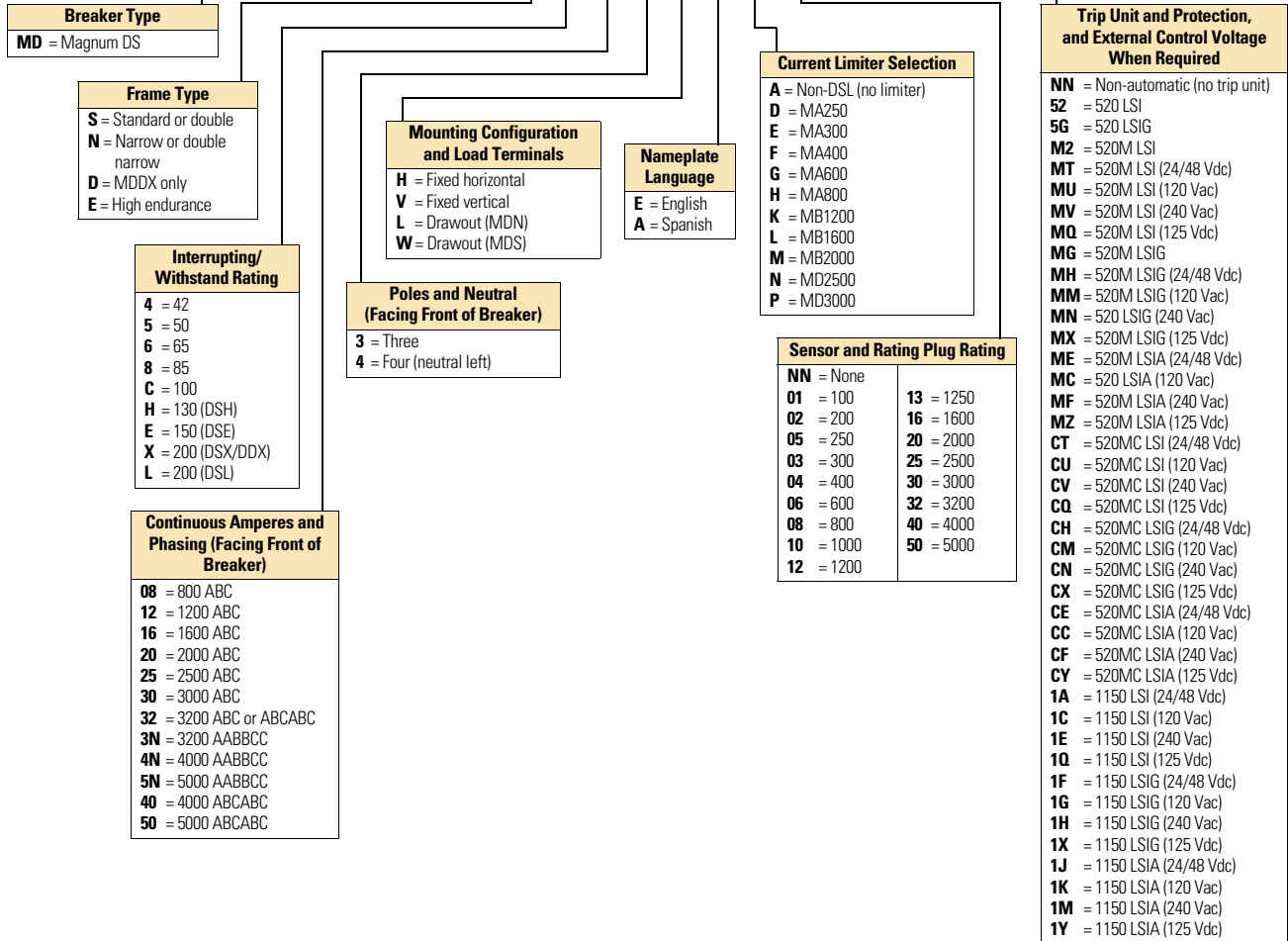
#### Product Selection

Contact Eaton for pricing.

Catalog Number Selection

Magnum DS ANSI Breaker Product Family

**MD S 4 12 3 V E A 06 MU**



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Magnum DS ANSI Breaker Product Family, continued

3

**A W C H N E H K L A X**

**Shunt Trip (ST)**

N = None  
**A** = 110–127 Vac/Vdc  
**R** = 208–240 Vac/Vdc  
**C** = 24 Vdc  
**H** = 48 Vdc  
**B** = 110–127 Vac/Vdc (100% duty)  
**S** = 220–250 Vac/Vdc (100% duty)  
**D** = 24 Vdc (100% duty)  
**K** = 48 Vdc (100% duty)  
**J** = 60 Vdc (100% duty)  
**6** = 60 Vdc

**Motor Operator**

**M** = Manual operated  
**N** = 110–125 Vac (5-sec)  
**W** = 110–125 Vdc (5-sec)  
**T** = 220–250 Vdc (5-sec)  
**P** = 208–277 Vac (5-sec)  
**L** = 24 Vdc (5-sec)  
**K** = 48 Vdc (5-sec)  
**S** = 60 Vdc (5-sec)  
**1** = 110–125 Vac (3-sec)  
**2** = 220–250 Vac (3-sec)  
**4** = 24 Vdc (3-sec)  
**8** = 48 Vdc (3-sec)  
**5** = 110–125 Vdc (3-sec)  
**9** = 220–250 Vdc (3-sec)

**Spring Release Device (SRD)**

N = None  
**A** = 110–127 Vac/Vdc  
**R** = 208–240 Vac/Vdc  
**C** = 24 Vdc  
**H** = 48 Vdc  
**S** = 60 Vdc

**Undervoltage Release (UVR) or 2nd Shunt Trip (ST)**

N = None  
**A** = UVR (110–127 Vac)  
**R** = UVR (208–240 Vac)  
**C** = UVR (24 Vdc)  
**H** = UVR (48 Vdc)  
**D** = UVR (60 Vdc)  
**E** = UVR (110–125 Vdc)  
**F** = UVR (220–250 Vdc)  
**G** = UVR (32 Vdc)  
**X** = UVR (380–415 Vac)  
**J** = UVR (480 Vac)  
**K** = UVR (600 Vac)  
**1** = 2nd ST (110–127 Vac/Vdc)  
**2** = 2nd ST (208–250 Vac/Vdc)  
**3** = 2nd ST (24 Vdc)  
**4** = 2nd ST (48 Vdc)  
**6** = 2nd ST (60 Vdc)  
**B** = 2nd ST (110–127 Vac/Vdc 100% duty)  
**O** = 2nd ST (220–250 Vac/Vdc 100% duty)  
**I** = 2nd ST (24 Vdc 100% duty)  
**Q** = 2nd ST (48 Vdc 100% duty)  
**9** = 2nd ST (60 Vdc 100% duty)

**Auxiliary Switch**

N = None  
**2** = 2A/2B  
**4** = 4A/4B  
**6** = 6A/6B

**Bell Alarms Switch (OTS) with 2a/2b Contacts and/or Mechanical Trip Indicator**

	Mech. Trip Indicator	Mech. Interlock for Manual Reset	OTS Switch with Two Form C Contacts
<b>E</b>	No	—	No
<b>N</b>	Yes	No	No
<b>Y</b>	Yes	No	Yes
<b>M</b>	Yes	Yes	No
<b>L</b>	Yes	Yes	Yes
<b>F</b>	Yes	No	Yes with 24 V reset
<b>G</b>	Yes	No	Yes with 120 V reset
<b>H</b>	Yes	No	Yes with 240 V reset
<b>I</b>	Yes	Yes	Yes with 24 V reset
<b>J</b>	Yes	Yes	Yes with 120 V reset
<b>K</b>	Yes	Yes	Yes with 240 V reset

**Padlock Provisions for Blocking Close and/or Open ACB Manual Pushbuttons**

N = None  
**M** = Metal (block close and open)  
**P** = Plastic (block close and open)  
**C** = Metal (block close only)  
**H** = Plastic (block close only)  
**S** = Metal swbd lock-off (block close, depress open)

**Operations Counter and/or Keylock Provisions**

	Counter	Keylock Provisions
<b>N</b>	No counter	No locks
<b>K</b>	No counter	Kirk lock
<b>C</b>	No counter	Castell lock
<b>R</b>	No counter	Ronis lock
<b>S</b>	No counter	CES lock
<b>A</b>	Counter	No lock
<b>Y</b>	Counter	Kirk lock
<b>L</b>	Counter	Castell lock
<b>H</b>	Counter	Ronis lock indicator
<b>E</b>	Counter	CES lock

**Latch Check Switch/Trip Unit Metering Voltage Connection for Digitrip 1150 Trip Unit**

	Latch Check Switch	1150 Voltage Connection
<b>N</b>	None	Upper terminals
<b>M</b>	None	Lower terminals
<b>L</b>	LCS wired to SRD	Upper terminals
<b>Y</b>	LCS Wired to SRD	Lower terminals
<b>C</b>	LCS Wired External	Upper terminals
<b>D</b>	LCS Wired External	Lower terminals

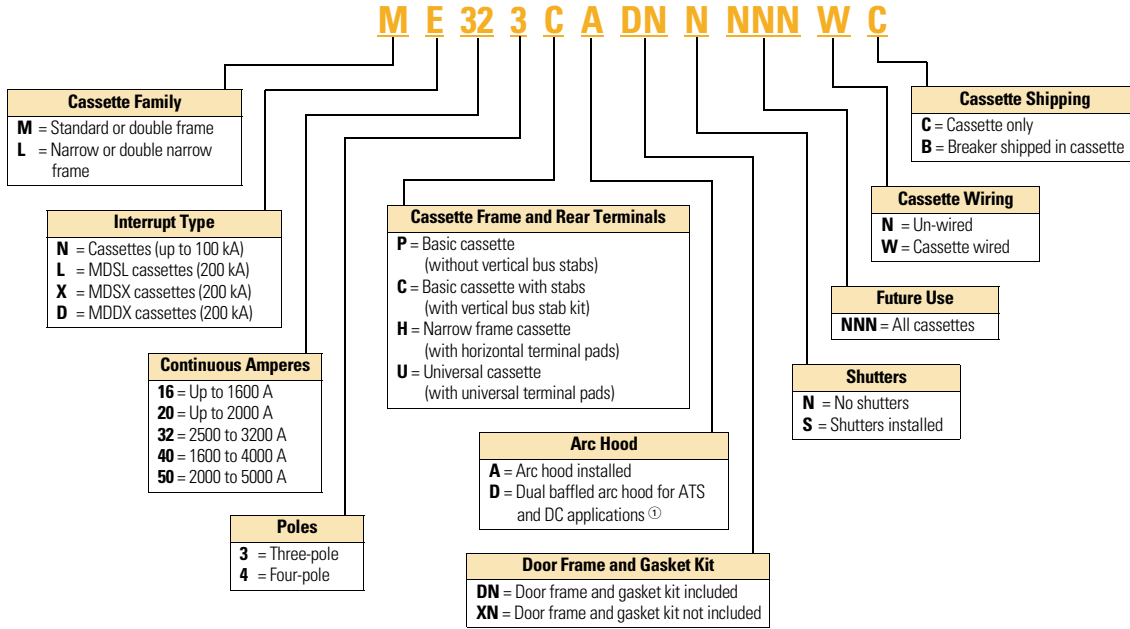
**Breaker Shipping Options and Instructions**

**A** = Fixed breaker alone with door kit  
**B** = Fixed breaker alone with door kit and pre-wired  
**F** = Fixed breaker alone without door kit  
**A** = Drawout breaker alone without door frame kit  
**C** = Drawout breaker in cassette (un-wired)  
**P** = Drawout breaker in cassette (shutters)  
**S** = Drawout breaker in cassette (shutters)  
**W** = Drawout breaker in cassette (pre-wired and shutters)  
 Double frame drawout breakers ship without cassette drawout. ACBs ship in narrow and universal cassettes only.

**Frame Use**

**X** = All breakers

### Cassette Magnum DS ANSI Breaker Product Family



**Note**

① The arc hood option 'D' is recommended for use for ATS applications as well as on Magnum ANSI DC breakers, 'DAS' and 'DBS' configurations.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Technical Data and Specifications

#### Magnum DS Switchgear Class UL 1066 Low Voltage Power Circuit Breakers

Frame Amperes	Breaker Type Catalog Position 1–6	Frame Type	rms Symmetrical Current Ratings kA 50/60 Hz ①				Short-Time Withstand Rating	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker $I_n$ Rating)
			Interruption Rating at 254 Vac	Interruption Rating at 508 Vac	Interruption Rating at 635 Vac	Interruption Rating at 635 Vac			
800	MDN-408	Narrow	42	42	42	42	—	200, 250, 300, 400, 600, 800	
	MDN-508	Narrow	50	50	50	50	—		
	MDN-608	Narrow	65	65	65	65	—		
	MDN-C08	Narrow	100	100	65	20	18 x $I_n$		
	MDS-408	Standard	42	42	42	42	—		
	MDS-508	Standard	50	50	50	50	—		
	MDS-608	Standard	65	65	65	65	—		
	MDS-808	Standard	85	85	85	85	—		
	MDS-C08	Standard	100	100	100	85	85		
	MDS-H08	Standard	130	130	130	85	85		
	MDS-L08 ②	Standard	200	200	200	—	—		
MDS-X08 ③	Standard	200	200	65	30	30			
1200	MDN-412	Narrow	42	42	42	42	—	200, 250, 300, 400, 600, 800, 1000, 1200	
	MDN-512	Narrow	50	50	50	50	—		
	MDN-612	Narrow	65	65	65	65	—		
	MDN-C12	Narrow	100	100	65	25	18 x $I_n$		
	MDS-X12	Standard	200	200	65	30	30		
	MDS-512	Standard	50	50	50	50	—		
	MDS-612	Standard	65	65	65	65	—		
	MDS-812	Standard	85	85	85	85	—		
	MDS-C12	Standard	100	100	100	85	—		
	MDS-H12	Standard	130	130	130	85	85		
1600	MDN-416	Narrow	42	42	42	42	—	200, 250, 300, 400, 600, 800, 1000, 1200, 1600	
	MDN-516	Narrow	50	50	50	50	—		
	MDN-616	Narrow	65	65	65	65	—		
	MDN-C16	Narrow	100	100	65	30	18 x $I_n$		
	MDS-516	Standard	50	50	50	50	—		
	MDS-616	Standard	65	65	65	65	—		
	MDS-816	Standard	85	85	85	85	—		
	MDS-C16	Standard	100	100	100	85	85		
	MDS-H16	Standard	130	130	130	85	85		
	MDS-L16 ②	Standard	200	200	200	—	—		
MDS-X16 ③	Standard	200	200	65	30	30			
2000	MDN-620	Narrow	65	65	65	65	—	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000	
	MDN-C20	Narrow	100	100	65	35	18 x $I_n$		
	MDS-620	Standard	65	65	65	65	—		
	MDS-820	Standard	85	85	85	85	—		
	MDS-C20	Standard	100	100	100	85	85		
	MDS-H20	Standard	130	130	130	85	85		
	MDS-L20 ②	Standard	200	200	200	—	—		
	MDS-X20 ③	Standard	200	200	65	30	30		

#### Notes

- ① Interrupting ratings shown based on breaker equipped with integral Digitrip RMS trip unit. Interruption ratings for non-automatic breakers are equal to the published short-time withstand rating. These interruption ratings are based on the standard duty cycle consisting of an open operation, a 15-second interval and a close-open operation, in succession, with delayed tripping in case of short-delay devices. The standard duty cycle for short-time ratings consists of maintaining the rated current for two periods of 1/2 seconds each, with a 15-second interval of zero current between the two periods.
- ② Magnum MDSL current limiting power circuit breaker with integral current limiters. Current Limiter selected determines short-time and fixed instantaneous trip rating. Maximum voltage rating is 600 Vac.
- ③ Magnum MDSX current limiting power circuit breaker with fast opening contacts.

Magnum DS Switchgear Class UL 1066 Low Voltage Power Circuit Breakers, continued

Frame Amperes	Breaker Type Catalog Position 1–6	Frame Type	rms Symmetrical Current Ratings kA 50/60 Hz <sup>①</sup>				Short-Time Withstand Rating	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interruption Rating at 254 Vac	Interruption Rating at 508 Vac	Interruption Rating at 635 Vac				
2500	MDS-625	Standard	65	65	65	65	—	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500	
	MDS-825	Standard	85	85	85	85	—		
	MDS-C25	Standard	100	100	100	100 <sup>②</sup>	85		
	MDS-H25	Standard	130	130	130	85	85		
3200	MDS-632	Standard	65	65	65	65	—	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500, 3000, 3200	
	MDS-832	Standard	85	85	85	85	—		
	MDS-C32	Standard	100	100	100	85	85		
	MDS-H32	Standard	130	130	130	85	85		
	MDS-X32 <sup>③</sup>	Double	200	200	<sup>④</sup>	50	50		
4000	MDN-640	Double narrow	65	65	65	65	—	2000, 2500, 3200, 4000	
	MDN-840	Double narrow	85	85	65	85	—		
	MDN-C40	Double narrow	100	100	65	100	—		
	MDS-840	Double	85	85	85	85	—		
	MDS-C40	Double	100	100	100	100	—		
	MDS-H40	Double	130	130	130	130	—		
	MDS-X40 <sup>③</sup>	Double	200	200	<sup>⑤</sup>	50	50		
	MDD-X40	Double	200	200	100	100	—		
5000	MDS-850	Double	85	85	85	85	—	2500, 3200, 4000, 5000	
	MDS-C50	Double	100	100	100	100	—		
	MDS-H50	Double	130	130	130	130	—		
	MDS-X50 <sup>③⑤</sup>	Double	200	200	<sup>④</sup>	50	50		
	MDD-X50	Double	200	200	100	100	—		

Notes

- ① Interruption ratings shown based on breaker equipped with integral Digitrip RMS trip unit. Interruption ratings for non-automatic breakers are equal to the published short-time withstand rating. These interruption ratings are based on the standard duty cycle consisting of an open operation, a 15-second interval and a close-open operation, in succession, with delayed tripping in case of short-delay devices. The standard duty cycle for short-time ratings consists of maintaining the rated current for two periods of 1/2 seconds each, with a 15-second interval of zero current between the two periods.
- ② Short-time withstand for MDSC at 2500A for 600 Vac is 85 kA.
- ③ Magnum MDSX current limiting power circuit breaker with fast opening contacts.
- ④ Product to be tested. Contact Eaton for product rating.
- ⑤ Breaker applied in a tested fan-cooled enclosure.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

3

Magnum MDSL Current Limiting Power Circuit Breaker



### Magnum MDSL Current Limiting Power Circuit Breaker

#### Product Description

The following curves illustrate the ratings, melting time-current characteristics and current limiting, or let-through characteristics, of limiters for Magnum low voltage power circuit breakers.

The let-through current for a given limiter application is readily determined by extending a vertical line from the applicable maximum available symmetrical fault amperes at the bottom margin to the characteristic line for the particular limiter, and from this intersection extending a horizontal line to the left margin and reading the peak current. The withstand rating of any circuit elements protected by the limiters should be at least equal to this peak current.

It will be noted that the let-through current increases with the limiter size or ampere rating; in other words, the maximum current limiting effect is obtained with the smallest size. This effect is to be expected, since the resistance decreases as the rating increases. If the vertical line from the bottom margin as described in the previous paragraph does not intersect the limiter characteristic line,

the available system fault current is below the "threshold" current of that limiter, and it will offer no current limiting effect.

The current limiting principle is illustrated below:

$I_a$  = The Available Peak Fault Current

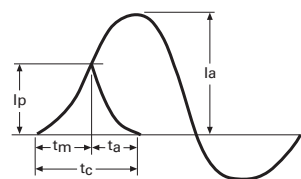
$t_m$  = The Melting Time

$I_p$  = The Peak Let-Through Current

$t_a$  = The Arcing Time

$t_c$  = The Total Interrupting (Clearing) Time

#### Current Limiting



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Trip Curve Charts . . . . .	<b>V4-T3-14</b>
Magnum SB Low Voltage Insulated Case Circuit Breakers . . . . .	<b>V4-T3-15</b>
Magnum IEC Rated Air Circuit Breakers . . . . .	<b>V4-T3-23</b>
Magnum DC (Direct Current) Low Voltage Switches . . . . .	<b>V4-T3-33</b>
Series NRX Low Voltage Power Circuit Breakers with PXR . . . . .	<b>V4-T3-35</b>
Series NRX Low Voltage Power Circuit Breakers with Digitrip . . . . .	<b>V4-T3-47</b>
Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-55</b>

#### Limiter Selection

The selection of a suitable limiter rating for a given application is generally governed by a choice of the following types of protection:

- A. Maximum protection of "downstream" components. Type MDSL breakers are often used for this purpose even when the maximum available fault currents are within the interruption rating of the corresponding unfused Magnum breakers.
- B. Protection of the circuit breaker only.

Case A would tend to use the smallest available limiter; Case B the largest. When downstream protection is required, the selection is usually a compromise, since certain small limiters cannot be coordinated with the breaker to avoid nuisance blowing on overloads or small and moderate short circuits.

Minimum, recommended and maximum limiter sizes for Magnum MDSL breakers are given in the table on **Page V4-T3-13**.

**Product Selection**

**Magnum MDSL Sensor/Rating Plug vs. Current Limiter Selection** ①

**Sensor and Rating Plug I<sub>n</sub>**      **MDSL Current Limiter Selection Chart** ②

200	<b>MA250</b>	<b>MA300</b>	<b>MA400</b>	<b>MA600</b> ③	<b>MA800</b>	<b>MB1200</b>	<b>MB1600</b>	<b>MB2000</b>	<b>MD2500</b>	<b>MD3000</b>
250			<b>MA400</b>	<b>MA600</b>	<b>MA800</b> ③	<b>MB1200</b>	<b>MB1600</b>	<b>MB2000</b>	<b>MD2500</b>	<b>MD3000</b>
300			<b>MA400</b>	<b>MA600</b>	<b>MA800</b> ③	<b>MB1200</b>	<b>MB1600</b>	<b>MB2000</b>	<b>MD2500</b>	<b>MD3000</b>
400				<b>MA600</b>	<b>MA800</b>	<b>MB1200</b> ③	<b>MB1600</b>	<b>MB2000</b>	<b>MD2500</b>	<b>MD3000</b>
600					<b>MA800</b>	<b>MB1200</b>	<b>MB1600</b>	<b>MB2000</b> ③	<b>MD2500</b>	<b>MD3000</b>
800						<b>MB1200</b>	<b>MB1600</b>	<b>MB2000</b>	<b>MD2500</b> ③	<b>MD3000</b>
1000							<b>MB1600</b>	<b>MB2000</b>	<b>MD2500</b> ③	<b>MD3000</b>
1200								<b>MB2000</b>	<b>MD2500</b> ③	<b>MD3000</b>
1600										<b>MD3000</b> ③
2000										<b>MD3000</b> ③

**Technical Data and Specifications**

**Magnum MDSL Ratings**

<b>Frame</b>	<b>Catalog Number</b>	<b>Available Sensor/Rating Plug (Amperes)</b>
800	<b>MDSL08</b>	200, 250, 300, 400, 600, 800
1600	<b>MDSL16</b>	200, 250, 300, 400, 600, 800, 1000, 1200, 1600
2000	<b>MDSC20</b>	1600, 2000

**Notes**

- ① Select the current limiter based on the Magnum breaker frame and current sensor and rating plug as shown.
- ② Refer to MDSL current limiter curves for let-through and time characteristics.
- ③ The recommended ratings shown as shaded provide for reduced current let-through and breaker coordination within the trip unit settings. Selection of current limiters below the recommended ratings shown provides lower current let-through, however, trip unit settings must be considered to avoid nuisance operation.

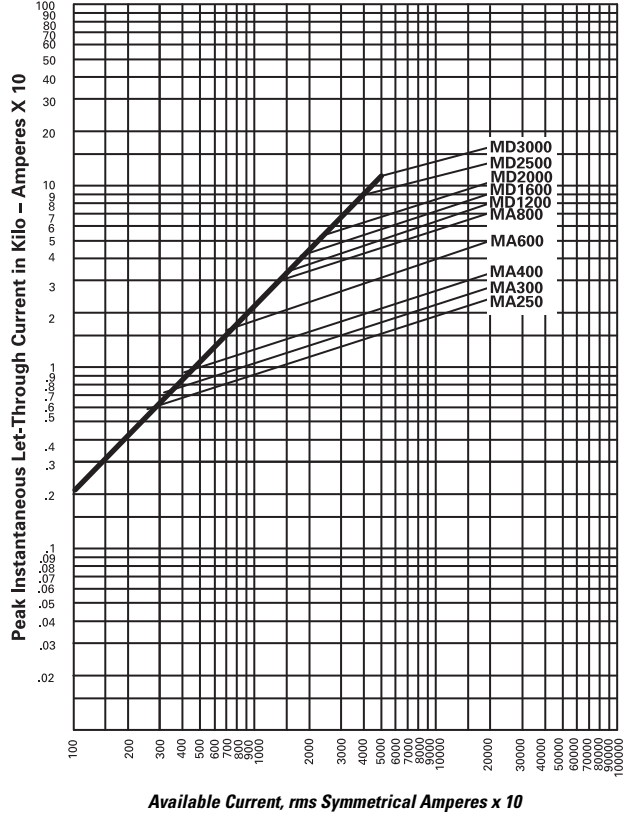
# 3.1

## Power Breakers, Contactors and Fuses

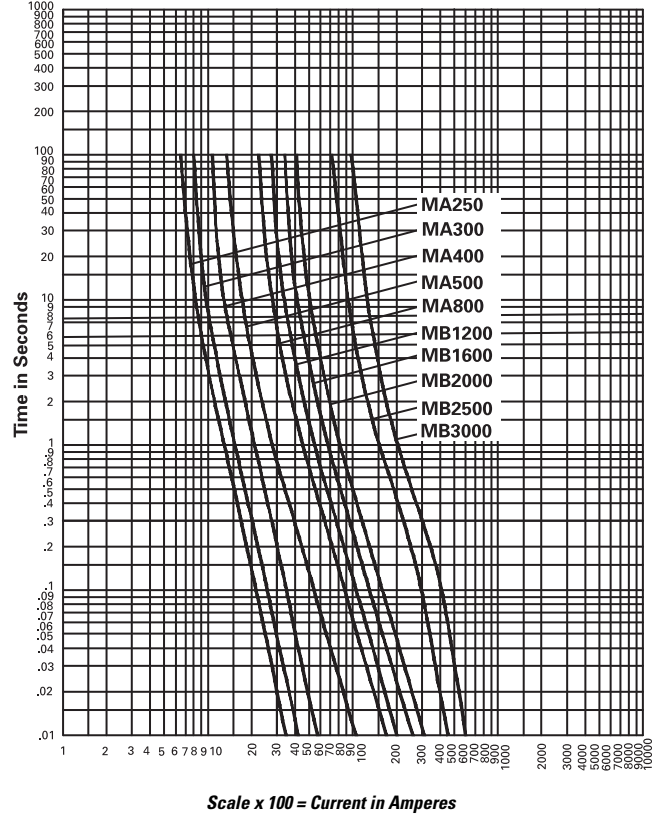
### Power Circuit Breakers

#### Trip Curve Charts

Type Magnum DSL Limiters, Peak Let-Through Current Characteristics



Type Magnum DSL Limiters Average Melting Time-Current Characteristics



**Note**

For Time/Current Curves, see [www.eaton.com/electrical](http://www.eaton.com/electrical)

**Magnum SB Low Voltage Insulated Case Circuit Breaker**



**Magnum SB Low Voltage Insulated Case Circuit Breakers**

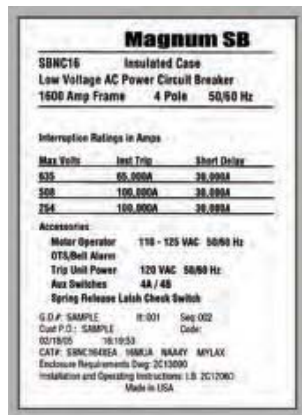
**Product Description**

Magnum SB is a low voltage insulated case circuit breaker family designed for the performance and economic requirements of UL 891 switchboards.

- Magnum SB insulated case circuit breakers have interruption ratings up to 130 kA at 635 Vac with continuous current ratings up to 5000 A
- Magnum SB insulated case circuit breakers have lighter-duty short-time withstand ratings and fixed internal instantaneous trips on most ratings, which is characteristic of UL 489 molded case breakers commonly used in UL 891 switchboards. This provides for greater economy and excellent coordination and selectivity for most commercial applications
- Fixed internal instantaneous trips will be phased in on all Magnum SB insulated case circuit breakers rated 3200 A and below to provide an extra safety factor by reducing the energy let-through to

downstream circuits at the maximum instantaneous trip point and to facilitate feeder circuit breaker protection in UL 891 switchboards with 3-cycle bus bracing

- Magnum SBSE current limiting power circuit breakers have 150 kA interruption ratings at 480 Vac with continuous current ratings up to 5000 A. The short-time withstand rating is 30 kA for standard frame and 50 kA for double frame breakers



**Typical Magnum SB Low Voltage Insulated Case Circuit Breaker Nameplate**

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Magnum SB Low Voltage Insulated Case Circuit Breakers	
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Magnum IEC Rated Air Circuit Breakers	<b>V4-T3-23</b>
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Series NRX Low Voltage Power Circuit Breakers with PXR . . . . .	<b>V4-T3-35</b>
Series NRX Low Voltage Power Circuit Breakers with Digitrip . . . . .	<b>V4-T3-47</b>
Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-55</b>

**Standards and Certifications**

**UL and ANSI Test Certifications**

Magnum SB meets or exceeds the applicable ANSI, NEMA, UL and CSA standards, including:

- ANSI C37.13 (Low Voltage AC Power Circuit Breakers Used in Enclosures)
- ANSI C37.16 (Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC Power Circuit Breakers)
- ANSI C37.17 (Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers)
- ANSI C37.50 (Test Procedures for Low Voltage AC Power Circuit Breakers Used in Enclosures)
- UL 1066 (Standard for Low Voltage AC and DC Power Circuit Breakers Used in Enclosures)
- NEMA SG3 (This standard adopts ANSI C37.16 in its entirety)

**Comprehensive Enclosure Solutions**

Magnum SB has proven performance in Eaton manufactured switchboards with the following test certifications:

- UL 891 (Certified Pow-R-Line C Low Voltage Switchboards)
- UL, CSA 22.2.31 Low Voltage Assemblies

**Approvals and Marks**

UL listed: Magnum DS Breaker UL File E52096 and Cassette UL File E204565



**Product Selection**

Contact Eaton for pricing.

# 3.1

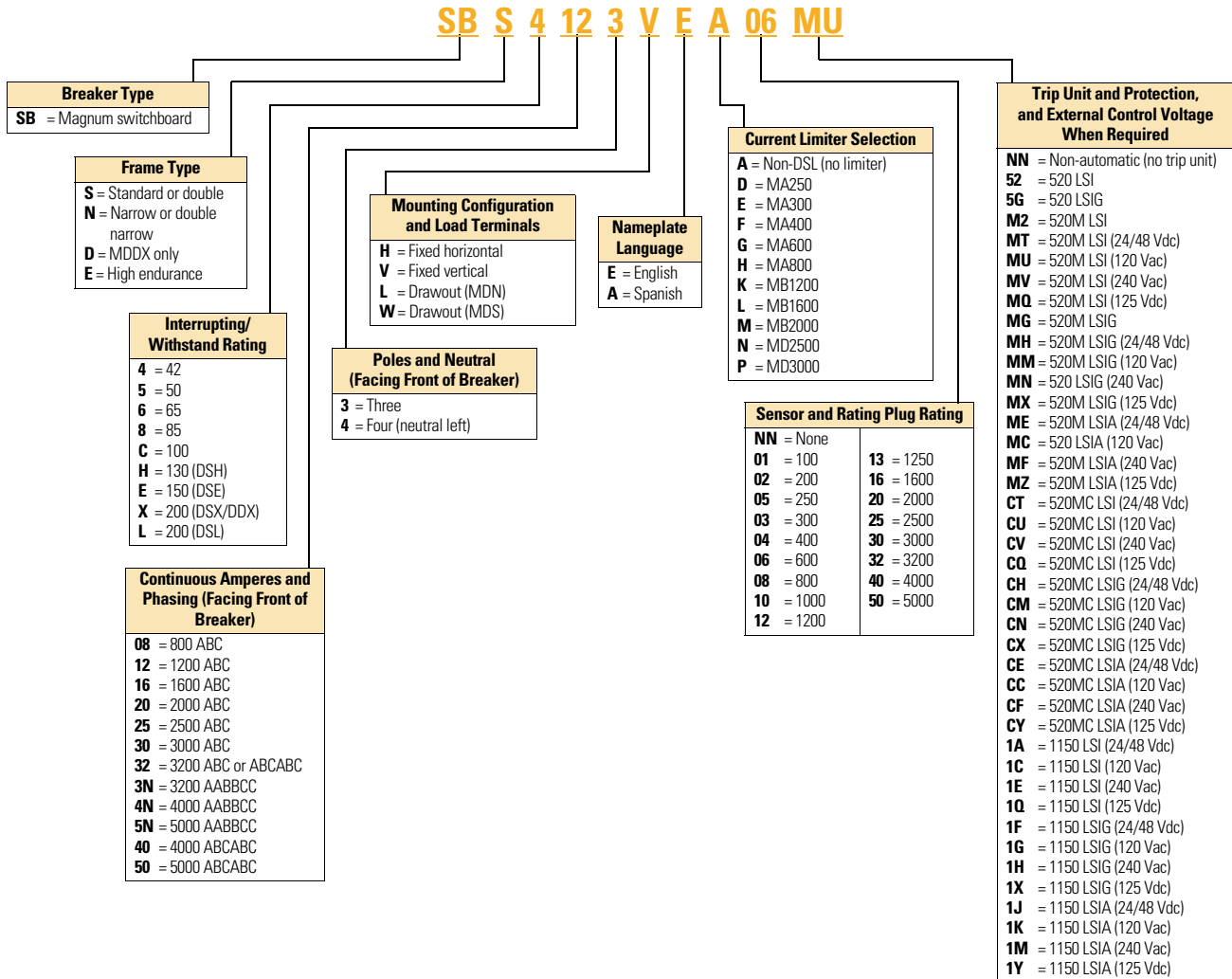
## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Catalog Number Selection

#### Magnum SB Breaker Product Family

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Magnum SB Breaker Product Family, continued

A W C H N E H K L A X

**Shunt Trip (ST)**

N = None  
 A = 110–127 Vac/Vdc  
 R = 208–240 Vac/Vdc  
 C = 24 Vdc  
 H = 48 Vdc  
 B = 110–127 Vac/Vdc (100% duty)  
 S = 220–250 Vac/Vdc (100% duty)  
 D = 24 Vdc (100% duty)  
 K = 48 Vdc (100% duty)  
 J = 60 Vdc (100% duty)  
 6 = 60 Vdc

**Motor Operator**

M = Manual operated  
 N = 110–125 Vac (5-sec)  
 W = 110–125 Vdc (5-sec)  
 T = 220–250 Vdc (5-sec)  
 P = 208–277 Vac (5-sec)  
 L = 24 Vdc (5-sec)  
 K = 48 Vdc (5-sec)  
 S = 60 Vdc (5-sec)  
 1 = 110–125 Vac (3-sec)  
 2 = 220–250 Vac (3-sec)  
 4 = 24 Vdc (3-sec)  
 8 = 48 Vdc (3-sec)  
 5 = 110–125 Vdc (3-sec)  
 9 = 220–250 Vdc (3-sec)

**Spring Release Device (SRD)**

N = None  
 A = 110–127 Vac/Vdc  
 R = 208–240 Vac/Vdc  
 C = 24 Vdc  
 H = 48 Vdc  
 S = 60 Vdc

**Undervoltage Release (UVR) or 2nd Shunt Trip (ST)**

N = None  
 A = UVR (110–127 Vac)  
 R = UVR (208–240 Vac)  
 C = UVR (24 Vdc)  
 H = UVR (48 Vdc)  
 D = UVR (60 Vdc)  
 E = UVR (110–125 Vdc)  
 F = UVR (220–250 Vdc)  
 G = UVR (32 Vdc)  
 X = UVR (380–415 Vac)  
 J = UVR (480 Vac)  
 K = UVR (600 Vac)  
 1 = 2nd ST (110–127 Vac/Vdc)  
 2 = 2nd ST (208–250 Vac/Vdc)  
 3 = 2nd ST (24 Vdc)  
 4 = 2nd ST (48 Vdc)  
 6 = 2nd ST (60 Vdc)  
 B = 2nd ST (110–127 Vac/Vdc 100% duty)  
 O = 2nd ST (220–250 Vac/Vdc 100% duty)  
 I = 2nd ST (24 Vdc 100% duty)  
 Q = 2nd ST (48 Vdc 100% duty)  
 9 = 2nd ST (60 Vdc 100% duty)

**Auxiliary Switch**

N = None  
 2 = 2A/2B  
 4 = 4A/4B  
 6 = 6A/6B

**Bell Alarms Switch (OTS) with 2a/2b Contacts and/or Mechanical Trip Indicator**

	Mech. Trip Indicator	Mech. Interlock for Manual Reset	OTS Switch with Two Form C Contacts
E	No	—	No
N	Yes	No	No
Y	Yes	No	Yes
M	Yes	Yes	No
L	Yes	Yes	Yes
F	Yes	No	Yes with 24 V reset
G	Yes	No	Yes with 120 V reset
H	Yes	No	Yes with 240 V reset
I	Yes	Yes	Yes with 24 V reset
J	Yes	Yes	Yes with 120 V reset
K	Yes	Yes	Yes with 240 V reset

**Padlock Provisions for Blocking Close and/or Open ACB Manual Pushbuttons**

N = None  
 M = Metal (block close and open)  
 P = Plastic (block close and open)  
 C = Metal (block close only)  
 H = Plastic (block close only)  
 S = Metal swdb lock-off (block close, depress open)

**Operations Counter and/or Keylock Provisions**

	Counter	Keylock Provisions
N	No counter	No locks
K	No counter	Kirk lock
C	No counter	Castell lock
R	No counter	Ronis lock
S	No counter	CES lock
A	Counter	No lock
Y	Counter	Kirk lock
L	Counter	Castell lock
H	Counter	Ronis lock indicator
E	Counter	CES lock

**Latch Check Switch/Trip Unit Metering Voltage Connection for Digitrip 1150 Trip Unit**

	Latch Check Switch	1150 Voltage Connection
N	None	Upper terminals
M	None	Lower terminals
L	LCS wired to SRD	Upper terminals
Y	LCS Wired to SRD	Lower terminals
C	LCS Wired External	Upper terminals
D	LCS Wired External	Lower terminals

**Breaker Shipping Options and Instructions**

A = Fixed breaker alone with door kit  
 B = Fixed breaker alone with door kit and pre-wired  
 F = Fixed breaker alone without door kit  
 A = Drawout breaker alone without door frame kit  
 C = Drawout breaker in cassette (un-wired)  
 P = Drawout breaker in cassette (shutters)  
 S = Drawout breaker in cassette (shutters)  
 W = Drawout breaker in cassette (pre-wired and shutters)  
 Double frame drawout breakers ship without cassette  
 drawout. ACBs ship in narrow and universal cassettes only.

**Frame Use**

X = All breakers



# 3.1

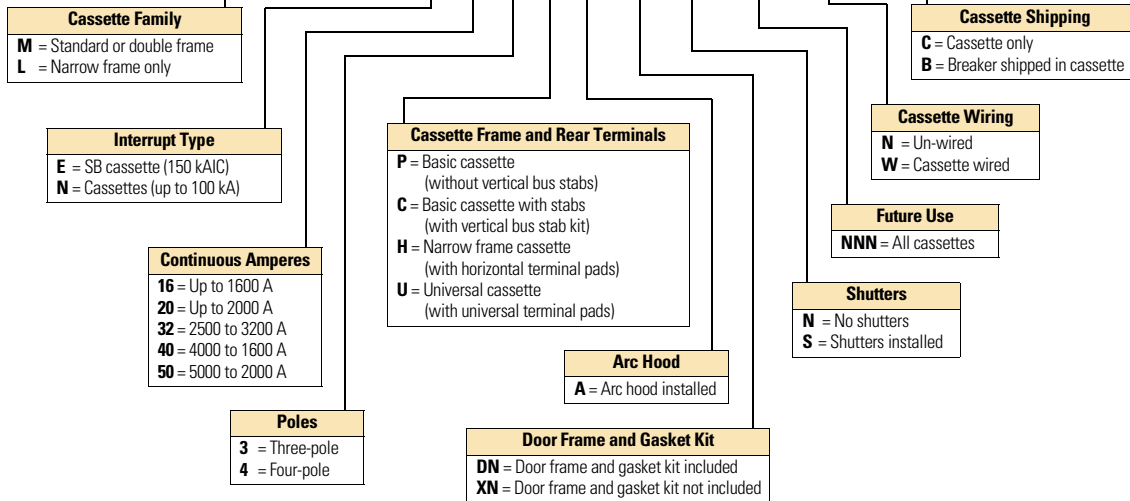
## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Cassette Magnum SB Breaker Product Family

**M E 32 3 C A DN N NNN W C**

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Technical Data and Specifications

Magnum SB Switchboard Class Insulated Case Low Voltage Air Circuit Breakers

Frame Amperes	Breaker Type Catalog Position 1–6	Frame Type	rms Symmetrical Current Ratings kA 50/60 Hz ①			Short-Time Withstand Rating	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interruption Rating at 254 Vac	Interruption Rating at 508 Vac	Interruption Rating at 635 Vac			
800	SBN-508	Narrow	50	50	35	20	18 x I <sub>n</sub>	200, 250, 300, 400, 600, 800
	SBN-608	Narrow	65	65	42	20	18 x I <sub>n</sub>	
	SBN-C08	Narrow	100	100	65	20	18 x I <sub>n</sub>	
	SBS-608	Standard	65	65	65	20	18 x I <sub>n</sub>	
	SBS-808	Standard	85	85	85	20	18 x I <sub>n</sub>	
	SBS-C08	Standard	100	100	85	20	18 x I <sub>n</sub>	
	SBS-H08	Standard	130	130	130	20	18 x I <sub>n</sub>	
	SBS-E08 ②③	Standard	200	150	65	30	30	
1200	SBN-512	Narrow	50	50	35	25	18 x I <sub>n</sub>	200, 250, 300, 400, 600, 800, 1000, 1200
	SBN-612	Narrow	65	65	42	25	18 x I <sub>n</sub>	
	SBN-C12	Narrow	100	100	65	25	18 x I <sub>n</sub>	
	SBS-612	Standard	65	65	65	25	18 x I <sub>n</sub>	
	SBS-812	Standard	85	85	85	25	18 x I <sub>n</sub>	
	SBS-C12	Standard	100	100	85	25	18 x I <sub>n</sub>	
	SBS-H12	Standard	130	130	130	25	18 x I <sub>n</sub>	
	SBS-E12 ②	Standard	200	150	65	30	30	
1600	SBN-516	Narrow	50	50	35	30	18 x I <sub>n</sub>	200, 250, 300, 400, 600, 800, 1000, 1200, 1600
	SBN-616	Narrow	65	65	42	30	18 x I <sub>n</sub>	
	SBN-C16	Narrow	100	100	65	30	18 x I <sub>n</sub>	
	SBS-616	Standard	65	65	65	30	18 x I <sub>n</sub>	
	SBS-816	Standard	85	85	85	30	18 x I <sub>n</sub>	
	SBS-C16	Standard	100	100	85	30	18 x I <sub>n</sub>	
	SBS-H16	Standard	130	130	130	30	18 x I <sub>n</sub>	
	SBS-E16 ②	Standard	200	150	65	30	30	
2000	SBN-620	Narrow	65	65	65	35	18 x I <sub>n</sub>	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000
	SBN-C20	Narrow	100	100	65	35	18 x I <sub>n</sub>	
	SBS-620	Standard	65	65	65	35	18 x I <sub>n</sub>	
	SBS-820	Standard	85	85	85	35	18 x I <sub>n</sub>	
	SBS-C20	Standard	100	100	85	35	18 x I <sub>n</sub>	
	SBS-H20	Standard	130	130	130	35	18 x I <sub>n</sub>	
		SBS-E20 ②	Standard	200	150	65	30	

Notes

① Interruption ratings shown based on breaker equipped with integral Digitrip RMS trip unit. Interruption ratings for non-automatic breakers are equal to the published short-time withstand rating. These interruption ratings are based on the standard duty cycle consisting of an open operation, a 15-second interval and a close-open operation, in succession, with delayed tripping in case of short-delay devices. The standard duty cycle for short-time ratings consists of maintaining the rated current for two periods of 1/2 seconds each, with a 15-second interval of zero current between the two periods.

② Magnum SBSE current limiting power circuit breaker with fast opening contacts.

③ Not released.

Product to be tested. Contact Eaton for product rating.

Breaker applied in a tested fan-cooled enclosure.

Magnum SB is UL 1066 listed.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Magnum SB Switchboard Class Insulated Case Low Voltage Air Circuit Breakers, continued

Frame Amperes	Breaker Type Catalog Position 1–6	Frame Type	rms Symmetrical Current Ratings kA 50/60 Hz <sup>①</sup>				Short-Time Withstand Rating	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interruption Rating at 254 Vac	Interruption Rating at 508 Vac	Interruption Rating at 635 Vac				
2500	SBS-625	Standard	65	65	65	45	18 x I <sub>n</sub>	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500	
	SBS-825	Standard	85	85	85	45	18 x I <sub>n</sub>		
	SBS-C25	Standard	100	100	85	45	18 x I <sub>n</sub>		
	SBS-H25	Standard	130	130	130	45	18 x I <sub>n</sub>		
	SBS-E25 <sup>②</sup>	Double	200	150	<sup>④</sup>	50	50		
3000	SBS-630	Standard	65	65	65	50	18 x I <sub>n</sub>	200, 250, 300, 400, 600, 800, 1000, 1200, 1600, 2000, 2500, 3000	
	SBS-830	Standard	85	85	85	50	18 x I <sub>n</sub>		
	SBS-C30	Standard	100	100	85	50	18 x I <sub>n</sub>		
	SBS-H30	Standard	130	130	130	50	18 x I <sub>n</sub>		
	SBS-E30 <sup>②</sup>	Double	200	150	<sup>④</sup>	50	50		
4000	SBS-840	Double	85	85	85	72	18 x I <sub>n</sub>	2000, 2500, 3000, 4000	
	SBS-C40	Double	100	100	100	72	18 x I <sub>n</sub>		
	SBS-H40	Double	130	130	130	72	18 x I <sub>n</sub>		
	SBN-840	Double Narrow	85	85	65	72/65	18 x I <sub>n</sub>		
	SBN-C40	Double Narrow	100	100	65	72/65	18 x I <sub>n</sub>		
	SBS-E40 <sup>②</sup>	Double	200	150	<sup>④</sup>	50	50		
5000	SBS-850	Double	85	85	85	85	18 x I <sub>n</sub>	2500, 3000, 4000, 5000	
	SBS-C50	Double	100	100	100	90	18 x I <sub>n</sub>		
	SBS-H50	Double	130	130	130	90	18 x I <sub>n</sub>		
	SBS-E50 <sup>②③</sup>	Double	200	150	<sup>④</sup>	50	50		

#### Notes

- ① Interruption ratings shown based on breaker equipped with integral Digitrip RMS trip unit. Interruption ratings for non-automatic breakers are equal to the published short-time withstand rating. These interruption ratings are based on the standard duty cycle consisting of an open operation, a 15-second interval and a close-open operation, in succession, with delayed tripping in case of short-delay devices. The standard duty cycle for short-time ratings consists of maintaining the rated current for two periods of 1/2 seconds each, with a 15-second interval of zero current between the two periods.
- ② Magnum SBSE current limiting power circuit breaker with fast opening contacts.
- ③ Breaker applied in a tested fan-cooled enclosure.
- ④ Product to be tested. Contact Eaton for product rating.

Magnum SB is UL 1066 listed.

Digitrip Trip Units for Magnum DS and SB ANSI/UL Rated Power Circuit Breakers



Trip Unit Type		Digitrip 520	Digitrip 520M	Digitrip 520MC	Digitrip 1150+ ①
Ampere range		200–5000 A	200–5000 A	200–5000 A	200–5000 A
Interruption rating at 480 V		42–200 kA	42–200 kA	42–200 kA	42–200 kA
rms sensing		Yes	Yes	Yes	Yes
<b>Protection and Coordination</b>					
Protection	Ordering options	LI, LSI, LSIG, LSIA	LSI, LSIG	LSI, LSIG	LSI, LSIG, LSIA
	Fixed rating plug ( $I_n$ )	Yes	Yes	Yes	Yes
	Overtemperature trip	Yes	Yes	Yes	Yes
Long delay protection (L)	Long delay pickup	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
	Long delay time $I^2t$ at 6 x $I_r$	2–24 sec	2–24 sec	2–24 sec	2–24 sec
	Long delay time $I^4t$	No	No	No	1–5 sec
	IEEE curves	No	No	No	Yes
	Long delay thermal memory	Yes	Yes	Yes	Yes
	High load alarm	No	No	No	0.5–1.0 x ( $I_r$ )
Short delay protection (S)	Short delay pickup	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1
	Short delay time $I^2t$ at 8 x $I_r$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time ZSI	Yes	Yes	Yes	Yes
Instantaneous protection (I)	Instantaneous pickup	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1
	Making current release	Yes	Yes	Yes	Yes
	Off position	Yes	Yes	Yes	Yes
Ground fault protection (G) ②	Ground fault alarm	No	Yes	Yes	Yes
	Ground fault pickup	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	24–100% x ( $I_n$ )
	Ground fault delay $I^2t$ at 0.625 x $I_n$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
Disable ground fault protection		No	No	No	No
Neutral protection (N)		Model LSI only	Model LSI only	Model LSI only	Model LSI only
<b>System Diagnostics</b>					
Cause of trip LEDs		Yes	Yes	Yes	Yes
Magnitude of trip information		No	Yes	Yes	Yes
Remote signal contacts		No	Yes	Yes	Yes
Programmable contacts		No	No	No	Yes
Electronic operations counter		No	No	No	Yes

Notes

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

② 1200 A maximum ground fault setting per UL/NEC.

$I_n$  = Rating plug and sensor rating.

$I_r$  = Long delay pickup setting.

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Digitrip Trip Units for Magnum DS and SB ANSI/UL Rated Power Circuit Breakers, continued



**Digitrip 520**



**Digitrip 520M**



**Digitrip 520MC**



**Digitrip 1150+ ①**

Trip Unit Type	Digitrip 520	Digitrip 520M	Digitrip 520MC	Digitrip 1150+ ①
<b>System Monitoring</b>				
Digital display	No	4-Character LCD	4-Character LCD	24-Character LED
Current (%) full scale sensor	No	Yes +/- 2%	Yes +/- 2%	Yes +/- 1%
Voltage (%) L to L	No	No	No	Yes +/- 1%
Power and energy (%)	No	No	No	Yes +/- 2%
Apparent power kVA and demand	No	No	No	Yes
Reactive power kVAR	No	No	No	Yes
Power factor	No	No	No	Yes
Crest factor	No	No	No	Yes
<b>System Communications</b>				
Type	—	—	INCOM/PowerNet/Modbus ②/ PROFIBUS ②	INCOM/PowerNet/TripLink/ Modbus ②/PROFIBUS ②
Power supply in breaker	N/A	Optional	Standard	Standard
<b>Additional Features</b>				
Trip log (three events)	No	No	No	Yes
Electronic operations counter	No	No	No	Yes
Testing method ③	Test set	Test set	Test set	Integral and test set
Waveform capture	No	No	No	Yes
<b>Arcflash Reduction Maintenance System Mode</b>				
Breaker health monitor	No	No	Yes	Yes ④
Programmable relay functions	No	No	No	Yes ①

**Notes**

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

② Requires externally mounted MMINT or PMINT module.

③ Test set for secondary injection.

④ Contact Eaton for availability.

$I_n$  = Rating plug and sensor rating.

$I_r$  = Long delay pickup setting.

Magnum IEC Double Narrow Frame Drawout Air Circuit Breaker, With Cassette



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Magnum MDSL Current Limiting Power Circuit Breaker . . . . .	<b>V4-T3-12</b>
Magnum SB Low Voltage Insulated Case Circuit Breakers . . . . .	<b>V4-T3-15</b>
Magnum IEC Rated Air Circuit Breakers	
Catalog Number Selection . . . . .	<b>V4-T3-24</b>
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Magnum Options and Accessories . . . . .	<b>V4-T3-30</b>
Wiring Diagrams . . . . .	<b>V4-T3-32</b>
Magnum DC (Direct Current) Low Voltage Switches . . . . .	<b>V4-T3-33</b>
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Series NRX Low Voltage Power Circuit Breakers with Digitrip . . . . .	<b>V4-T3-47</b>
Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-55</b>

**Magnum IEC Rated Air Circuit Breakers**

**Product Description**

Magnum air circuit breakers are designed to enable global power distribution solutions in IEC switchboards and other custom enclosures.

- Magnum IEC air circuit breakers have interruption ratings up to 100 kA at 690 Vac with continuous current ratings up to 6300 A
- Magnum IEC air circuit breaker continuous current frames are 100% rated. No thermal de-rating is required when applying the breaker in the low voltage systems enclosure at ambient temperatures of 104 °F (40 °C)
- Magnum IEC breakers carry the KEMA Keur Mark, which requires periodic follow-up testing, witnessed by KEMA, to demonstrate our product performs to its published nameplate ratings. This differentiates Magnum air circuit breakers from the competition, where in general, self-certification testing is performed on products when initially introduced with no binding commitments to perform subsequent follow-up third-party testing

**Standards and Certifications**

**IEC Test Certifications**

Magnum air circuit breakers meet or exceed the applicable IEC standards, including:

- EN/IEC 60947-2
- KEMA third-party witness and follow-up testing

**Comprehensive Enclosure Solutions**

Magnum air circuit breakers have proven performance in IEC switchboards and custom enclosures manufactured by Eaton and Low Voltage Systems Builders (OEMs) to the following standards:

- EN/IEC 60947-1
- EN/IEC 60439-1
- Eaton manufactured IEC Low Voltage Switchboard solutions include:
  - Eaton MEM M-Form (UK) Low Voltage Switchboards
  - Eaton Holec® Capitole 40 and Capitole 20 (Holland) Low Voltage Switchboards

- Eaton Tabula Low Voltage Switchboard Systems (global) for Low Voltage Systems Builders
- Eaton Elatis (Germany) Low Voltage Switchboards
- Eaton Xenergy and Modan switchboard systems (global) for low voltage systems builders
- American Bureau of Shipping (ABS)
- Det Norske Veritas (DNV)
- Lloyds of London
- South African Bureau of Standards (SABS)
- For a complete and comprehensive listing of all low voltage power breakers, please visit [www.eaton.com](http://www.eaton.com)



**Approvals and Marks**

Magnum air circuit breakers carry the following approvals and approval marks:

- CE
- KEMA Keur mark
- ABS (American Bureau of Shipping) Type Listed Certificate Number 04-HS422844B-PDA-DUB
- CCC (Certificate for China Compulsory Product Certification) to GB14048.2-2001, Certificate Numbers:
  - 2005010307139381
  - 2003010307094561
  - 2003010307094558

**Note:** The KEMA Keur Mark on the Magnum ACB Label Confirms Third-Party Witness and Follow-up Testing

# 3.1

## Power Breakers, Contactors and Fuses

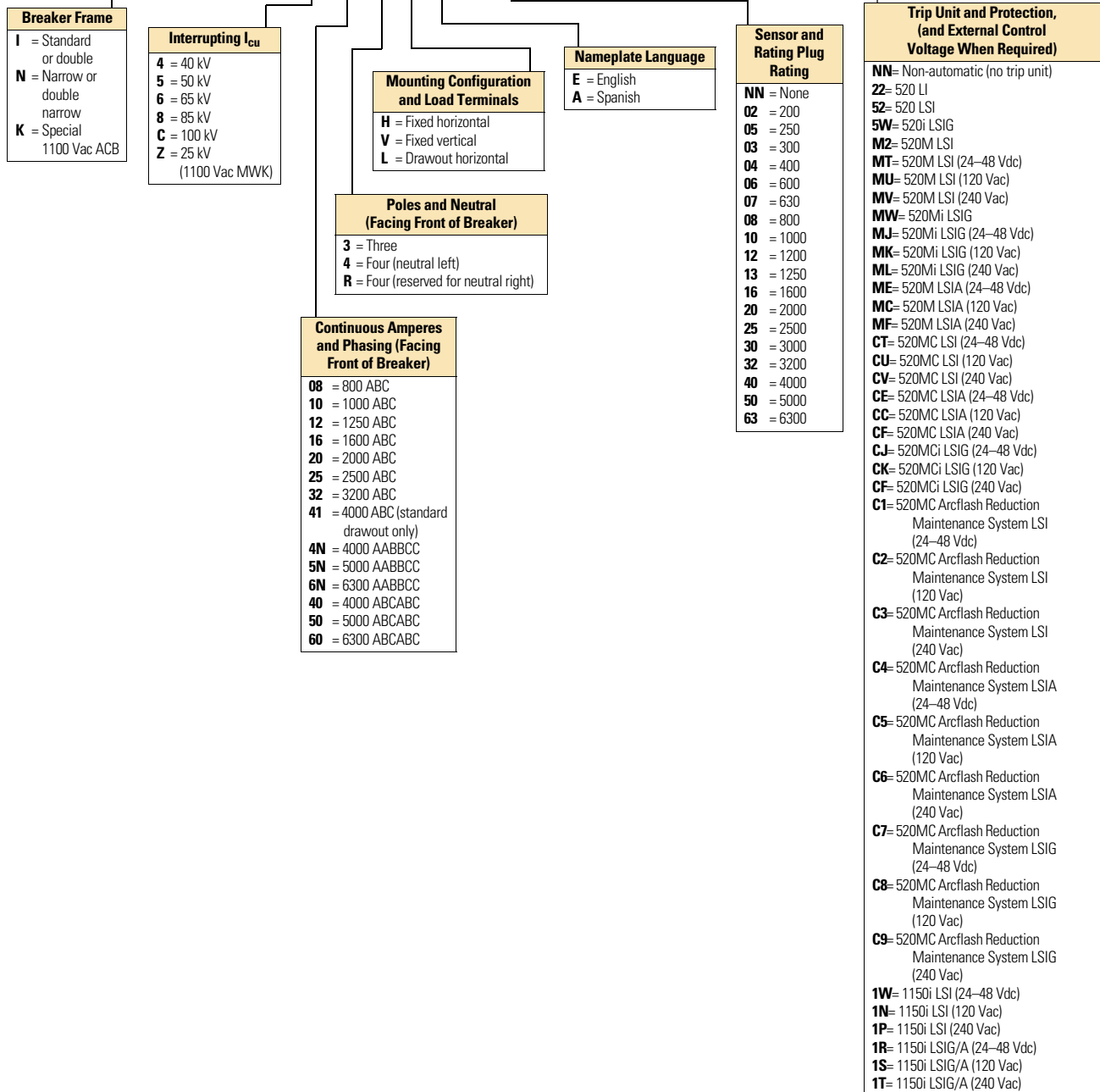
### Power Circuit Breakers

#### Catalog Number Selection

#### Magnum IEC Breaker Product Family <sup>Ⓢ</sup>

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**MW N 5 12 4 V E A 03 MT 6 M C J 2 Y C N M W X**



**Note**

<sup>Ⓢ</sup> Exclusionary rules apply. Refer to price list. Confirm all final part numbers with Eaton. Format structure subject to modifications and additions without notice.

Magnum IEC Breaker Product Family, continued ①

MW N 5 12 4 V E A 03 MT 6 M C J 2 Y C N M W X

**Shunt Trip Attachment (STA)**

N = None  
 A = 110–127 Vac/Vdc  
 R = 208–240 Vac/Vdc  
 C = 24 Vdc  
 H = 48 Vdc  
 B = 110–127 Vac/Vdc (100% duty)  
 S = 220–250 Vac/Vdc (100% duty)  
 D = 24 Vdc (100% duty)  
 K = 48 Vdc (100% duty)  
 J = 60 Vdc (100% duty)  
 6 = 60 Vdc

**Spring Release Device (SRD)**

N = None  
 A = 110–127 Vac/Vdc  
 R = 208–240 Vac/Vdc  
 C = 24 Vdc  
 H = 48 Vdc  
 S = 60 Vdc

**Auxiliary Switch**

N = None  
 2 = 2A/2B  
 4 = 2A/2B  
 6 = 2A/2B

**Future Use**

X = All ACBs

**ACB Shipping Instructions**

A = Fixed ACB with door kit  
 B = Fixed breaker alone with door kit and pre-wired  
 F = Fixed ACB without door kit  
 A = D/O ACB only without door kit  
 C = D/O ACB in cassette (un-wired)  
 P = D/O ACB in cassette (pre-wired)  
 S = D/O ACB in cassette (shutters)  
 W = D/O ACB in cassette (pre-wired and shutters)  
 Double frame D/O ACBs ship without cassette

**Motor Operator**

M = Manual operated  
 N = 110–125 Vac (5-sec)  
 W = 110–125 Vdc (5-sec)  
 T = 220–250 Vdc (5-sec)  
 P = 208–277 Vac (5-sec)  
 L = 24 Vdc (5-sec)  
 K = 48 Vdc (5-sec)  
 S = 60 Vdc (5-sec)  
 1 = 110–125 Vac (3-sec)  
 2 = 220–250 Vac (3-sec)  
 4 = 24 Vdc (3-sec)  
 8 = 48 Vdc (3-sec)  
 5 = 110–125 Vdc (3-sec)  
 9 = 220–250 Vdc (3-sec)

**Undervoltage Release (UVR) or 2nd Shunt Trip (ST)**

N = None  
 A = UVR (110–127 Vac)  
 R = UVR (208–240 Vac)  
 C = UVR (24 Vdc)  
 H = UVR (48 Vdc)  
 D = UVR (60 Vdc)  
 E = UVR (110–125 Vdc)  
 F = UVR (220–250 Vdc)  
 G = UVR (32 Vdc)  
 X = UVR (380–415 Vac)  
 J = UVR (480 Vac)  
 K = UVR (600 Vac)  
 1 = 2nd ST (110–127 Vac/Vdc)  
 2 = 2nd ST (208–250 Vac/Vdc)  
 3 = 2nd ST (24 Vdc)  
 4 = 2nd ST (48 Vdc)  
 6 = 2nd ST (60 Vdc)  
 B = 2nd ST (110–127 Vac/Vdc 100% duty)  
 O = 2nd ST (220–250 Vac/Vdc 100% duty)  
 I = 2nd ST (24 Vdc 100% duty)  
 Q = 2nd ST (48 Vdc 100% duty)  
 9 = 2nd ST (60 Vdc 100% duty)

**Bell Alarms Switch (OTS) with 2a/2b Contacts and/or Mechanical Trip Indicator**

	Mech. Trip Indicator	Mech. Interlock for Manual Reset	OTS Switch with Two Form C Contacts
E =	No	—	No
N =	Yes	No	No
Y =	Yes	No	Yes
M =	Yes	Yes	No
L =	Yes	Yes	Yes
F =	Yes	No	Yes with 24 V reset
G =	Yes	No	Yes with 120 V reset
H =	Yes	No	Yes with 240 V reset
I =	Yes	Yes	Yes with 24 V reset
J =	Yes	Yes	Yes with 120 V reset
K =	Yes	Yes	Yes with 240 V reset

**Latch Checking Switch/Trip Unit Metering Voltage Connection for Digitrip 1150 Trip Unit**

Latch Check Switch	1150 Voltage Connection
N = None	Upper terminals
M = None	Lower terminals
L = LCS wired to SRD	Upper terminals
Y = LCS wired to SRD	Lower terminals
C = LCS wired external	Upper terminals
D = LCS wired external	Lower terminals

**Padlock Provisions for Blocking Close and/or Open ACB Manual Pushbuttons**

N = None  
 M = Metal (block close and open)  
 P = Plastic (block close and open)  
 C = Metal (block close only)  
 H = Plastic (block close only)

**Operations Counter and/or Keylock Provisions**

	Counter	Keylock Provisions
N =	No counter	No locks
K =	No counter	Kirk lock
C =	No counter	Castell lock
R =	No counter	Ronis lock
S =	No counter	CES lock
A =	Counter	No lock
Y =	Counter	Kirk lock
L =	Counter	Castell lock
H =	Counter	Ronis lock indicator
E =	Counter	CES lock

**Note**

① Exclusionary rules apply. Refer to price list. Confirm all final part numbers with Eaton. Format structure subject to modifications and additions without notice.



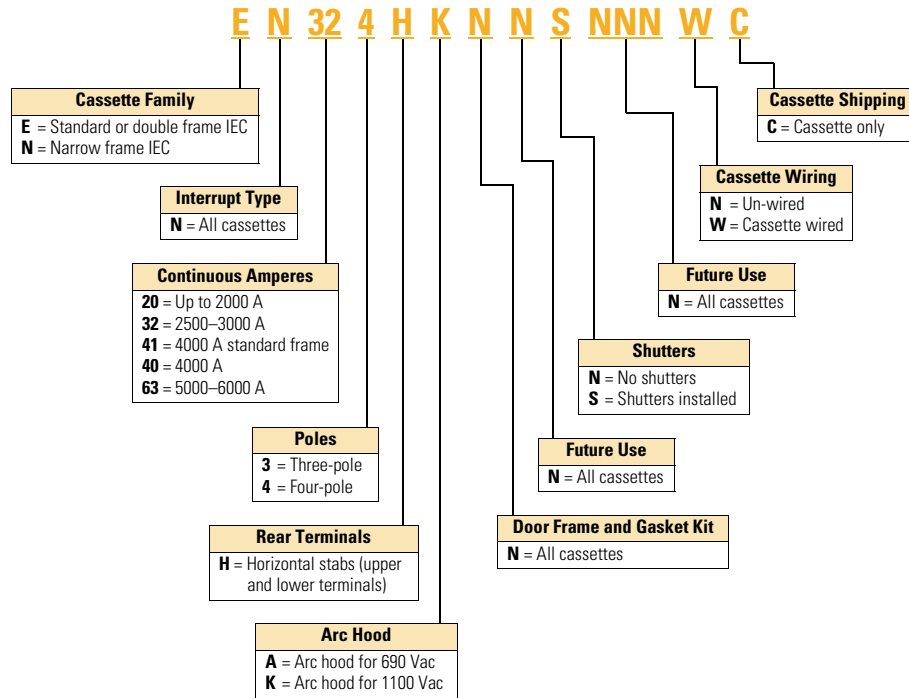
# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Cassette Magnum IEC Breaker Product Family ①

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**Note**

① Exclusionary rules apply. Refer to price list. Confirm all final part numbers with Eaton. Format structure subject to modifications and additions without notice.

Technical Data and Specifications

Magnum IEC 60947-2 Rated Air Circuit Breakers

Frame Amperes	Breaker Type Catalog Position 1-6	Frame Type	rms Symmetrical Current Ratings kA ①			Withstand Rating I <sub>cw</sub> 1-Sec / 3-Sec	Fixed Internal Instantaneous Trip	Available Current Sensor and Rating Plugs for Digitrip RMS Trip Unit (Establishes Breaker I <sub>n</sub> Rating)
			Interruption Rating at 240 Vac I <sub>cu</sub> = I <sub>cs</sub>	Interruption Rating at 440 Vac I <sub>cu</sub> = I <sub>cs</sub>	Interruption Rating at 690 Vac I <sub>cu</sub> = I <sub>cs</sub>			
800	MWN-508	Narrow	50	50	50	50/—	—	200, 250, 300, 400, 630, 800
	MWN-608	Narrow	65	65	65	65/40	—	
	MWI-608	Standard	65	65	65	65/—	—	
	MWI-808	Standard	85	85	85	85/65	—	
	MWI-C08	Standard	100	100	85	85/65	85	
1000	MWN-410	Narrow	40	40	40	40/—	—	200, 250, 300, 400, 630, 800, 1000
	MWN-510	Narrow	50	50	50	50/—	—	
	MWN-610	Narrow	65	65	65	65/40	—	
	MWI-610	Standard	65	65	65	65/—	—	
	MWI-810	Standard	85	85	85	85/65	—	
1250	MWI-C10	Standard	100	100	85	85/65	85	200, 250, 300, 400, 630, 800, 1000, 1250
	MWN-412	Narrow	40	40	40	40/—	—	
	MWN-512	Narrow	50	50	50	50/—	—	
	MWN-612	Narrow	65	65	65	65/40	—	
	MWI-612	Standard	65	65	65	65/—	—	
1600	MWI-812	Standard	85	85	85	85/65	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600
	MWI-C12	Standard	100	100	85	85/65	85	
	MWN-516	Narrow	50	50	50	50/—	—	
	MWN-616	Narrow	65	65	65	65/40	—	
	MWI-616	Standard	65	65	65	65/—	—	
2000	MWI-816	Standard	85	85	85	85/65	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600, 2000
	MWI-C16	Standard	100	100	85	85/65	85	
	MWN-520	Narrow	50	50	50	50/30	—	
	MWN-620	Narrow	65	65	65	65/40	—	
	MWI-620	Standard	65	65	65	65/50	—	
2500	MWI-820	Standard	85	85	85	85/65	—	200, 250, 300, 400, 630, 800, 1000, 1250, 1600, 2000, 2500
	MWI-C20	Standard	100	100	85	85/65	85	
	MWI-625	Standard	65	65	65	65/—	—	
	MWI-825	Standard	85	85	85	85/65	—	
3200	MWI-C25	Standard	100	100	85	85/65	85	200, 250, 300, 400, 630, 800, 1000, 1250, 1600, 2000, 2500, 3200
	MWI-H25	Standard	125	125	125	85/65	—	
	MWI-632	Standard	65	65	65	65/50	—	
	MWI-832	Standard	85	85	85	85/65	—	
4000	MWI-C32	Standard	100	100	85	85/65	85	2000, 2500, 3200, 4000
	MWI-H32	Standard	—	—	125	—	—	
	MWI-641 ②	Standard	65	65	65	65/50	—	
	MWI-841 ②	Standard	85	85	85	85/65	—	
	MWI-C41 ②	Standard	105	105	85	85/65	—	
	MWN-64N	Double narrow	65	65	65	65/—	—	
	MWN-84N	Double narrow	85	85	65	85/—	—	
	MWN-C4N	Double narrow	100	100	65	100/—	—	
5000	MWI-64N	Double	65	65	65	65/—	—	2500, 3200, 4000, 5000
	MWI-84N	Double	85	85	85	85/—	—	
6300	MWI-C4N	Double	100	100	100	100/—	—	3200, 4000, 5000, 6300
	MWI-85N	Double	85	85	85	85/—	—	
6300	MWI-C5N	Double	100	100	100	100/—	—	3200, 4000, 5000, 6300
	MWI-86N	Double	85	85	85	85/—	—	
6300	MWI-C6N	Double	100	100	100	100/—	—	3200, 4000, 5000, 6300
	MWI-86N	Double	85	85	85	85/—	—	

Notes

- ① Interruption ratings shown based on breaker equipped with integral Digitrip RMS Trip Unit. Interruption ratings for non-automatic breakers are equal to the published breaker I<sub>cw</sub> rating.
- ② Magnum IEC standard frame breakers rated for 4000 A continuous current are available in drawout configuration only.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Digitrip Trip Units for Magnum IEC Rated Air Circuit Breakers



Trip Unit Type		Digitrip 520i	Digitrip 520Mi	Digitrip 520MCi	Digitrip 1150i+ ①
Ampere range		200–6300 A	200–6300 A	200–6300 A	200–6300 A
Interruption rating at 690 V		40–100 kA	40–100 kA	40–100 kA	40–100 kA
rms sensing		Yes	Yes	Yes	Yes
<b>Protection and Coordination</b>					
Protection	Ordering options	LI, LSI, LSIG, LSIA	LSI, LSIG	LSI, LSIG	LSI, LSIG, LSIA
	Fixed rating plug ( $I_n$ )	Yes	Yes	Yes	Yes
	Overtemperature trip	Yes	Yes	Yes	Yes
Long delay protection (L)	Long delay setting	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )	0.4–1.0 x ( $I_n$ )
	Long delay time $I^2t$ at 6 x $I_r$	2–24 sec	2–24 sec	2–24 sec	2–24 sec
	Long delay time $I^4t$	No	No	No	1–5 sec
	IEC Type A, B, C curves	No	No	No	Yes
	Long delay thermal memory	Yes	Yes	Yes	Yes
	High load alarm	No	No	No	0.7–1.0 x $I_r$
Short delay protection (S)	Short delay pickup	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	200–1000% x ( $I_r$ ) and M1	150–1000% x ( $I_r$ ) and M1
	Short delay time $I^2t$ at 8 x $I_r$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Short delay time ZSI	Yes	Yes	Yes	Yes
Instantaneous protection (I)	Instantaneous pickup	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1	200–1000% x ( $I_n$ ) and M1
	Making current release	Yes	Yes	Yes	Yes
	Off position	Yes	Yes	Yes	Yes
Earth fault protection (G)	Earth fault alarm	No	Yes	Yes	Yes
	Earth fault pickup	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	25–100% x ( $I_n$ )	24–100% x ( $I_n$ )
	Earth fault delay $I^2t$ at 0.625 x $I_n$	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Earth fault delay flat	100–500 ms	100–500 ms	100–500 ms	100–500 ms
	Earth fault ZSI	Yes	Yes	Yes	Yes
	Earth fault memory	Yes	Yes	Yes	Yes
Disable ground fault protection		No	No	No	Yes
Neutral protection (N)		Model LSI only	Model LSI only	Model LSI only	Model LSI only
<b>System Diagnostics</b>					
Cause of trip LEDs		Yes	Yes	Yes	Yes
Magnitude of trip information		No	No	No	Yes
Remote signal contacts		No	Yes	Yes	Yes
Programmable contacts		No	No	No	2

#### Notes

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

$I_n$  = Rating plug rating.

$I_r$  = LDPUs setting.

$i$  Trip units are only used on IEC breakers with earth fault.

Digitrip Trip Units for Magnum IEC Rated Air Circuit Breakers, continued



Trip Unit Type	Digitrip 520i	Digitrip 520Mi	Digitrip 520MCi	Digitrip 1150i+ ①
<b>System Monitoring</b>				
Digital display	No	4-Character LCD	4-Character LCD	24-Character LED
Current (%) full scale sensor	No	Yes +/- 2%	Yes +/- 2%	Yes +/- 1%
Voltage (%) L to L	No	No	No	Yes +/- 1%
Power and energy (%)	No	No	No	Yes +/- 2%
Apparent power kVA and demand	No	No	No	Yes
Reactive power kVAR	No	No	No	Yes
Power factor	No	No	No	Yes
Crest factor	No	No	No	Yes
Power quality—harmonics	No	No	No	Yes
% THD	No	No	No	Yes
<b>System Communications</b>				
Type	—	—	INCOM/PowerNet/Modbus ②/ PROFIBUS ②	INCOM/PowerNet/TripLink/ Modbus ②/PROFIBUS ②
Power supply in breaker	N/A	Optional	Standard	Standard
<b>Additional Features</b>				
Trip log (three events)	No	No	No	Yes
Electronic operations counter	No	No	No	Yes
Testing method ③	Test set	Test set	Test set	Integral and test set
Waveform capture	No	No	No	Yes
<b>Arcflash Reduction Maintenance System Mode</b>				
Breaker health monitor	No	No	No	Yes
Programmable relay functions	No	No	No	Yes ①

**Notes**

① Over and undervoltage alarm or trip, over and underfrequency alarm or trip, voltage unbalance alarm or trip, reverse power trip and phase rotation alarm are included.

② Requires externally mounted MMINT or PMINT module.

③ Test set for secondary injection.

④ Contact Eaton for availability.

$I_n$  = Rating plug rating.

$I_r$  = LDPU setting.

*i* Trip units are only used on IEC breakers with earth fault.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breaker

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#### Magnum Options and Accessories

##### Breaker-Mounted Options and Accessories

Magnum breakers are available with a comprehensive array of factory-installed breaker options to enable configured-to-order solutions for specified customer requirements. Field option kits are available to provide easy service, modification and customization of the breaker at the point of use.

- **Shunt Trip device (ST).**

Provides for remote electrically controlled breaker opening when energized by a rated voltage input

- **Spring Charge Motor (MOT).**

Charges the breaker closing springs automatically, facilitating remote or local closing. The motor assembly includes its own cut-off switch that changes state at the end of the charging cycle. This contact can be wired out for external indication

- **Spring Release device (SR).**

Provides for remote electrically controlled breaker closing when its coils are energized by a rated voltage input

- **Undervoltage Release (UVR).** Trips the breaker when an existing voltage signal is lost or falls below an established threshold

- **Auxiliary Switch.** Up to 6a/6b auxiliary individual dedicated contacts are available for customer use to indicate if the breaker is in the OPEN or CLOSE position

- **Mechanical Trip Indicator Flag.**

The red trip indicator flag pops out to provide local visual indication when the Digitrip RMS trip unit acts to trip the breaker on an overcurrent condition. Available in two options: an interlocked version that mechanically locks out the breaker until the indicator is manually reset and a non-interlocked version for indication only.

- **Bell Alarm/Overcurrent Trip Switch (OTS).**

Provides 2 Form C (changeover) contacts that change state when the Digitrip RMS trip unit acts to trip the breaker on an overcurrent condition. The contacts are available for external indication or customer use and are manually reset by the Mechanical Trip Indicator

- **Padlockable Pushbutton Cover.** Permits padlocking hinged cover plates to block access to the PUSH ON and PUSH OFF buttons on the breaker faceplate

- **Mechanical Operations Counter.**

Records mechanical operations of the breaker over its installed life

- **Key Off Lock Provisions.**

Enables mounting of a single cylinder Kirk®, Castell or Ronis key lock to lock the breaker in the OPEN position

- **Latch Check Switch.**

Provides 1 Form C (changeover contact) that changes state when the breaker is ready to close. Can be wired to the Spring Release Device for fast transfer applications or wired for external ready-to-close indication



*Shunt Trip, Spring Release and Undervoltage Release Device Installed on Accessory Deck*



*Auxiliary Switches Come in Modular 2a/2b Contact Stages Providing up to 6a/6b Dedicated Contacts*



*Arc Chutes are Easily Removable for Inspection and Access to Breaker Contacts*



*Heel-Toe Contact Design Provides Demonstrated Long Life and Includes Wear Indicator for Visual Inspection*



*Mechanical Trip Indicator With Bell Alarm (OTS) Switches Mounted*

## Magnum Breaker Control Device Application Guide—Vdc

Breaker Control Device Nominal Voltage		24 Vdc	32 Vdc	48 Vdc	60 Vdc	125 Vdc	250 Vdc
<b>Shunt Trip (ST)— Trip Circuit</b>							
Operational voltage range	70–110%	17–26 Vdc	—	34–53 Vdc	42–66 Vdc	77–138 Vdc	154–275 Vdc
Power consumption (inrush)	Required for 35 ms <sup>①</sup>	250 W	—	250 W	250 W	450 W	450 W
Opening time	Seconds	35 ms	—	35 ms	35 ms	35 ms	35 ms
<b>Spring Release (SR)—Close Circuit</b>							
Operational voltage range	70–110%	17–26 Vdc	—	34–53 Vdc	42–66 Vdc	77–138 Vdc	154–275 Vdc
Power consumption (inrush)	Required for 200 ms	250 W	—	250 W	250 W	450 W	450 W
Closing time	Seconds	40 ms	—	40 ms	40 ms	40 ms	40 ms
<b>Spring Charge Motor (MOT)</b>							
Operational voltage range	85–110% voltage	20–26 Vdc	—	41–53 Vdc	51–66 Vdc	94–138 Vdc	187–225 Vdc
Amperes (running)	Running	12.0 A	—	5.0 A	4.0 A	2.0 A	1.0 A
Amperes (inrush)	% of running	300%	—	500%	500%	600%	600%
Power consumption	—	300 W	—	250 W	250 W	250 W	250 W
Charging time	Seconds	5 sec	—	5 sec	5 sec	5 sec	5 sec
<b>Undervoltage Release (UVR)</b>							
Operational voltage range	85–110% voltage	20–26 Vdc	27–35 Vdc	41–53 Vdc	51–66 Vdc	94–138 Vdc	187–275 Vdc
Dropout voltage range	30–60% voltage	7–14 Vdc	10–19 Vdc	14–29 Vdc	18–36 Vdc	33–75 Vdc	66–150 Vdc
Power consumption (inrush)	Required for 200 ms	250 W	275 W	275 W	275 W	450 W	450 W
Power consumption (continuous)	Required for 400 ms	18 W	15 W	18 W	18 W	10 W	10 W
Opening time	Seconds	70 ms	70 ms	70 ms	70 ms	70 ms	70 ms
<b>Auxiliary Switches</b>							
Minimum load contact rating	Inductive load	0.5 A	—	0.5 A	—	0.5 A	0.25 A

## Magnum Breaker Control Device Application Guide—Vac

Breaker Control Device Nominal Voltage		120 Vac	240 Vac	415 Vac	480 Vac	600 Vac
<b>Shunt Trip (ST)— Trip Circuit</b>						
Operational voltage range	70–110%	77–140 Vac	146–264 Vac	—	—	—
Power consumption (inrush)	Required for 35 ms	450 VA	450 VA	—	—	—
Opening time	Seconds	35 ms	35 ms	—	—	—
<b>Spring Release (SR)—close circuit</b>						
Operational voltage range	70–110%	77–140 Vac	146–264 Vac	—	—	—
Power consumption (inrush)	Required for 200 ms	450 VA	450 VA	—	—	—
Closing time	Seconds	40 ms	40 ms	—	—	—
<b>Spring Charge Motor (MOT)</b>						
Operational voltage range	85–110% voltage	93–140 Vdc	177–305 Vdc	—	—	—
Amperes (running)	Running	2.0 A	1.0 A	—	—	—
Amperes (inrush)	% of running	600%	600%	—	—	—
Power consumption	—	250 VA	250 VA	—	—	—
Charging time	Seconds	5 sec	5 sec	—	—	—
<b>Undervoltage Release (UVR)</b>						
Operational voltage range	85–110% voltage	94–140 Vac	177–264 Vac	323–457 Vac	408–528 Vac	510–660 Vac
Dropout voltage range	30–60% voltage	33–76 Vac	62–144 Vac	114–249 Vac	144–288 Vac	180–360 Vac
Power consumption (inrush)	Required for 200 ms	450 VA	400 VA	480 VA	400 VA	400 VA
Power consumption (continuous)	Required for 400 ms	10 VA	10 VA	10 VA	10 VA	10 VA
Opening time	Seconds	70 ms	70 ms	70 ms	70 ms	70 ms
<b>Auxiliary Switches</b>						
Minimum load contact rating	Inductive load	10 A	10 A	—	—	—

**Note**

① 100% duty shunt trips require power consumption (inrush) for 200 ms.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breaker

#### Wiring Diagrams

#### Typical Magnum Breaker Control Circuit

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**Legend:**

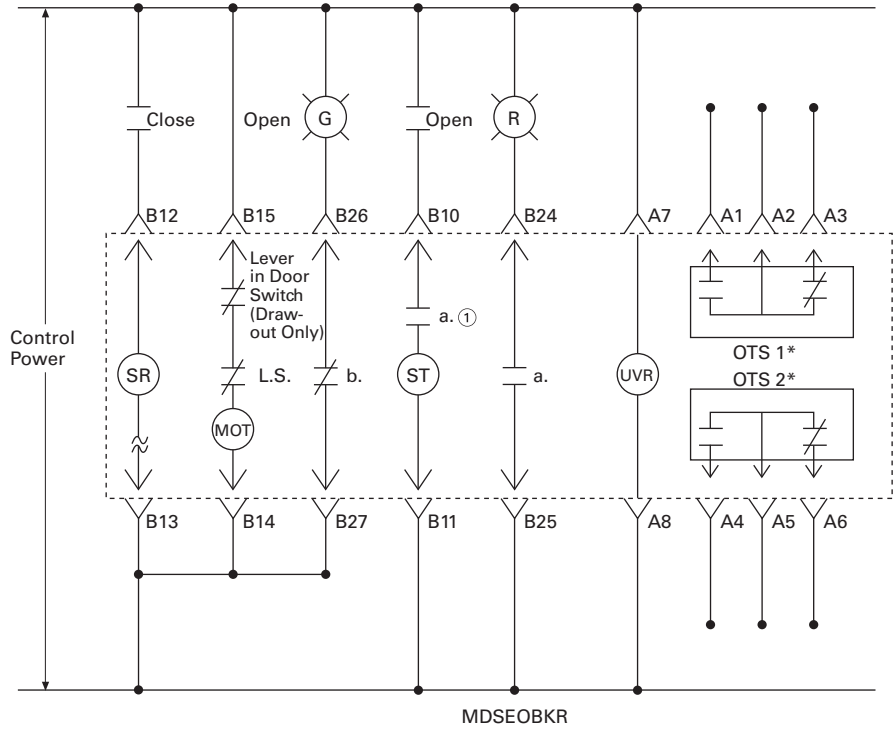
- LS Limit Switch for Closing Spring
- MOT Motor for Spring Charging
- ST Shunt Trip ①
- SR Spring Release
- UVR Undervoltage Release
- OTS Overcurrent Trip Switch

**Description of Operation:**

- 1 — Motor is energized through LS contact.
- 2 — Motor runs and charges closing spring.
- 3 — When closing spring is fully charged, LS contacts change state.
- 4 — Close contacts energize SR coil.
- 5 — When breaker closes, "b" opens.
- 6 — LS contacts change state and motor recharges closing springs.

**Notes**

- \* Contacts shown for breaker open (not fully charged), not tripped.
- - - Dotted line denotes Magnum Breaker.
- ① Not needed with 100% duty rated shunt.



**Magnum DC (Direct Current) Low Voltage Switches**



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Magnum SB Low Voltage Insulated Case Circuit Breakers	
Magnum IEC Rated Air Circuit Breakers . . . . .	<b>V4-T3-23</b>
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**Magnum DC (Direct Current) Low Voltage Switches**

**Product Description**

Eaton Magnum DC switches are a comprehensive offering of third-party and globally certified DC switches that are designed to provide excellent safety with a high level of performance that meets the demands of a global market.

**Applications**

The new line of Magnum DC switches covers a wide range industry applications.

- Utility companies incorporating DC facility power and control for emergency or redundant power
- Backup UPS power systems requiring means to disconnect the battery for isolation and maintenance
- SCR and drive isolation switches for maintenance and emergency disconnect

**Features and Benefits**

The new DC switch in the industry-proven Magnum platform provides DC technology in a common power breaker platform.

- The DC switch provides disconnect and switching to meet demanding industry standards:
  - UL1066—300 Vdc, 50 kA withstand and interruption, up to 3200 A continuous current
  - UL 489—600 Vdc, 50 kA withstand and interruption, up to 3200 A continuous current
  - IEC 60947-2—1000 Vdc, 25 kA interruption and 65 kA withstand, up to 3200 A
- Common accessories with the Magnum AC line of power circuit breakers reduces inventory and integration time
- Fixed and drawout versions address important design criteria, balancing cost, size and serviceability
- Internationally approved factory-installed and field-installable accessories identical to the Magnum air circuit breaker offering

**Standards and Certifications**

**UL and ANSI Test Certifications**

Magnum DC switches meet or exceed the applicable ANSI, NEMA, UL and CSA standards, including:

- ANSI C37.14 (Low Voltage DC Power Circuit Breakers Used in Enclosures)
- ANSI C37.16 (Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC and DC Power Circuit Breakers)
- ANSI C37.17 (Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers)
- UL 1066 (Standard for Low Voltage AC and DC Power Circuit Breakers Used in Enclosures)
- UL 489 Molded Case Switches

**IEC Test Certification**

Magnum Air Circuit Breakers meet or exceed the applicable IEC standards

- EN/IEC 60947-2

**Approvals and Marks**

- UL listed: Magnum DS Breaker UL File No. E52096 and Cassette UL File No. E204565
- ABS (American Bureau of Shipping) Type Approval
- CE
- CCC (Certificate for China Compulsory Product Certification) to GB14048.2-2001
- Det Norske Veritas (DNV)
- Lloyds of London
- South African Bureau of Standards (SABS)
- For a complete and comprehensive listing of all low voltage power breakers, please visit [www.eaton.com](http://www.eaton.com)



**Product Selection**

Contact Eaton for pricing.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Technical Data and Specifications

##### Ratings for Magnum DC Switches

Catalog Type/standard	Frame Type	Number of Poles	Frame Ampere Rating	DC Voltage/ Interrupt Rating/ Withstand Rating	Load Switching	For Use in Grounded Systems	Connection Type	Fixed/ Drawout	Certification
<b>ANSI/UL 1066 ratings at 300 Vdc</b>									
DAS	Standard	3	1600	300 V / 50 kA / 50 kA	Yes	Yes	Two-pole in series	Drawout	UL 1066
DAS	Standard	3	2000	300 V / 50 kA / 50 kA	Yes	Yes	Two-pole in series	Drawout	UL 1066
DAS	Standard	3	3200	300 V / 50 kA / 50 kA	Yes	Yes	Two-pole in series	Drawout	UL 1066
<b>UL 489 ratings at 600 Vdc</b>									
DBS	Standard	3	3200	600 V / 50 kA / 50 kA	Yes	Yes	Three-pole in series	Both	UL 489
<b>IEC ratings at 1000 Vdc <sup>①</sup></b>									
DEM/DGM	Narrow	3	800	1000 V / 25 kA / 65 kA	Yes	No/yes <sup>①</sup>	Three-pole in series	Both	IEC 60947-2
DEM/DGM	Narrow	3	1000	1000 V / 25 kA / 65 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEM/DGM	Narrow	3	1250	1000 V / 25 kA / 65 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEM/DGM	Narrow	3	1600	1000 V / 25 kA / 65 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEM/DGM	Narrow	3	2000	1000 V / 25 kA / 65 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEK/DGK	Standard	3	2500	1000 V / 25 kA / 85 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEK/DGK	Standard	3	3200	1000 V / 25 kA / 85 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEM/DGM	Double narrow	6	4000	1000 V / 25 kA / 100 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEM/DGM	Double narrow	6	5000	1000 V / 25 kA / 100 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEK/DGK	Double standard	6	4000	1000 V / 25 kA / 100 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2
DEK/DGK	Double standard	6	5000	1000 V / 25 kA / 100 kA	Yes	No/yes	Three-pole in series	Both	IEC 60947-2

**Note**

① DE is for use in ungrounded applications; DG is for use in grounded applications.

**Series NRX Low Voltage Power Circuit Breaker with Power Xpert Release Trip Unit (PXR)**



*Series NRX with PXR NF Drawout Breaker*



*Series NRX with PXR RF Fixed Breaker*

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Series NRX Low Voltage Power Circuit Breakers with Digitrip . . . . .	<b>V4-T3-47</b>
Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-55</b>

**Series NRX Low Voltage Power Circuit Breakers with PXR**

**Product Description**

Series NRX is a low voltage power circuit breaker suitable for UL 1558, UL 891, and IEC switchgear and switchboards. The compact size and weight of three-pole drawout with cassette Series NRX, see **Pages V4-T3-39** and **V4-T3-41**, allows for a 24.00 (609.6 mm) switchgear enclosure. Series NRX with Power Release Xpert (PXR) trip unit is available with a variety of cable and bus connection options: rear fixed, front fixed, fixed hybrid and drawout.

**The breaker ratings are:**

**NF Frame**

- 800–1200 A for UL 489
- 630–1600 A IEC 60947-2

**RF Frame**

- 800–3000 A for UL 489
- 800–4000 A for IEC 60947-2

**Application Description**

The compact sizes of the two Series NRX circuit breakers, NF and RF frames, help reduce non-revenue generating floor space, and the modular design and common accessories allow for easy panel and switchboard integration. The Series NRX circuit breakers combine high interruption and short time withstand ratings with easy to integrate communications. NF Frame is rated for 800 A (UL 1066), 800 A and 1200 A (UL 489) and 630–1600 A (IEC 60947-2) with an interrupting capacity of 65 kA with short time withstand at 42 kA at the 440/480 Vac level. RF Frame is rated for 800–3000 A (UL 489) and 800–4000 A (IEC 60947-2) with an interrupting capacity of 100 kA with short time withstand at 65 kA (or 85 kA for IEC 60947-2) at the 440/480 Vac level.

The Series NRX circuit breaker provides all the capabilities of a power circuit breaker in the compact size of a molded case breaker. It offers you the same protection and performance—along with increased flexibility—at half the size of a typical power circuit breaker.

Eaton’s new PXR electronic trip units provide advanced metering, communication and diagnostic features with an easy-to-use interface. The Power Xpert® Protection Manager (PXPM) software for the PXR trip units can provide and perform secondary injection and test reporting through a PC to simplify testing, serviceability and customization.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Features, Benefits and Functions

Series NRX utilizes several innovative technologies:

- Rogowski coil—does not saturate like iron core sensors, and one sensor accommodates 200–1600 ampere range for NF and 800–4000 for RF. You never have to change a sensor and CTs are not required
- Tension clamp secondary terminals—10 A continuous rating at 600 V meets UL/CSA/RoHS and UL-94 V0. Mounted directly to fixed breaker or drawout cassette, they reduce wiring throughout enclosure and provide clean, organized wiring schemes
- A Modbus® communication port is standard in the PXR 25 trip units and is available as an option on PXR 20 trip units. This native Modbus RTU capability gives access to breaker status and metering information. Additional PCAM, MCAM or ECAM modules can be installed externally for PXR to expand the communication capability and simplify integration into existing electrical system design and protocols
- “Direct Drive” mechanism—symmetrically loaded forces of the two-staged stored energy mechanism improves robustness, reliability, and achieves improved breaker life ratings
- Fold-up cassette—with this simple design, all items in a cassette are replaceable without removing the cassette from the cell
- “Arc chute” design
- Breaker-mounted racking or levering-in device—Racking device is mounted on the breaker, decreasing the width of the cassette, because the cassette is not burdened with the cost or parts of the lev-in
- Plug-n-Play accessories—No special tools needed. Accessory comes with plug and wires ready to install
- Arcflash Reduction Maintenance System—Eaton’s patented technology provides maintenance staff with improved safety of downstream maintenance locations using a simple and reliable method to reduce fault clearing times and energy during an arc flash event (radiation, sound, pressure, temperature). Arcflash Reduction Maintenance System uses a separate analog trip circuit, providing faster signal processing and interruption times than the standard (digital) “instantaneous” protection. The Arcflash Reduction Maintenance System function is activated either directly on the circuit breaker through a local switch or remotely through communications or a digital input

**Note:** UL 489: For  $I_n \leq 2500$  A, mechanical ops = 2500. For  $I_n < 2500$ , mechanical ops = 1500. For  $I_n \leq 2500$  A, mechanical ops = 3000. For  $I_n > 2500$ , mechanical ops = 2000.

#### Standards and Certifications

- UL 489 (molded case circuit breakers, molded case switches and circuit breaker enclosures)
- IEC 60947-1 (low voltage switchgear and controlgear—Part 1 general rules)
- IEC 60947-2 (low voltage switchgear and controlgear—Part 2 circuit breakers)
- CSA 22.2 (molded case circuit breakers, molded case switches and circuit breaker enclosures)
- UL 891 (deadfront switchboard)
- UL 1558 (metal-enclosed low voltage power circuit breaker switchgear)



#### Reference Information—Series NRX with PXR Publications

##### List of Instruction Leaflets and Manuals

Description	Publication Number	Frame Number
<b>NF Frames</b>		
Series NRX—Installation Instructions for Operation Counter	IL01301011E	NF
Series NRX—Installation Instructions for Drawout Cassette IP20 Safety Shutters	IL01301013E	NF
Series NRX—Installation Instructions for Fixed Breaker Arc Hood	IL01301014E	NF
Series NRX—Installation Instructions for Drawout Breaker Primary Adapters	IL01301016E	NF
Series NRX—Installation Instructions for Breaker and Cassette Interphase Barriers	IL01301021E	NF
Series NRX—Installation Instructions for Pushbutton Cover Kit	IL01301041E	NF
Series NRX—Installation Instructions for Drawout Circuit Breaker 2-Way Cable Interlock Kit	IL01301069E	NF
Series NRX—Installation Instructions for Drawout Circuit Breaker 3-Way Cable Interlock Kit	IL01301070E	NF
Series NRX—Installation Instructions for Fixed Circuit Breaker 2-Way Cable Interlock Kit	IL01301071E	NF
Series NRX—Installation Instructions for Fixed Circuit Breaker 3-Way Cable Interlock Kit	IL01301072E	NF
Series NRX—Installation Instructions for Cassette Door Interlock	IL01301073E	NF
Series NRX with PXR—Instructions for Neutral Current Sensor—Type NF	IL0131090EN	NF
Series NRX with PXR—Instructions for Cassette Cell Switch—Type NF	IL0131097EN	NF
Series NRX—Fixed Breaker Rear Connect and Front Connect Configurations	IL0131123EN	NF
Series NRX with PXR, Type NF low voltage power (air) circuit breakers instruction manual	MN013001EN	NF
Series NRX—Installation Instructions for Pop-Out Mechanical Trip Indicator	IL01301019E	NF

## List of Instruction Leaflets and Manuals, continued

Description	Publication Number	Frame Number
<b>RF Frames</b>		
Series NRX—Installation Instructions for Drawout Cassette IP20 Safety Shutters	IL01301044E	RF
Series NRX—Installation Instructions for Breaker and Cassette Interphase Barrier	IL01301048E	RF
Series NRX—Installation Instructions for Rear Primary Adapters	IL01301053E	RF
Series NRX—Installation Instructions for Operation Counter	IL01301055E	RF
Series NRX—Installation Instructions for Front Connect Adapters	IL01301056E	RF
Series NRX—Installation Instructions for Pop-Out Mechanical Trip Indicator	IL01301058E	RF
Series NRX—Installation Instructions for Drawout Circuit Breaker 2-Way Cable Interlock Kit	IL01301059E	RF
Series NRX—Installation Instructions for Drawout Circuit Breaker 3-Way Cable Interlock Kit	IL01301060E	RF
Series NRX—Installation Instructions for Fixed Circuit Breaker 2-Way Cable Interlock Kit	IL01301061E	RF
Series NRX—Installation Instructions for Fixed Circuit Breaker 3-Way Cable Interlock Kit	IL01301062E	RF
Series NRX—Installation Instructions for Lev-in Key Interlocks	IL01301063E	RF
Series NRX—Installation Instructions for Pushbutton Cover Kit	IL01301065E	RF
Series NRX—Installation Instructions for Cassette Door Interlock	IL01301066E	RF
Series NRX with PXR—Instructions for Neutral Current Sensor—Type RF	IL0131094EN	RF
Series NRX with PXR—Instructions for Cassette Cell Switch—Type RF	IL0131095EN	RF
Series NRX with PXR, Type RF low voltage power (air) circuit breakers instruction manual	MN013002EN	RF
<b>NF and RF Frames</b>		
Series NRX NF & RF Circuit Breakers with PXR 20/25 Trip Units - Time Current Curves	AD013001EN	NF and RF
Series NRX Drawout Circuit Breaker and Cassette Rejection Interlocks	IL01301006E	NF and RF
Series NRX—Installation Instructions for Fixed and Drawout Breaker Door Escutcheon	IL01301012E	NF and RF
Series NRX—Installation Instructions for IP55 Dust and Water-Resistant Cover	IL01301038E	NF and RF
Series NRX—Installation Instructions for Kirk Key Interlock Kit	IL01301039E	NF and RF
Series NRX—Installation Instructions for Ronis Key Lock Kit	IL01301040E	NF and RF
Series NRX—Installation Instructions for CES Key Lock Kit	IL01301049E	NF and RF
Series NRX—Installation Instructions for Castell Key Lock Kit	IL01301050E	NF and RF
Series NRX with PXR—Instructions for PT Module	IL01301074E	NF and RF
Series NRX with PXR—Instructions for Undervoltage Release, Shunt Trip, and Overcurrent Trip Switch	IL0131087EN	NF and RF
Series NRX with PXR—Instructions for Spring Release, Latch Check Switch, and Motor Operator	IL0131088EN	NF and RF
Series NRX with PXR—Instructions for Source Ground and Zero Sequence Ground Sensor	IL0131089EN	NF and RF
Series NRX with PXR—Instructions for Modbus Communications Adapter Module (MCAM)	IL0131091EN	NF and RF
Series NRX with PXR—Instructions for PROFIBUS DP Communications Adaptor Module (PCAM)	IL0131092EN	NF and RF
Series NRX with PXR—Instructions for Secondary Terminal Blocks	IL0131093EN	NF and RF
Series NRX with PXR—Instructions for Auxiliary Switch	IL0131096EN	NF and RF
Series NRX with PXR—Instructions for INCOM Communications Adapter Module	IL0131124EN	NF and RF
Series NRX with PXR—Installation Instructions for Ethernet Communications Adapter Module	IL0131125EN	NF and RF
PXR 20/25 Trip Unit for Series NRX Screen Navigation Guide	IL0131128EN	NF and RF
Time Delay Undervoltage Module for use with Undervoltage Release in Eaton Circuit Breakers	IL5721B33	NF and RF
PXR 20/25 Trip Unit for Series NRX User Manual	MN013003EN	NF and RF
Series NRX with PXR Circuit Breaker Wiring Diagrams	TD013001EN	NF and RF

# 3.1

## Power Breakers, Contactors and Fuses

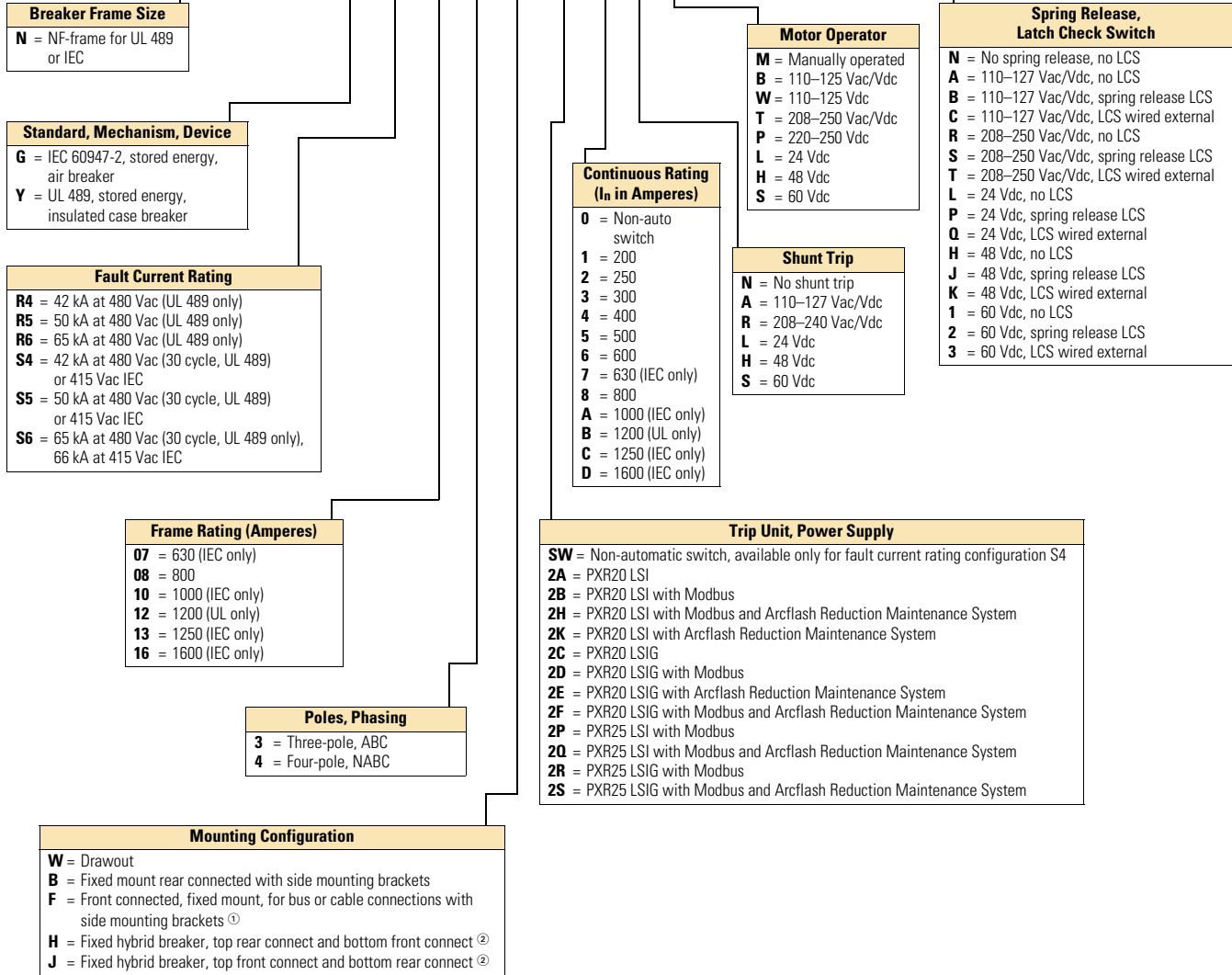
### Power Circuit Breakers

#### Catalog Number Selection

#### Series NRX with Power Xpert Release NF Frame Circuit Breaker (exclusionary rules apply)

3

**N G S6 08 3 W 2A 8 A B A N 4 X N D X**



#### Notes

- ① Four-pole cable kit only available up to 50 kA, 65 kA cable kit not available at this time.
- ② UL 489 three-pole only.

Series NRX with Power Xpert Release NF Frame Circuit Breaker (exclusionary rules apply), continued

**N G S6 08 3 W 2A 8 A B A N 4 X N D X**

**UVR, Second Shunt Trip**

**N** = None  
**A** = 110–125 Vac/Vdc UVR  
**R** = 220–250 Vac/Vdc UVR  
**L** = 24 Vdc UVR  
**H** = 48 Vdc UVR  
**S** = 60 Vdc UVR  
**1** = 110–127 Vac/Vdc second shunt trip  
**2** = 208–240 Vac/Vdc second shunt trip  
**4** = 24 Vdc second shunt trip  
**8** = 48 Vdc second shunt trip  
**9** = 60 Vdc second shunt trip

**Auxiliary Switches, Label Language**

**E** = No auxiliary switches, English  
**2** = 2 Form C, English  
**4** = 4 Form C, English

	Trip Indicator and Bell Alarm ①	OTS	Secondary Terminal Blocks	Remote Reset
<b>N</b>	None	None	Per breaker options	None
<b>X</b>	Trip indicator	None	Per breaker options	None
<b>Z</b>	Trip indicator	2 Form C	Per breaker options	None
<b>M</b>	Interlock trip indicator	None	Per breaker options	None
<b>Y</b>	Interlock trip indicator	2 Form C	Per breaker options	None
<b>1</b>	None	None	Full complement	None
<b>2</b>	Trip indicator	None	Full complement	None
<b>3</b>	Trip indicator	2 Form C	Full complement	None
<b>4</b>	Interlock trip indicator	None	Full complement	None
<b>5</b>	Interlock trip indicator	2 Form C	Full complement	None

	Pushbutton Padlock Cover	Safe OFF Feature	Operations Counter
<b>N</b>	No	None	No
<b>A</b>	No	—	Provided
<b>B</b>	Yes (plastic/plastic)	—	No
<b>J</b>	Yes (plastic/plastic)	—	Provided
<b>K</b>	Yes (metal/metal)	—	No
<b>L</b>	Yes (metal/metal)	—	Provided
<b>1</b>	Yes (metal/metal)	Yes	No
<b>2</b>	Yes (metal/metal)	Yes	Provided

**Drawout Breaker Shipping, Fixed Breaker Terminals (Door frame kit ships as standard unless noted otherwise)**

**D** = Drawout breaker shipping alone, without door frame kit  
**C** = Drawout breaker shipping in cassette, no shutters, no terminals  
**1** = Drawout breaker shipping in cassette, no shutters, short vertical/horizontal  
**2** = Drawout breaker shipping in cassette, no shutters, long vertical/horizontal  
**4** = Drawout breaker shipping in cassette, with shutters, short vertical/horizontal  
**5** = Drawout breaker shipping in cassette, with shutters, long vertical/horizontal  
**9** = Drawout breaker shipping in cassette, with shutters, no terminals  
**K** = Rear connect, fixed breaker, no terminal adapters  
**F** = Fixed breaker, rear connect, with mounting feet and short terminal adapters  
**H** = Fixed breaker, rear connect, with mounting feet and long terminal adapters  
**J** = Front connect, fixed breaker, with no terminal adapters  
**Q** = Fixed hybrid, no rear terminals, TA1200NB1M front cable terminals  
**T** = Fixed hybrid, no rear terminals, TA1201NB1M front cable terminals

Series NRX with Power Xpert Release NF Frame Cassette

**NY 12 3 F A B N S N N N C**

**Cassette Family and Breaker Frame**

**NY** = UL 489 NF Frame  
**NG** = IEC NF Frame

**Continuous Ampere Range**

**12** = 800–1200 (UL 489)  
**16** = 630–1600 (IEC)

**Poles and Phasing (Facing front of breaker)**

**3** = Three-pole ABC  
**4** = Four-pole NABC

**Load Terminal Connections**

**A** = With vertical/horizontal bus adapter kit (long style)  
**F** = With flat tapped pads only  
**G** = With vertical/horizontal bus adapter kit (short style)

**Arc Hood**

**A** = Arc hood installed (default)

**Door Frame Gasket and Rejection Kits**

**B** = Door kit included (default), with rejection kit

**Cell Switch Options**

**N** = Not included

**Shutters**

**N** = Not included (default)  
**S** = Included

**Cassette Shipping**

**C** = Cassette only  
**B** = Breaker shipped in cassette

**Future**

**N** = None

**Future**

**N** = None

**Second Contact Terminals Installed**

**N** = None  
**B** = Breaker defined, when breaker ships in cassette  
**F** = Full complement

Note

① Two Form C contacts except on NF with Power Xpert Release and OTS and RRTI, where only one Form C OTS contact will be provided.

# 3.1

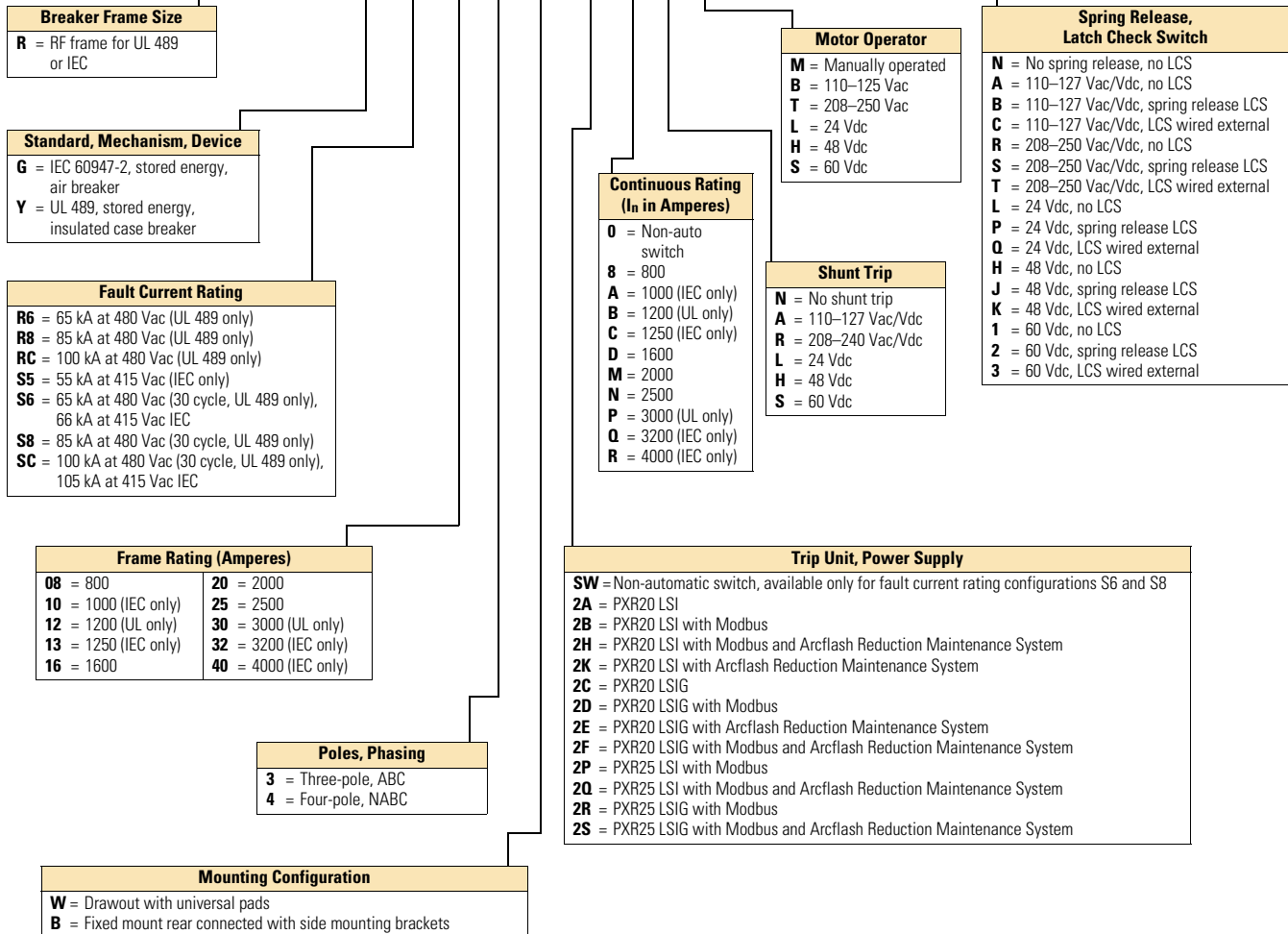
## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Series NRX with Power Xpert Release RF Frame Circuit Breaker (exclusionary rules apply)

3

**R G S6 08 3 W 2A 8 A B A N 4 X N D X**





Series NRX with Power Xpert Release RF Frame Circuit Breaker (exclusionary rules apply), continued

**R G S6 08 3 W 2A 8 A B A N 4 X N D X**

**UVR, Second Shunt Trip**

**N** = None  
**A** = 110–125 Vac/Vdc UVR  
**R** = 220–250 Vac/Vdc UVR  
**L** = 24 Vdc UVR  
**H** = 48 Vdc UVR  
**S** = 60 Vdc UVR  
**1** = 110–127 Vac/Vdc second shunt trip  
**2** = 208–240 Vac/Vdc second shunt trip  
**4** = 24 Vdc second shunt trip  
**8** = 48 Vdc second shunt trip  
**9** = 60 Vdc second shunt trip

**Auxiliary Switches, Label Language**

**E** = No auxiliary switches, English  
**2** = 2 Form C, English  
**4** = 4 Form C, English  
**6** = 6 Form C, English  
**8** = 8 Form C, English  
**A** = 10 Form C, English  
**W** = 12 Form C, English

	Trip Indicator and Bell Alarm	OTS	Secondary Terminal Blocks	Remote Reset
<b>N</b>	None	None	Per breaker options	None
<b>X</b>	Trip indicator	None	Per breaker options	None
<b>Z</b>	Trip indicator	2 Form C	Per breaker options	None
<b>M</b>	Interlock trip indicator	None	Per breaker options	None
<b>A</b>	Interlock trip indicator	None	Per breaker options	24 Vdc RR
<b>6</b>	Interlock trip indicator	None	Per breaker options	48 Vdc RR
<b>7</b>	Interlock trip indicator	None	Per breaker options	60 Vdc RR
<b>B</b>	Interlock trip indicator	None	Per breaker options	120 Vdc RR
<b>C</b>	Interlock trip indicator	None	Per breaker options	240 Vdc RR
<b>Y</b>	Interlock trip indicator	2 Form C	Per breaker options	None
<b>D</b>	Interlock trip indicator	2 Form C	Per breaker options	24 Vdc RR
<b>8</b>	Interlock trip indicator	2 Form C	Per breaker options	48 Vdc RR
<b>9</b>	Interlock trip indicator	2 Form C	Per breaker options	60 Vdc RR
<b>E</b>	Interlock trip indicator	2 Form C	Per breaker options	120 Vdc RR
<b>F</b>	Interlock trip indicator	2 Form C	Per breaker options	240 Vdc RR
<b>1</b>	None	None	Full complement	None
<b>2</b>	Trip indicator	None	Full complement	None
<b>3</b>	Trip indicator	2 Form C	Full complement	None
<b>4</b>	Interlock trip indicator	None	Full complement	None
<b>J</b>	Interlock trip indicator	None	Full complement	24 Vdc RR
<b>G</b>	Interlock trip indicator	None	Full complement	48 Vdc RR
<b>H</b>	Interlock trip indicator	None	Full complement	60 Vdc RR
<b>K</b>	Interlock trip indicator	None	Full complement	120 Vdc RR
<b>L</b>	Interlock trip indicator	None	Full complement	240 Vdc RR
<b>5</b>	Interlock trip indicator	2 Form C	Full complement	None
<b>R</b>	Interlock trip indicator	2 Form C	Full complement	24 Vdc RR
<b>U</b>	Interlock trip indicator	2 Form C	Full complement	48 Vdc RR
<b>V</b>	Interlock trip indicator	2 Form C	Full complement	60 Vdc RR
<b>S</b>	Interlock trip indicator	2 Form C	Full complement	120 Vdc RR
<b>T</b>	Interlock trip indicator	2 Form C	Full complement	240 Vdc RR

**Options**

**X** = Default  
**W** = Low temperature applications (–57 °C)

**Drawout Breaker Shipping, Fixed Breaker Terminals (Door frame kit ships as standard unless noted otherwise)**

**D** = Drawout breaker shipping alone, without door frame kit  
**C** = Drawout breaker shipping in cassette, no shutters, no terminals  
**1** = Drawout breaker shipping in cassette, no shutters, horizontal adapters  
**2** = Drawout breaker shipping in cassette, no shutters, vertical adapters  
**4** = Drawout breaker shipping in cassette, with shutters, vertical adapters  
**5** = Drawout breaker shipping in cassette, with shutters, horizontal mounting  
**9** = Drawout breaker shipping in cassette, with shutters, no terminals  
**K** = Rear connect, fixed breaker, no terminal adapters  
**F** = Fixed breaker, rear connect with vertical adapters  
**H** = Fixed breaker, rear connect with horizontal adapters

	Pushbutton Padlock Cover	Safe OFF Feature	Operations Counter
<b>N</b>	No	None	No
<b>A</b>	No	—	Provided
<b>B</b>	Yes (plastic/plastic)	—	No
<b>J</b>	Yes (plastic/plastic)	—	Provided
<b>K</b>	Yes (metal/metal)	—	No
<b>L</b>	Yes (metal/metal)	—	Provided
<b>1</b>	Yes (metal/metal)	Yes	No
<b>2</b>	Yes (metal/metal)	Yes	Provided

Series NRX with Power Xpert Release RF Frame Cassette

**RY 12 3 F A B N S N N N C**

**Cassette Family and Breaker Frame**

**RY** = UL 489 NF Frame  
**RG** = IEC NF Frame

**Continuous Ampere Range**

**30** = 3000 A (UL only)  
**40** = 3200–4000 A (IEC only)

**Poles and Phasing (Facing front of breaker)**

**3** = Three-pole ABC  
**4** = Four-pole NABC

**Load Terminal Connections**

**F** = With flat tapped pads only (no terminals)  
**G** = With vertical/horizontal bus adapter kit (short style)  
**A** = With vertical/horizontal bus adapter kit (long style)

**Arc Hood**

**A** = Arc hood installed (default)

**Door Frame Gasket and Rejection Kits**

**B** = Door kit included (default), with rejection kit

**Cell Switch Options (Available on breaker + cassette or cassette only)**

**N** = Not included  
**3** = Cell switch assembly with 3 Form C contacts

**Shutters**

**N** = Not included (default)  
**S** = Included

**Cassette Shipping**

**C** = Cassette only  
**B** = Breaker shipped in cassette

**Future**

**N** = None

**Future**

**N** = None

**Second Contact Terminals Installed**

**N** = None  
**B** = Breaker defined, when breaker ships in cassette  
**F** = Full complement



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Technical Data and Specifications

##### UL 489 Ratings

3


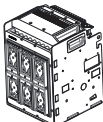
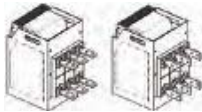
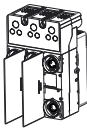
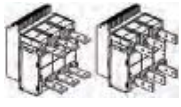

1 rms Symmetrical Current Ratings kA 50/60 Hz

Frame Amperes	Breaker Type Catalog Number	Frame Type	Interrupting at 240 Vac	Interrupting at 480 Vac	Interrupting at 600 Vac	30 Cycle Short-Time Withstand Rating <sup>①</sup>	Instantaneous Override (Equivalent Symmetrical rms, kA) <sup>②</sup>	Poles Available	Available Trip Rating (Establishes Breaker In Rating) <sup>③</sup>
<b>NF Frame—UL 489</b>									
800	NYR4-08	NF-R	50	42	42	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	200, 250, 300, 400, 500, 600, 800
	NYR5-08	NF-R	65	50	42	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	NYR6-08	NF-R	85	65	42	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
1200	NYR4-12	NF-R	50	42	42	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	200, 250, 300, 400, 500, 600, 800, 1200
	NYR5-12	NF-R	65	50	42	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	NYR6-12	NF-R	85	65	42	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
<b>NF Frame—UL 489 with high short-time (30 cycle) withstand capabilities</b>									
800	NYS4-08	NF-S	50	42	42	42	42	3, 4	200, 250, 300, 400, 500, 600, 800
	NYS5-08	NF-S	65	50	42	42	42	3, 4	
	NYS6-08	NF-S	85	65	42	42	42	3, 4	
1200	NYS4-12	NF-S	50	42	42	42	42	3, 4	200, 250, 300, 400, 500, 600, 800, 1200
	NYS5-12	NF-S	65	50	42	42	42	3, 4	
	NYS6-12	NF-S	85	65	42	42	42	3, 4	
<b>RF Frame—UL 489</b>									
800	RYR5-08	RF-R	65	65	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	800
	RYR8-08	RF-R	85	85	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	RYRC-08	RF-R	100	100	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
1200	RYR5-12	RF-R	65	65	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	800, 1200
	RYR8-12	RF-R	85	85	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	RYRC-12	RF-R	100	100	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
1600	RYR5-16	RF-R	65	65	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	800, 1200, 1600
	RYR8-16	RF-R	85	85	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	RYRC-16	RF-R	100	100	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
2000	RYR5-20	RF-R	65	65	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	800, 1200, 1600, 2000
	RYR8-20	RF-R	85	85	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	RYRC-20	RF-R	100	100	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
2500	RYR5-25	RF-R	65	65	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	800, 1200, 1600, 2000, 2500
	RYR8-25	RF-R	85	85	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	RYRC-25	RF-R	100	100	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
3000	RYR5-30	RF-R	65	65	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	800, 1200, 1600, 2000, 2500, 3000
	RYR8-30	RF-R	85	85	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
	RYRC-30	RF-R	100	100	—	16 x I <sub>n</sub>	16 x I <sub>n</sub>	3, 4	
<b>RF Frame—UL 489 with high short-time (30 cycle) withstand capabilities</b>									
800	RYS6-08	RF-S	65	65	—	65	—	3, 4	800
	RYS8-08	RF-S	85	85	—	65	65	3, 4	
	RYSC-08	RF-S	100	100	—	65	65	3, 4	
1200	RYS6-12	RF-S	65	65	—	65	—	3, 4	800, 1200
	RYS8-12	RF-S	85	85	—	65	65	3, 4	
	RYSC-12	RF-S	100	100	—	65	65	3, 4	
1600	RYS6-16	RF-S	65	65	—	65	—	3, 4	800, 1200, 1600
	RYS8-16	RF-S	85	85	—	65	65	3, 4	
	RYSC-16	RF-S	100	100	—	65	65	3, 4	
2000	RYS6-20	RF-S	65	65	—	65	—	3, 4	800, 1200, 1600, 2000
	RYS8-20	RF-S	85	85	—	65	65	3, 4	
	RYSC-20	RF-S	100	100	—	65	65	3, 4	
2500	RYS6-25	RF-S	65	65	—	65	—	3, 4	800, 1200, 1600, 2000, 2500
	RYS8-25	RF-S	85	85	—	65	65	3, 4	
	RYSC-25	RF-S	100	100	—	65	65	3, 4	
3000	RYS6-30	RF-S	65	65	—	65	—	3, 4	800, 1200, 1600, 2000, 2500, 3000
	RYS8-30	RF-S	85	85	—	65	65	3, 4	
	RYSC-30	RF-S	100	100	—	65	65	3, 4	



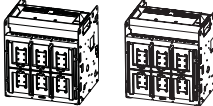
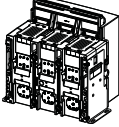
#### Notes

- ① UL 489 does not require a short-time withstand rating for breakers. The UL 489 Series NRX breakers have instantaneous override fixed at 22.5 x I<sub>n</sub> (asymmetrical peak value). An equivalent symmetrical rms value would roughly equate to 16 x I<sub>n</sub>.
- ② A 30-cycle withstand option is available for Series NRX breakers to provide better selectivity.
- ③ No change of hardware is required, trip rating can be programmed using I<sub>n</sub> Programming Tool Kit.

Mounting and Load Connection Configurations—NF Frame

Breaker Type	Breaker Mechanism	Standard Bus Connection Provisions	Rear-Connect Horizontal/ Vertical Adapter Kit with and without Cover (Kits shipped unassembled)	Fixed Front Connect Breaker Cable-Connected Cable Terminals	Hybrid Connect Breaker: Rear Connect Top— Cable Connect Bottom	Hybrid Connect Breaker: Cable Connect Top— Rear Connect Bottom
Drawout Breaker 	Stored energy	Finger clusters	—	—	—	—
Cassette 	—	Rear-connected pre-drilled bus pads		—	—	—
Fixed 	Stored energy	Rear-connected pre-drilled bus pads			—	—

Mounting and Load Connection Configurations—RF Frame

Breaker Type	Breaker Mechanism	Standard Bus Connection Provisions	Rear-Connect Horizontal/ Vertical Adapter Kit with and without Cover (Kits shipped unassembled)
Drawout Breaker 	Stored energy	Finger clusters	—
Cassette 	—	Rear-connected pre-drilled bus pads	
Fixed 	Stored energy	Rear-connected pre-drilled bus pads	—

Circuit Breaker Dimensions in Inches (mm) and Weights in lb (kg)

Description	Height		Width		Depth		Weight	
	NF	RF	NF	RF	NF	RF	NF	RF
<b>Fixed—Rear Connect</b>								
Three-pole	13.31 (338.1)	15.65 (397.6)	8.25 (209.6)	13.22 (335.8)	7.15 (181.8)	11.51 (292.4)	45 (20)	120 (55)
Four-pole	13.31 (338.1)	15.65 (397.6)	11.00 (279.4)	19.41 (492.9)	7.15 (181.6)	11.51 (292.4)	62 (28)	155 (71)
<b>Fixed—Front Connect</b>								
Three-pole	15.99 (406.3)	—	8.25 (209.6)	—	7.16 (181.8)	—	45 (20)	120 (55)
Four-pole	15.99 (406.3)	—	11.00 (279.4)	—	7.15 (181.6)	—	62 (28)	155 (71)
<b>Drawout</b>								
Three-pole	14.17 (359.9)	17.96 (456.1)	10.00 (254.0)	15.67 (397.9)	10.50 (266.7)	14.48 (367.8)	87 (40)	211 (96)
Four-pole	14.17 (359.9)	17.96 (456.1)	12.75 (323.9)	18.06 (458.7)	10.50 (266.7)	14.48 (367.8)	109 (50)	258 (117)






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## Power Breakers, Contactors and Fuses




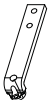
### Power Circuit Breakers

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
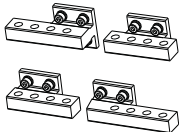
#### Available Front Connect Cable Terminals

List Number	Connector	Ratings (kA)	To Breaker?	Catalog Number (Three-Pole)
	1 Bus conductor extension (42 kA and below)	42	—	<b>NRXBUSEXT</b>
	Bus conductor extension (50 kA and below)	50	—	<b>NRXBUSEXT</b>
	Bus conductor extension (65 kA and below)	65	—	<b>NRXBUSEXT653</b>
	2 Cable terminals (two holes)	65	Yes	<b>TA700NB1M</b>
	With control wire provisions	65	Yes	<b>TA700NB1MCWT</b>
	3 Cable terminals (three holes)	65	Yes	<b>TA1000NB1M</b>
	With control wire provisions	65	Yes	<b>TA1000NB1MCWT</b>
	4 Cable terminals (four holes)	65	Load side only <sup>①</sup>	<b>TA1200NB1M</b>
	With control wire provisions	65	Load side only <sup>①</sup>	<b>TA1200NB1MCWT</b>
	5 Cable terminals (three holes for 750 kcmil)	65	Load side only <sup>①</sup>	<b>TA1201NB1M</b>

#### Available Rear Connectors for Fixed Breakers or Cassettes (NF-Frame)

List Number	Connector	Number of Poles	Catalog Number
	1 Universal bus adapter—short	3	<b>SADP316</b>
		4	<b>SADP416</b>
	2 Universal bus adapter—long	3	<b>LADP316</b>
		4	<b>LADP416</b>
	3 Rear connect adapter extensions—short (horizontal holes)	3	<b>SBADP316</b>
		4	<b>SBADP416</b>
	4 Rear connect adapter extensions—long (horizontal holes)	3	<b>LBADPU316</b>
		4	<b>LBADPU416</b>
5	Front connect	3	<b>CASADP316</b>
		4	<b>CASADP416</b>

#### Available Rear Connectors for Fixed Breakers or Cassettes (RF-Frame)

List Number	Connector	Number of Poles	Catalog Number
	1 Horizontal/vertical kit	3	<b>RFADP3PU32</b>
		4	<b>RFADP4PU32</b>
	2 Vertical kit	3	<b>RFADP3PV40</b>
		4	<b>RFADP4PV40</b>
	3 Horizontal/vertical 4000A kit	3	<b>RFADP3PH40</b>
		4	<b>RFADP4PH40</b>

#### Note

<sup>①</sup> For use on line side, user must use catalog number **NRXBUSEXT503** for 50 kA, or **NRXBUSEXT653** for 65 kA.

## Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire (Number of Conductors)	AWG Wire Catalog Number <sup>①</sup>	Metric Wire Range mm <sup>2</sup>	Metric Catalog Number <sup>①</sup>
<b>Standard Cu/Al Pressure Terminals</b>						
700	Aluminum	Cu/Al	1–500 (2)	TA700NB1	50–240	TA700NB1M
1000	Aluminum	Cu/Al	3/0–400 (3)	TA1000NB1	95–185	TA1000NB1M
1200	Aluminum	Cu/Al	4/0–500 (4)	TA1200NB1	120–240	TA1200NB1M
1200	Aluminum	Cu/Al	500–750 (3)	TA1201NB1	300–400	TA1201NB1M

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## Accessory Ratings

## Undervoltage Release Ratings

Control Voltages	Frequency	Operational Voltage Range 85%–110%	Dropout Voltage Range 35%–60%	Inrush/Continuous Power Consumption (VA)	Opening Time (ms) -NF	Opening Time (ms) -RF
24	DC	20–26	8–14	425/2	25	37
48	DC	41–53	17–29	750/3	25	37
60	DC	51–66	21–36	825/4	25	37
110–127	50–60 Hz	94–140	44–66	1150/8	25	37
110–125	DC	94–138	44–66	1150/8	25	37
208–240	50–60 Hz	177–264	84–125	1200/8	25	37
220–250	DC	187–275	88–132	1200/8	25	37

## Shunt Trip Ratings

Control Voltages	Frequency	Operational Voltage Range 70%–110%	Inrush/Continuous Power Consumption (VA)	Opening Time (ms) -NF	Opening Time (ms) -RF
24	DC	17–26	400/2	15	22
48	DC	34–53	500/3	15	22
60	DC	42–66	500/4	15	22
110–127	50–60 Hz	77–140	800/8	15	22
110–125	DC	77–138	800/8	15	22
208–240	50–60 Hz	146–264	850/8	15	22

## Spring Release Ratings

Control Voltages	Frequency	Operational Voltage Range 85%–110%	Inrush Power Consumption (VA)	Closing Time (ms) -NF	Closing Time (ms) -RF
24	DC	20–26	400	20	35
48	DC	41–53	500	20	35
60	DC	51–66	500	20	35
110–127	50–60 Hz	94–140	750	20	35
110–125	DC	94–138	750	20	35
208–240	50–60 Hz	177–264	800	20	35

**Note**

<sup>①</sup> Single terminals individually packed.

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Motor Operator

Control Voltages	Frequency	Operational Voltage Range 85%–110%	Running Current (A)	Typical Inrush Current	Power Consumption (VA)	Maximum Charging Time (sec)
<b>NF</b>						
24	DC	20–26	6	325%	160	4
48	DC	41–53	3	500%	150	3
60	DC	51–66	2	350%	150	4
110–127	50–60 Hz	94–140	2	300%	280	3
110–125	DC	94–138	1	500%	150	3
208–240	50–60 Hz	177–264	1	1000%	280	4
220–250	DC	187–275	1	1000%	280	4
<b>RF</b>						
24	DC	20–26	7	350%	200	6
48	DC	41–53	3	450%	175	6
60	DC	51–66	2	450%	225	6
110–127	50–60 Hz	94–140	3	300%	425	6
110–125	DC	94–138	2	375%	275	6
208–240	50–60 Hz	177–264	1.5	300%	400	6
220–250	DC	187–275	1	400%	250	6

#### Control Voltages and Currents

Control Voltages	24 Vdc	48 Vdc	60 Vdc	110–125 Vdc	110–127 Vac	220–250 Vdc	208–240 Vac
<b>Current</b>							
Close current (inrush)	14	10	8	7	7	4	4
Shunt trip current (ST)—(inrush/continuous)	16/0.08	10/0.06	8/0.07	7/0.07	7/0.07	4/0.04	4/0.04
NF—Charge motor current (inrush/continuous)	20/6	15/3	7/2	5/1	6/2	10/1	10/1
RF—Charge motor current (inrush/continuous)	23/7	14/3	14/3	8/2	9/3	4/1	5/1.5
<b>Operating Voltage Rating</b>							
Close	20–26	41–53	51–66	94–138	94–140	187–275	177–264
Open	17–26	34–53	42–66	77–138	77–140	154–275	146–264
Charge—NF	20–26	41–53	51–66	94–138	94–140	187–275	177–264
Charge—RF	26–26	41–53	51–66	94–138	94–140	187–275	177–264

#### Overcurrent Trip Switch

Control Voltages	Frequency	Contact Rating (Amperes)
250	50–60 Hz	10
125	DC	0.5
250	DC	0.25

#### Auxiliary Switch

Control Voltages	Frequency	Contact Rating (Amperes)
250	50–60 Hz	10
125	DC	0.5
250	DC	0.25

#### Breaker Position/Continuity—NF Frame

Breaker Position	Continuity Between Red and Black Lead Pairs	Continuity Between Blue and Black Lead Pairs
Open	No	47 and 45; 48 and 49
	No	53 and 51; 54 and 55
Closed	46 and 45; 50 and 49	No
	52 and 51; 56 and 55	No

#### Breaker Position/Continuity—RF Frame

Breaker Position	Continuity Between Red and Black Lead Pairs	Continuity Between Blue and Black Lead Pairs
Open	No	59 and 57; 60 and 61
	No	65 and 63; 66 and 67
	No	71 and 69; 72 and 73
	No	77 and 75; 78 and 79
	No	83 and 81; 84 and 85
	No	89 and 87; 90 and 91
Closed	58 and 57; 62 and 61	No
	64 and 63; 68 and 67	No
	70 and 69; 74 and 73	No
	76 and 75; 80 and 79	No
	82 and 81; 86 and 85	No
	88 and 87; 92 and 91	No

Series NRX with Digitrip



Series NRX NF Drawout Breaker



Series NRX Fixed Front Connect Breaker with Bus Extensions (Optional)

Contents

<i>Description</i>	<i>Page</i>
Low Voltage Power Circuit Breakers . . . . .	<b>V4-T3-2</b>
Magnum DS Low Voltage Power Circuit Breakers . . . . .	<b>V4-T3-6</b>
Magnum MDSL Current Limiting Power Circuit Breaker . . . . .	<b>V4-T3-12</b>
Magnum SB Low Voltage Insulated Case Circuit Breakers . . . . .	<b>V4-T3-15</b>
Magnum IEC Rated Air Circuit Breakers . . . . .	<b>V4-T3-23</b>
Magnum DC (Direct Current) Low Voltage Switches . . . . .	<b>V4-T3-33</b>
Series NRX Low Voltage Power Circuit Breakers with PXR . . . . .	<b>V4-T3-35</b>
Series NRX Low Voltage Power Circuit Breakers with Digitrip	
Catalog Number Selection . . . . .	<b>V4-T3-49</b>
Technical Data and Specifications . . . . .	<b>V4-T3-51</b>
Medium Voltage Circuit Breakers . . . . .	<b>V4-T3-55</b>

Series NRX Low Voltage Power Circuit Breakers with Digitrip

Product Description

Series NRX is a low voltage power circuit breaker suitable for UL 1558, UL 891, and IEC switchgear and switchboards. The compact size and weight of three-pole drawout with cassette Series NRX, see **Page V4-T3-51**, allows for a 24.00 (609.6 mm) switchgear enclosure.

The breaker ratings are:

- 800 A for UL 1066
- 800 A, 1200 A for UL 489
- 630–1600 A IEC 60947-2 from a voltage range of 220–725 Vac

Application Description

The Series NRX is a compact globally certified low voltage power (air) circuit breaker. It is rated for 800 A (UL 1066), 800 A and 1200 A (UL 489) and 630–1600 A (IEC 60947-2) with an interrupting capacity of 65 kA with short time withstand at 42 kA at the 440/480 Vac level.

The Series NRX circuit breaker provides all the capabilities of a power circuit breaker in the compact size of a molded case breaker. It offers you the same protection and performance—along with increased flexibility—at half the size of a typical power circuit breaker.

The dimensions and design of Series NRX allows up to eight UL 1066 or UL 489 breakers in a 24-inch (600 mm) wide structure. The one frame size, regardless of ampere rating, reduces drawing conversion, structure integration time and parts inventory for several board, gear and machinery applications.

Features, Benefits and Functions

Series NRX utilizes several innovative technologies:

- Rogowski coil—does not saturate like iron core sensors, and one sensor accommodates 200–1600 ampere range. You never have to change a sensor and CTs are not required
- Tension clamp secondary terminals—10 A continuous rating at 600 V meets UL/CSA/RoHS and UL-94 V0. Mounted directly to fixed breaker or drawout cassette, they reduce wiring throughout enclosure and provide clean, organized wiring schemes

- Breaker-mounted communication modules—communication modules for INCOM™, Modbus® and PROFIBUS mount directly to the cassette, reducing the space and room required in gear for communication capability
- “Direct Drive” mechanism—symmetrically loaded forces of the two-staged stored energy mechanism improves robustness, reliability, and achieves improved breaker life ratings
- Fold-up cassette—with this simple design, all items in a cassette are replaceable without removing the cassette from the cell
- “Arc chute” design
- Breaker-mounted racking or levering-in device—Racking device is mounted on the breaker, decreasing the width of the cassette, because the cassette is not burdened with the cost or parts of the lev-in
- Plug-N-Play accessories—No special tools needed. Accessory comes with plug and wires ready to install
- Arcflash Reduction Maintenance System—Eaton’s patented technology provides maintenance staff with improved safety of downstream maintenance locations using a simple and reliable method to reduce fault clearing times and energy during an arc flash event (radiation, sound, pressure, temperature). Arcflash Reduction Maintenance System uses a separate analog trip circuit, providing faster signal processing and interruption times than the standard (digital) “instantaneous” protection. The Arcflash Reduction Maintenance System function is activated either directly on the circuit breaker through a local switch or remotely through communications or a digital input

The use of these technologies allows Series NRX to offer a life of 20,000 mechanical operations and 10,000 electrical operations with a high degree of reliability.

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Standards and Certifications

- UL 1066 (low voltage AC power circuit breakers used in enclosures)
- UL 489 (molded case circuit breakers, molded case switches and circuit breaker enclosures)
- EN 45011
- CEI EN 60947
- BS EN 60439-1 Form 4b
- IEC 60439-1 (low voltage switchgear and controlgear assemblies)
- IEC 60947-1 (low voltage switchgear and controlgear —Part 1 general rules)
- IEC 60947-2 (low voltage switchgear and controlgear —Part 2 circuit breakers)
- IEC 60947-3 (switches, disconnectors, switch-disconnectors and fuse-combination units)
- CSA 22.2 (molded case circuit breakers, molded case switches and circuit breaker enclosures)
- ANSI C37.51 (metal-enclosed low voltage AC power circuit breaker switchgear assemblies—conformance test procedures)
- ANSI C37.20.1 (metal-enclosed low voltage power circuit breaker switchgear)
- ANSI C37.60 (requirements for overhead, pad-mounted dry-type and submersible automatic reclosers and fault interrupters for AC systems)
- ANSI C37.50 (low voltage AC power circuit breakers used in enclosures—test procedures)
- ANSI C37.17 (for trip devices for AC and general purpose DC low voltage power circuit breakers)
- ANSI C37.16 (low voltage power circuit breakers and AC power circuit protectors—preferred ratings, related requirements, and application recommendations)
- ANSI C37.13 (IEEE® standard for low voltage AC power circuit breakers used in enclosures)
- CCC—China
- KEMA (&CB)
- UL 891 (deadfront switchboard)
- UL 1558 (metal-enclosed low voltage power circuit breaker switchgear)



#### Reference Information

##### List of Instruction Leaflets and Manuals

Description	Publication Number
Instruction Book for Fixed and Drawout Breaker/Cassette	MN01301001E
IL Drawout Circuit Breaker and Cassette Rejection Interlocks	IL01301006E
IL Auxiliary Switch in Right Accessory Tray	IL01301007E
IL UVR/ST/OTS in Left Accessory Tray	IL01301008E
IL Motor Operator	IL01301010E
IL Spring Release Device and Latch Check Switch (Numbers 5 and 6 are Combining into one Document)	IL01301010E
IL Door Escutcheon and Gasket Kit	IL01301012E
IL Drawout Cassette IP 20 Shutters	IL01301013E
IL Fixed Breaker Arc Hood Kit	IL01301014E
IL Fixed Breaker Front/Rear/Cable Connectors	IL01301015E
IL Drawout Cassette Front/Rear/Cable Connectors	IL01301016E
IL Racking Device Levering Device	IL01301018E
IL Mechanical Pop-Out Indicator and Interlocked Indicator	IL01301019E
IL Breaker and Cassette Phase Barriers	IL01301021E
IL Cassette Rails	IL01301025E
IL Mounting Feet	IL01301030E
IL Surface Mount	IL01301036E
IL Terminal Blocks	IL01301037E
IL Modbus Communication Adapter Module	IL01301034E
IL INCOM Communication Adapter Module	IL01301033E
IL Digitrip 520 and 520M Manual	IL70C1619H01
IL IP55 Cover	IL01301038E
PROFIBUS Communication Module	IL01301035E
IL Kirk Key Lock	IL01301039E
IL Ronis Key Lock	IL01301040E
IL Pushbutton Covers	IL01301041E

Catalog Number Selection

Series NRX Type NF-Frame Circuit Breaker (Exclusionary Rules Apply)

**N S S6 08 3 W 52 8 A B A N 4 X N D X**

**Breaker Frame Size**  
**N** = Type NF, 630–1600 A, (70 mm pole spacing)

**Standard, Mechanism, Device**  
**S** = UL 1066, stored energy, power breaker  
**X** = UL 489, stored energy, insulated case breaker  
**E** = IEC 60947-2, stored energy, air breaker

**Fault Current Rating**  
**S4** = 42 kA at 480 Vac UL or 415 Vac IEC  
**S5** = 50 kA at 480 Vac UL or 415 Vac IEC  
**S6** = 65 kA at 480 Vac UL or 415 Vac IEC

**Frame Rating (Amperes)**  
**07** = 630 (IEC only)  
**08** = 800  
**10** = 1000 (IEC only)  
**12** = 1200 (UL only)  
**13** = 1250 (IEC only)  
**16** = 1600 (On NF: IEC only)

**Poles, Phasing**  
**3** = Three-pole, ABC  
**4** = Four-pole, NABC

**Mounting Configuration**  
**W** = Drawout  
**B** = Fixed mount rear connected with side mounting brackets  
**R** = Fixed mount rear connected without side mounting brackets  
**F** = Front connected, fixed mount, for bus or cable connections with side mounting brackets

**Rating Plug (Amperes)**  
**1** = 200  
**2** = 250  
**3** = 300  
**4** = 400  
**5** = 500  
**6** = 600  
**7** = 630  
**8** = 800  
**A** = 1000  
**B** = 1200  
**C** = 1250  
**D** = 1600

**Motor Operator**  
**M** = Manually operated  
**B** = 110–125 Vac  
**W** = 110–125 Vdc  
**T** = 208–250 Vac  
**P** = 220–250 Vdc  
**L** = 24 Vdc  
**H** = 48 Vdc  
**S** = 60 Vdc

**Shunt Trip**  
**N** = No shunt trip  
**A** = 110–127 Vac/Vdc  
**R** = 208–240 Vac/Vdc  
**L** = 24 Vdc  
**H** = 48 Vdc  
**S** = 60 Vdc

**Spring Release, Latch Check Switch**  
**N** = No spring release, no LCS  
**E** = No spring release, LCS wired external  
**A** = 110–127 Vac/Vdc, no LCS  
**B** = 110–127 Vac/Vdc, spring release LCS  
**C** = 110–127 Vac/Vdc, LCS wired external  
**R** = 208–240 Vac/Vdc, no LCS  
**S** = 208–240 Vac/Vdc, spring release LCS  
**T** = 208–240 Vac/Vdc, LCS wired external  
**L** = 24 Vdc, no LCS  
**P** = 24 Vdc, spring release LCS  
**Q** = 24 Vdc, LCS wired external  
**H** = 48 Vdc, no LCS  
**J** = 48 Vdc, spring release LCS  
**K** = 48 Vdc, LCS wired external  
**1** = 60 Vdc, no LCS  
**2** = 60 Vdc, spring release LCS  
**3** = 60 Vdc, LCS wired external

Trip Unit, Power Supply	
<b>SW</b> = Switch—no MCR—42 kA for IEC and UL 1066 (non-auto)	<b>13</b> = 1150i LSI, with ZSI, 24 Vdc
<b>22</b> = 520 LI, no ZSI	<b>1E</b> = 1150 LSIA, no ZSI, 24 Vdc
<b>52</b> = 520 LSI, no ZSI	<b>1F</b> = 1150 LSIA, with ZSI, 24 Vdc
<b>53</b> = 520 LSI, with ZSI	<b>1L</b> = 1150 LSIG, no ZSI, 24 Vdc
<b>5G</b> = 520 LSIG, no ZSI	<b>1M</b> = 1150 LSIG, with ZSI, 24 Vdc
<b>5H</b> = 520 LSIG, with ZSI	<b>14</b> = 1150 LSIGA, no ZSI, 24 Vdc
<b>M2</b> = 520M LSI, no ZSI, 24 Vdc	<b>15</b> = 1150 LSIGA, with ZSI, 24 Vdc
<b>M3</b> = 520M LSI, with ZSI, 24 Vdc	<b>1C</b> = 1150 LSI, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>MA</b> = 520M LSIA, no ZSI, 24 Vdc	<b>1D</b> = 1150 LSI, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>MB</b> = 520M LSIA, with ZSI, 24 Vdc	<b>16</b> = 1150i LSI, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>MG</b> = 520M LSIG, no ZSI, 24 Vdc	<b>17</b> = 1150i LSI, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>MH</b> = 520M LSIG, with ZSI, 24 Vdc	<b>1J</b> = 1150 LSIA, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>R2</b> = 520M LSI, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System	<b>1K</b> = 1150 LSIA, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>R3</b> = 520M LSI, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System	<b>1R</b> = 1150 LSIG, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>RA</b> = 520M LSIA, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System	<b>1S</b> = 1150 LSIG, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>RB</b> = 520M LSIA, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System	<b>18</b> = 1150i LSIGA, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>RG</b> = 520M LSIG, no ZSI, 24 Vdc, with Arcflash Reduction Maintenance System	<b>19</b> = 1150i LSIGA, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System
<b>RH</b> = 520M LSIG, with ZSI, 24 Vdc, with Arcflash Reduction Maintenance System	
<b>1A</b> = 1150 LSI, with ZSI, 24 Vdc	
<b>1B</b> = 150 LSI, with ZSI, 24 Vdc	
<b>12</b> = 1150i LSI, no ZSI, 24 Vdc	



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Series NRX Type NF-Frame Circuit Breaker (Exclusionary Rules Apply), continued

**N S S6 08 3 W 52 8 A B A N 4 X N D X**

3

**UVR, Second Shunt Trip**

**N** = None  
**A** = 110–125 Vac/Vdc UVR  
**R** = 220–250 Vac/Vdc UVR  
**L** = 24 Vdc UVR  
**H** = 48 Vdc UVR  
**S** = 60 Vdc UVR  
**G** = 32 Vdc UVR  
**1** = 110–127 Vac/Vdc second shunt trip  
**2** = 208–240 Vac/Vdc second shunt trip  
**4** = 24 Vdc second shunt trip  
**8** = 48 Vdc second shunt trip  
**9** = 60 Vdc second shunt trip

**Auxiliary, Switches, Label Language**

**E** = No auxiliary switches, no label (parent)  
**2** = 2 Form C, English  
**4** = 4 Form C, English

	Trip Indicator and Bell Alarm	OTS	Secondary Terminal Blocks
<b>N</b>	None	None	Per breaker options
<b>X</b>	Trip indicator	None	Per breaker options
<b>Z</b>	Trip indicator	2 Form C	Per breaker options
<b>M</b>	Interlock trip indicator	None	Per breaker options
<b>Y</b>	Interlock trip indicator	2 Form C	Per breaker options
<b>1</b>	None	None	Full complement
<b>2</b>	Trip indicator	None	Full complement
<b>3</b>	Trip indicator	2 Form C	Full complement
<b>4</b>	Interlock trip indicator	None	Full complement
<b>5</b>	Interlock trip indicator	2 Form C	Full complement

	Padlock Provisions	Key Lock Provisions	Operations Counter
<b>N</b>	No	None	No
<b>A</b>	No	—	Provided
<b>B</b>	Yes (plastic/plastic)	—	No
<b>C</b>	Yes (plastic/plastic)	—	Provided

**Future Use**  
**X** = All product

**Drawout Breaker Shipping, Fixed Breaker Terminals (Door Frame Kit ships as standard unless noted otherwise)**

**D** = Drawout breaker shipping alone, without door frame kit  
**C** = Drawout breaker shipping in cassette, no shutters, no terminals  
**1** = Drawout breaker shipping in cassette, no shutters, short vertical/horizontal  
**2** = Drawout breaker shipping in cassette, no shutters, long vertical/horizontal  
**4** = Drawout breaker shipping in cassette, with shutters, short vertical/horizontal  
**5** = Drawout breaker shipping in cassette, with shutters, long vertical/horizontal  
**9** = Drawout breaker shipping in cassette, no shutters, no terminals  
**F** = Fixed terminal adapters for rear connect, with mounting feet, short vertical/horizontal adapter kit  
**H** = Rear connect, fixed breaker, with long vertical/horizontal adapters  
**J** = Front connect fixed breaker, with no terminal adapters  
**K** = Rear connect, fixed breaker, no terminal adapters

#### Series NRX Type NF-Frame Cassette

**NX 12 3 F A B Z S N N N C**

**Cassette Family and Breaker Frame**

**NS** = UL 1066 N-Frame  
**NX** = UL 489 N-Frame  
**NE** = IEC N-Frame

**Continuous Ampere Range**

**08** = 800 (UL 1066)  
**12** = 800–1200 (UL 489)  
**16** = 630–1600 (IEC)

**Poles and Phasing (Facing Front of Breaker)**

**3** = Three-pole ABC  
**4** = Four-pole NABC

**Load Terminal Connections**

**F** = With flat tapped pads only  
**G** = With vertical/horizontal bus adapter kit (short style)  
**H** = With front-connected kit  
**N** = No cassette stabs (interunit only)

**Arc Hood**

**A** = Arc hood installed (default)

**Door Frame Gasket and Rejection Kits**

**B** = Door kit included (default), with rejection kit  
**D** = Door kit included, no rejection kit  
**R** = Not included, with rejection kit  
**N** = Not included, with rejection kit

**Cell Switch Options (available on Breaker + Cassette or Cassette Only)**

**W** = None  
**Z** = Cell switch installed

**Cassette Shipping**

**C** = Cassette only  
**B** = Breaker shipped in cassette

**Future**  
**N** = None

**Future**  
**N** = None

**Secondary Contact Terminals Installed**

**N** = None  
**B** = Breaker defined, when breaker ships in cassette  
**F** = Full complement  
**C** = Common options when cassette ships alone

**Shutters**

**N** = Not included (default)  
**S** = Included

Technical Data and Specifications

UL 1066 Ratings

Description	Rating
Continuous current rating (amperes)	800
<b>Short-Circuit Rating (kA)</b>	
254 Vac	85
508 Vac	65
635 Vac	35
Short-time withstand (kA) <sup>ⓐ</sup>	42

UL 489 Ratings

Description	Rating	Rating
Continuous current rating (amperes)	800	1200
<b>Short-Circuit Rating (kA)</b>		
240 Vac	85	85
480 Vac	65	65
600 Vac	42	42
Short-time withstand (kA)	42	42

IEC 60947-2 Ratings

Description	Rating		Rating		Rating	
Continuous current rating (amperes)	630 and 800		1000 and 1250		1600	
Short-circuit rating (kA)	Icu	Ics	Icu	Ics	Icu	Ics
240/254 Vac	85	50	85	50	85	50
415/435 Vac	65	50	65	50	65	50
690/725 Vac	42	42	42	42	42	42
Short-time withstand = Icw (kA)	42	42	42	42	42	42

Approximate Dimensions in Inches (mm)

Series NRX Three-Pole Drawout with Cassette

Height	Width	Depth	Lb (kg)
14.18 (360.2)	10.02 (254.5)	10.68 (271.3)	85.00 (38.59)


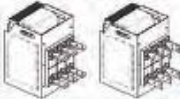





Series NRX Three-Pole Front Connect Fixed Breaker

Height	Width	Depth	Lb (kg)
16.00 (406.4)	8.25 (209.6)	7.15 (181.6)	—

Rear Fixed Circuit Breaker and Drawout with Cassette

Breaker Type	Height	Width	Depth	Lb (kg)
<b>Fixed</b>				
Three-pole	13.18 (334.8)	8.25 (209.6)	7.15 (181.6)	33.58 (15.23)
Four-pole	13.18 (334.8)	11.00 (279.4)	7.15 (181.6)	44.40 (20.14)
<b>Drawout with Cassette</b>				
Three-pole	14.18 (360.2)	10.02 (254.5)	10.69 (271.5)	85.20 (38.65)
Four-pole	14.18 (360.2)	12.69 (322.3)	10.69 (271.5)	104.00 (47.17)

Mounting and Load Connection Configurations

Breaker Type	Breaker Mechanism	Standard Bus Connection Provisions	Rear-Connect Horizontal/Vertical Adapter Kit With and Without Cover (Kits Shipped Unassembled)	Rear Connect Breaker Front-Connect Horizontal/Vertical Adapter Kit With and Without Cover (Kits Shipped Separately)	Fixed Front Connect Breaker Cable-Connected Cable Terminals
Drawout Breaker	Stored energy	Finger clusters	—	—	—
					
Cassette	—	Rear-connected pre-drilled bus pads		—	—
					
Fixed	Stored energy	Rear-connected pre-drilled bus pads			
					

Note

<sup>ⓐ</sup> 35 kAIC short-time withstand at 635 V level only. All other voltages 42 kAIC short-time withstand.




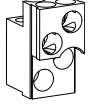
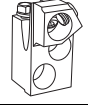
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## Power Breakers, Contactors and Fuses

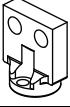
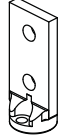
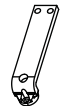
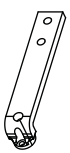
### Power Circuit Breakers

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#### Available Front Connect Cable Terminals

	List Number	Connector	Ratings (kA)	To Breaker?	Catalog Number (Three-Pole)
	1	Bus conductor extension (42 kA and below)	42	--	<b>NRXBUSEXT</b>
		Bus conductor extension (50 kA and below)	50	--	<b>NRXBUSEXT</b>
		Bus conductor extension (65 kA and below)	65	--	<b>NRXBUSEXT653</b>
	2	Cable terminals (two holes)	65	Yes	<b>TA700NB1M</b>
		With control wire provisions	65	Yes	<b>TA700NB1MCWT</b>
	3	Cable terminals (three holes)	65	Yes	<b>TA1000NB1M</b>
		With control wire provisions	65	Yes	<b>TA1000NB1MCWT</b>
	4	Cable terminals (four holes)	65	Load side only ①	<b>TA1200NB1M</b>
		With control wire provisions	65	Load side only ①	<b>TA1200NB1MCWT</b>
	5	Cable terminals (three holes for 750 kcmil)	65	Load side only ①	<b>TA1201NB1M</b>

#### Available Rear Connectors for Fixed Breakers or Cassettes

	List Number	Connector	Catalog Number
	1	Universal bus adapter—short	<b>SADP316</b>
			<b>SADP416</b>
	2	Universal bus adapter—long	<b>LADP316</b>
			<b>LADP416</b>
	3	Rear connect adapter extensions—short (horizontal holes)	<b>SBADP316</b> <b>SBADP416</b>
	4	Rear connect adapter extensions—long (horizontal holes)	<b>LBADPU316</b> <b>LBADPU416</b>

#### Line and Load Terminals

Maximum Breaker Amperes	Terminal Body Material	Wire Type	AWG Wire (Number of Conductors)	AWG Wire Catalog Number ②	Metric Wire Range mm <sup>2</sup>	Metric Catalog Number ②
<b>Standard Cu/Al Pressure Terminals</b>						
700	Aluminum	Cu/Al	1–500 (2)	<b>TA700NB1</b>	50–240	<b>TA700NB1M</b>
1000	Aluminum	Cu/Al	3/0–400 (3)	<b>TA1000NB1</b>	95–185	<b>TA1000NB1M</b>
1200	Aluminum	Cu/Al	4/0–500 (4)	<b>TA1200NB1</b>	120–240	<b>TA1200NB1M</b>
1200	Aluminum	Cu/Al	500–750 (3)	<b>TA1201NB1</b>	300–400	<b>TA1201NB1M</b>

#### Notes

① For use on line side, user must use catalog number **NRXBUSEXT503** for 50 kA, or **NRXBUSEXT653** for 65 kA.

② Single terminals individually packed.

**Accessory Ratings****Shunt Trip**

Control Voltages	Frequency	Operational Voltage Range 70–110%	Inrush/Continuous Power Consumption (VA)	Opening Time (ms)
24	DC	17–26	500/5	25
48	DC	34–53	530/5	25
110–127	50–60 Hz	77–140	540/5	25
110–125	DC	77–138	540/5	25
208–240	50–60 Hz	146–264	500/5	25
220–250	DC	154–275	515/5	25

**UVR**

Control Voltages	Frequency	Operational Voltage Range 85–110%	Dropout Volts 35–60%	Inrush/Continuous Power Consumption (VA)	Opening Time (ms)
24	DC	20–26	8–14	500/5	50
32	DC	27–35	11–19	620/5	50
48	DC	41–53	17–29	850/5	50
110–127	50–60 Hz	94–140	44–94	890/5	50
110–125	DC	94–138	44–94	890/5	50
208–240	50–60 Hz	177–264	84–125	910/5	50
220–250	DC	187–275	88–132	910/5	50
380–415	AC	323–457	145–228	960/5	50
480	AC	408–528	168–288	800/8	50
600	AC	510–660	210–360	800/12	50

**Spring Release**

Control Voltages	Frequency	Operational Voltage Range 70–110%	Inrush Power Consumption (VA)	Closing Time (ms)
24	DC	17–26	500	25
48	DC	34–53	530	25
110–127	50–60 Hz	77–140	540	25
110–125	DC	77–138	540	25
208–240	50–60 Hz	146–264	500	25
220–250	DC	154–275	515	25

**OCT/OTS**

Control Voltages	Frequency	Contact Rating (Amperes)
250	50–60 Hz	10
125	DC	0.5
250	DC	0.25

**Auxiliary Switch**

Control Voltages	Frequency	Contact Rating (Amperes)
250	50–60 Hz	10
125	DC	0.5
250	DC	0.25

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## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

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#### Breaker Position/Continuity

Breaker Position	Continuity Between Red and Black Lead Pairs	Continuity Between Blue and Black Lead Pairs
Open	NO	45 and 43
	NO	46 and 47
	NO	51 and 49
	NO	52 and 53
Closed	44 and 43	NO
	48 and 47	NO
	50 and 49	NO
	54 and 53	NO

#### Motor Operator

Control Voltages	Frequency	Operational Voltage Range 85–110%	Running Current (A)	Typical Inrush Current	Power Consumption (VA)	Maximum Charging Time (Sec)
24	DC	20–26	5	500%	150	3
48	DC	41–53	3	500%	150	3
110–127	50–60 Hz	94–140	2	300%	280	3
110–125	DC	94–138	1	500%	150	3
208–240	50–60 Hz	177–264	1	1000%	280	4
220–250	DC	187–275	1	1000%	280	4

#### Control Voltages and Currents

Control Voltages	24 Vdc	48 Vdc	110–125 Vdc	110–127 Vac	220–250 Vdc	208–240 Vac
<b>Current</b>						
Close current (inrush)	21	11	5	5	2	2
Shunt trip current (ST)—(inrush/continuous)	21 / .2	11 / .1	5 / .04	5 / .04	2 / .02	2 / .02
Charge motor current—(inrush/continuous)	TBD	TBD	5 / 1	6 / 2	10 / 1	10 / 1
<b>Operating Voltage Rating</b>						
Close	17–26	34–53	77–138	77–140	154–275	146–264
Trip	17–26	34–53	77–138	77–140	154–275	146–264
Charge	20–26	41–53	94–138	94–140	187–275	177–264

Type VCP-W/VCP-T Medium Voltage Vacuum Circuit Breaker



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Magnum MDSL Current Limiting Power Circuit Breaker . . . . .	<b>V4-T3-12</b>
Magnum SB Low Voltage Insulated Case Circuit Breakers . . . . .	<b>V4-T3-15</b>
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**Medium Voltage Circuit Breakers**

**Product Description**

Breakers and structures for switchgear assemblies:

**ANSI**

- VCP-W medium voltage circuit breakers
  - 5/15 kV VCP-W (K>1, K=1, narrow design, extra-capability and generator circuit breakers available)
  - 27 kV and 38 kV (extra-capability circuit breakers available)
  - Ground and test devices
  - Dummy elements
- VCP-T medium voltage circuit breakers
  - 5/15 kV VCP-T (capacitor switching and magnetic actuated circuit breakers available)
  - Ground and test devices
  - Dummy elements

**IEC**

- T-VAC medium voltage circuit breakers
  - 5/15 kV VCP-T (capacitor switching circuit breakers available)
  - Ground and test devices
  - Dummy elements
- VCP-W IEC medium voltage circuit breakers
  - 3.6/7.2/12/17.5 kV
  - 24 kV

**OEM Structures**

- Metal-clad, compartmented design
- Barebones
- Power modules
- Mini modules
- Breaker compartment kits

**Application Description**

Eaton’s medium voltage circuit breakers offer the latest in vacuum technology, providing superior control and protection of medium voltage power equipment in utility, industrial, commercial, mining and marine installations. Built in a state-of-the-art ISO® 9002 certified facility, they meet and exceed all ANSI and IEC requirements. Available in drawout configurations, Eaton’s vacuum circuit breakers are a result of our ongoing commitment to research and development, which have resulted in significant breakthrough technologies. Each breaker is provided with its unique Quality Assurance Certificate that documents all tests and inspections performed.

**Features, Benefits and Functions****VCP-W Standard Features**

- Eaton's maintenance-free vacuum interrupters with visual contact erosion indicator
- Non-sliding/non-rolling V-Flex™ current transfer system
- Glass polyester insulation
- Cycloaliphatic epoxy insulation (optional with Type VCPW-SE breakers) for 27 kV and 38 kV breakers
- Front-accessible operating mechanism
- Electrically operated trip-free, spring stored energy mechanism
- Interlocks that prevent moving a closed circuit breaker into or out of the connected position
- Closing springs automatically discharge before moving the circuit breaker into or out of the enclosure
- Provisions for manual charging of closing springs
- Manual close and trip pushbuttons
- Operations counter
- Closing spring charged/discharged indicator
- Circuit breaker Open/Closed indicator
- Auxiliary switch with 2A/3B for DC and 1A/3B for AC spare contacts
- Spring charging motor, close coil, trip coil, latch check switch and anti-pump relay

**VCP-T Standard Features**

- Small without compromise—significantly smaller and lighter than comparable breakers
- Grounded steel barrier between mechanism and primary conductors
- Spring loaded, silver-plated primary disconnects (drawout breaker)
- Silver-plated primary connections (fixed circuit breaker)
- Manual charging of closing springs (includes shunt trip)
- Integral spring charging handle
- Auxiliary switch (5a and 5b contacts)
- Mechanical operations counter
- 24, 48, 125 and 250 Vdc, 120 and 240 Vac control
- Shunt trip
- ON and OFF pushbuttons
- Integral lifting hooks
- Through- or behind-door operation
- Identified/dedicated secondaries
- Secondary umbilical cord (drawout circuit breaker)
- Secondary disconnect block (fixed circuit breaker)
- Two-step stored energy mechanism
- O–0.3s–CO–15s–CO
- Anti-pump
- Trip free
- Latch check switch
- Visible contact erosion indicator
- Visible contact wipe indicator
- Disconnect, Test and Connect (drawout circuit breaker)
- Integral levering mechanism (drawout circuit breaker)
- Field-installable accessories

**Standards and Certifications**

- Designed, tested and certified in accordance with ANSI and IEC standards
- Applicable ANSI standards C37.04-1979 or 1999, C37.09-1979 or 1999, C37.06-2000 and C37.013
- Internal arc resistance tested to IEC 298, Appendix AA, 25 kA for 1 second
- Drawout circuit breaker fully qualified to IEC 56 by testing inside the IEC 298 switchgear cubicle
- IEEE C37.013 and amendment C37.013a-2007

**Product Selection**

Please contact your Eaton sales representative for additional product information and to review your specific application and required product configuration.

**Technical Data and Specifications****ANSI Standards****ANSI Standard Ratings—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis—Standard Circuit Breakers** <sup>①</sup>

Description	Circuit Breaker Type								
	50 VCP-WND250	50 VCP-W250	50 VCP-W350	50 VCP-W500 (63 kA)	75 VCP-W500	150 VCP-W500	150 VCP-W750	150 VCP-W1000	150 VCP-W1500 (63 kA)
<b>Identification</b>									
Nominal voltage class kV	4.16	4.16	4.16	4.16	7.2	13.8	13.8	13.8	13.8
Nominal three-phase MVA class	250	250	350	—	500	500	750	1000	—
<b>Rated Values</b>									
<b>Voltage</b>									
Maximum voltage E kV rms	4.76	4.76	4.76	4.76	8.25	15	15	15	15
Voltage range factor K <sup>②</sup>	1.24	1.24	1.19	1.00	1.25	1.30	1.30	1.30	1.00
<b>Insulation Level</b>									
Withstand test voltage									
Power frequency (1 min.) kV rms	19	19	19	19	36	36	36	36	36
Impulse kV peak	60	60	60	60	95	95	95	95	95
<b>Current</b>									
Continuous current at 60 Hz amperes	1200	1200	1200	1200	1200	1200	1200	1200	1200
		2000	2000	2000	2000	2000	2000	2000	2000
		3000	3000	3000	3000	3000	3000	3000	3000
Short-circuit current (at rated max. kV) I kA rms	29	29	41	63	33	18	28	37	63
Interrupting time cycles	5	5	5	5	5	5	5	5	5
Permissible tripping delay Y seconds	2	2	2	2	2	2	2	2	2
Maximum voltage divided by K E/K kV rms <sup>②</sup>	3.85	3.85	4.0	4.76	6.6	11.5	11.5	11.5	15.0
<b>Current Values</b>									
Maximum symmetrical interrupting capability Short-time current K x 1 kA rms <sup>②</sup>	36	36	49	63	41	23	36	48	63
Closing and latching capability kA peak	97	97	132	170	111	62	97	130	170
Closing and latching momentary capability	58	58	78	101	66	37	58	77	101
<b>Weight Lb (kg)</b>									
1200 A	345 (157)	350 (159)	460 (209)	525 (238)	375 (170)	350 (159)	350 (159)	460 (209)	525 (238)
2000 A	345 (157)	410 (186)	490 (223)	530 (241)	410 (186)	410 (186)	410 (186)	490 (223)	530 (241)
3000 A	345 (157)	525 (238)	525 (238)	550 (250)	525 (238)	525 (238)	525 (238)	525 (238)	550 (250)

**Notes**

<sup>①</sup> Applicable ANSI Standards C37.04-1999, C37.06-2000 (including both K >1 and K =1 ratings), and C37.09-1999.

<sup>②</sup> See *Consulting Application Guide* for further information.



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### ANSI Standard Ratings—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis— Extra Capability Breakers <sup>①</sup>

Description	Circuit Breaker Type								
	50 VCP-W25C	50 VCP-W40C	50 VCP-W50C	50 VCP-W63C	75 VCP-W50C	150 VCP-W25C	150 VCP-W40C	150 VCP-W50C	150 VCP-W63C
<b>Identification</b>									
Nominal voltage class kV	4.16	4.16	4.16	4.16	7.2	13.8	13.8	13.8	13.8
Nominal three-phase MVA class	—	—	—	—	—	—	—	—	—
<b>Rated Values</b>									
<b>Voltage</b>									
Maximum voltage E kV rms	5.95	5.95	5.95	5.95	10.3	17.5	17.5	17.5	15.0
Voltage range factor K <sup>②</sup>	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<b>Insulation Level</b>									
Withstand test voltage									
Power frequency (1 min.) kV rms	24	24	24	24	42	42	42	42	42
Impulse kV peak	75	75	75	75	95	95	95	95	95
<b>Current</b>									
Continuous current at 60 Hz amperes	1200	1200	1200	1200	1200	1200	1200	1200	1200
	2000	2000	2000	2000	2000	2000	2000	2000	2000
	3000	3000	3000	3000	3000	3000	3000	3000	3000
Short-circuit current (at rated max. kV) I kA rms	25	40	50	63	50	25	40	50	63
Interrupting time cycles	3	3	3	3	3	3	3	3	3
Permissible tripping delay Y seconds	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>	2 <sup>③</sup>
Maximum voltage divided by K E/K kV rms <sup>②</sup>	5.95	5.95	5.95	5.95	10.3	17.5	17.5	17.5	15.0
<b>Current Values</b>									
Maximum symmetrical interrupting capability Short-time current K x 1 kA rms <sup>②</sup>	25	40	50	63	50	25	40	50	63
Closing and latching capability kA peak	97	139	139	175	139	97	139	139	175
Closing and latching momentary capability	58	83	83	104	83	58	83	83	104
<b>Weight Lb (kg)</b>									
1200 A	350 (159)	460 (209)	525 (238)	350 (159)	460 (209)	350 (159)	350 (159)	460 (209)	525 (238)
2000 A	410 (186)	490 (223)	530 (241)	410 (186)	490 (223)	410 (186)	410 (186)	490 (223)	530 (241)
3000 A	525 (238)	525 (238)	550 (250)	525 (238)	525 (238)	525 (238)	525 (238)	525 (238)	550 (250)

#### Notes

- ① Applicable ANSI Standards C37.04-1999, C37.06-2000 (including both K >1 and K =1 ratings), and C37.09-1999.
- ② See *Consulting Application Guide* for further information.
- ③ Tested for 3 seconds.

**ANSI Standard Ratings—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis—Generator Breakers (to ANSI C37.013) ①**

Description	Circuit Breaker Type					
	50 VCP-WG50	50 VCP-WG63	50 VCP-WG75	150 VCP-WG50	150 VCP-WG63	150 VCP-WG75
<b>Identification</b>						
Nominal voltage class kV	4.16	4.16	4.16	13.8	13.8	13.8
Nominal three-phase MVA class	—	—	—	—	—	—
<b>Rated Values</b>						
<b>Voltage</b>						
Maximum voltage E kV rms	4.76	4.76	4.76	15.0	15.0	15.0
Voltage range factor K ②	1.00	1.00	1.00	1.00	1.00	1.00
<b>Insulation Level</b>						
Withstand test voltage						
Power frequency (1 min.) kV rms	19	19	19	36	36	36
Impulse kV peak	60	60	60	95	95	95
<b>Current</b>						
Continuous current at 60 Hz amperes	1200	1200	1200	1200	1200	1200
	2000	2000	2000	2000	2000	2000
	3000	3000	3000	3000	3000	3000
	4000	4000	4000	4000	4000	4000
Short-circuit current (at rated max. kV) kA rms	50	63	75	50	63	75
Interrupting time cycles						
1200 A	3	3	3	3	3	3
2000 A	3	3	3	3	3	3
3000 A	3	3	3	3	3	3
4000 A	5	5	5	5	5	5
Permissible tripping delay Y seconds						
1200 A	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3
2000 A	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3
3000 A	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3	1 and 3
4000 A	1	1	1	1	1	1
Maximum voltage divided by K E/K kV rms ②	4.76	4.76	4.76	15.0	15.0	15.0
<b>Current Values</b>						
Maximum symmetrical interrupting capability						
Short-time current K x 1 kA rms ②	50	63	75	50	63	75
Closing and latching capability kA peak	137	173	206	137	173	206
Closing and latching momentary capability	82	103	123	82	103	123
<b>Weight Lb (kg)</b>						
1200 A	525 (238)	525 (238)	926 (419)	525 (238)	525 (238)	926 (419)
2000 A	530 (241)	530 (241)	936 (424)	530 (241)	530 (241)	936 (424)
3000 A	550 (250)	550 (250)	946 (429)	550 (250)	550 (250)	946 (429)
4000 A	956 (433)	956 (433)	956 (433)	956 (433)	956 (433)	956 (433)

**Notes**

① Applicable ANSI Standards C37.04-1999, C37.06-2000 (including both K >1 and K =1 ratings), C37.09-1999 and C37.013 (including C37.013a-2007).

② See *Consulting Application Guide* for further information.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Available Type VCP-W Vacuum Circuit Breakers Rated on Symmetrical Current Basis Per ANSI Standards (Rated K=1)

Identification	Drawout Circuit Breaker Type									
	50 VCP-W25	50 VCP-W40	50 VCP-W50	50 VCP-W63	75 VCP-W40	75 VCP-W50	150 VCP-W25	150 VCP-W40	150 VCP-W50	150 VCP-W63
<b>Rated Values</b>										
Maximum voltage (V) kV rms	4.76	4.76	4.76	4.76	8.25	8.25	15	15	15	15
Power frequency Hz <sup>①</sup>	60	60	60	60	60	60	60	60	60	60
<b>Insulation Level</b>										
Power frequency withstand voltage (1 min.) kV rms	19	19	19	19	36	36	36	36	36	36
Lightning impulse withstand voltage (1.2 x 50 μs) kV peak	60	60	60	60	95	95	95	95	95	95
Continuous current A rms <sup>②</sup>	1200	1200	1200	1200	1200	1200	1200 <sup>Ⓣ</sup>	1200	1200	1200 <sup>Ⓣ</sup>
	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000 <sup>Ⓣ</sup>
	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000 <sup>Ⓣ</sup>
<b>Short-Circuit Ratings (Reference C37.04-1999 and C37.06-2009 except as noted <sup>Ⓣ</sup>)</b>										
Symmetrical interrupting current (I) kA rms sym <sup>③</sup>	25	40	50	63	40	50	25	40	50	63
DC component (% DC) <sup>④</sup>	50	50	44	55	50	44	50	50	44	55
Asymmetrical interrupting current (I <sub>t</sub> ) kA rms asym total <sup>⑤</sup>	31	49	59	80	49	59	31	49	59	80
Closing and latching current (2.6 x I) kA peak	65	104	130	164	104	130	65	104	130	164
Short-time withstand current rms <sup>⑥</sup>	25	40	50	63	40	50	25	40	50	63
<b>Transient Recovery Voltage parameters are based on TD-4</b>										
Peak voltage (E <sub>2</sub> ) = (u <sub>c</sub> ) (kV peak)	8.2	8.2	8.2	8.2	14	14	28 <sup>Ⓣ</sup> , 25.7	25.7	25.7	28 <sup>Ⓣ</sup>
Time to peak (T <sub>2</sub> = t <sub>3</sub> x 1.137) (μsec)	50	50	50	50	59	59	75	75	75	75
TRV rise time (t <sub>3</sub> ) (μsec)	44	44	44	44	52	52	66	66	66	66
RRRV = u <sub>c</sub> /t <sub>3</sub> (kV/μsec) <sup>⑦</sup>	0.19	0.19	0.19	0.19	0.27	0.27	0.42, 0.39	0.39	0.39	0.42
Interrupting time ms	50	50	50	50	50	50	50	50	50	50
Cycles (60 Hz)	3	3	3	3	3	3	3	3	3	3
Operating duty (duty cycle)	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO	0-0.3s-CO-3m-CO
Mechanical endurance no-load operations <sup>ⓉⓉ</sup>	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

#### Notes

- ① All circuit breakers are tested at 60 Hz, however, they can also be applied at 50 Hz with no de-rating.
- ② 4000 A fan cooled rating is available for 3000 A circuit breakers.
- ③ Because the voltage range factor K=1, the short-time withstand current and the maximum symmetrical interrupting current are equal to the rated symmetrical interrupting current.
- ④ Based on the standard DC time constant of 45 ms (corresponding to X/R of 17 for 60 Hz) and the minimum contact parting time as determined from the minimum opening time plus the assumed minimum relay time of 1/2 cycle (8.33 ms for 60 Hz).
- ⑤ The asymmetrical interrupting current, I total, is given by  $I_t = I \times \text{Sqrt}(1 + 2 \times \%DC \times \%DC)$  kA rms asym total.
- ⑥ Duration of short-time current and maximum permissible tripping delay are both 2 seconds for all circuit breakers listed in this table, as required in C37.04-1999, C37.06-2000 and C37.06-2009.
- ⑦ RRRV can also be calculated as  $= 1.137 \times E_2/T_2$ .
- ⑧ Each operation consists of one closing plus one opening.
- ⑨ All 40 and 50 kA circuit breakers exceed required 5000 no-load operations; all 63 kA circuit breakers exceed the required 2000 no-load ANSI operations.
- Ⓣ These circuit breakers were tested to the preferred TRV ratings specified in C37.06-2000.

Available Type VCP-W Vacuum Circuit Breakers Rated on Symmetrical Current Basis Per ANSI Standards (Rated K=1), continued

Identification	Drawout Circuit Breaker Type									
	50 VCP-W25	50 VCP-W40	50 VCP-W50	50 VCP-W63	75 VCP-W40	75 VCP-W50	150 VCP-W25	150 VCP-W40	150 VCP-W50	150 VCP-W63
<b>Capacitance Current Switching Capability</b> (Reference C37.04a-2003, C37.06-2009 and C37.09a-2005)										
Cable-charging current										
Class	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2
A rms	3-10	3-10	3-10	7.5-25	7.5-25	7.5-25	7.5-25	7.5-25	7.5-25	7.5-25
Isolated shunt capacitor bank current										
Class	C2	C2	C2	C2	C2	C2	C2, C2, C1	C2, C2, C1	C2, C2, C1	C2
A rms										
1200 A	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630
2000 A	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000
3000 A	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600
<b>Back-to-Back Capacitor Switching</b>										
Capacitor bank current										
Class	C2	C2	C2	C2	C2	C2	C2, C2, C1	C2, C2, C1	C2, C2, C1	C2
A rms										
1200 A	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630	75-630
2000 A	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000	75-1000
3000 A	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600	75-1600
Inrush current kA peak	6	6	6	6	6	6	6	6	6	6
Inrush frequency kHz										
1200 A	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
2000 A	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3000 A	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
<b>Out-of-Phase Switching</b>										
Voltage = 1.44 x V (kV rms)										
	7	7	7	7	12	12	22	22	22	22
Current = 0.25 x I (kA rms)										
	6.3	10	12.5	15.8	10	12.5	6.3	10	12.5	15.8

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### VCP-W Vacuum Breaker Types Rated on Symmetrical Current Rating Basis <sup>①</sup>

	Circuit Breaker Type							
	270 VCP-W750	270 VCP-W1000	270 VCP-W1250	270 VCP-W1600	270 VCP-W2000	270 VCP-W25C	270 VCP-W32C	270 VCP-W40C
<b>Identification</b>								
Nominal voltage class kV	27	27	27	27	27	27	27	27
Nominal three-phase MVA class	750	1000	1250	1600	2000	—	—	—
<b>Rated Values</b>								
<b>Voltage</b>								
Maximum voltage E kV rms	27 <sup>②</sup>	27 <sup>②</sup>	27 <sup>②</sup>	27 <sup>②</sup>	27 <sup>②</sup>	27	27	27
Voltage range factor K <sup>③</sup>	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Insulation Level</b>								
Withstand test voltage								
Power frequency (1 min.) kV rms	60	60	60	60	60	60	60	60
Impulse kV peak	125	125	125	125	125	125	125	125
<b>Current</b>								
Continuous current at 60 Hz amperes	600	600	600	1200	1200	1200	1200	1200
	1200	1200	1200	2000	2000	1600	1600	1600
	2000	2000	2000	—	—	—	—	—
Short-circuit current (at rated maximum kV) <sup>④⑤</sup>	16	22	25	25	40	25 <sup>⑦</sup>	31.5 <sup>⑧</sup>	40 <sup>⑧</sup>
Interrupting time ms (cycles)	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	83 (5) <sup>⑥</sup>	50 (3)	50 (3)	50 (3)
Maximum permissible tripping delay Y seconds	2	2	2	2	2	2.5	1.6	1.0
Transient recovery voltage								
E <sub>2</sub> kV peak	51	51	51	51	51	50	50	50
T <sub>2</sub> μs	105	105	105	105	105	50	50	50
<b>Current Values</b>								
Closing and latching capability (2.6 K times rated short-circuit current) kA peak	43	60	68	85	106	85	100	112
Capacitor switching cable charging amperes	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5
<b>Weight Lb (kg)</b>								
600 A	460 (209)	460 (209)	460 (209)	545 (247)	545 (247)	545 (247)	545 (247)	545 (247)
1200 A	480 (218)	480 (218)	480 (218)	560 (254)	600 (272)	560 (254)	560 (254)	560 (254)
2000 A	500 (227)	500 (227)	500 (227)	—	—	—	—	—

#### Notes

- ① CESI tested to applicable ANSI standards C37.04, C37.09 and C37.06. Consult Eaton for CESI copies of test reports on file. Operating duty cycle CO-15 seconds-CO. Operating time values: Opening 33–55 ms, closing 50–60 ms and reclosing 18 cycles (300 ms).
- ② Tested at 28.5 kV.
- ③ K = 1.0, therefore E = E/K and I = KI.
- ④ Also maximum interruption rating and short-time current rating.
- ⑤ Duration of short-time current = 3 seconds, except as noted in footnotes 7, 8 and 9.
- ⑥ Optional interrupting time of 50 ms (3 cycles) is available.
- ⑦ Duration of short-time current = 2.5 seconds.
- ⑧ Duration of short-time current = 1.6 seconds.
- ⑨ Duration of short-time current = 1 second.

**Type VCP-W Vacuum Circuit Breaker Ratings****Type VCP-W Ratings on Symmetrical Current Rating Basis** ①②

Identification	Circuit Breaker Type				
	380 VCP-W 6 and 380 VCP-WR 16	380 VCP-W 25 and 380 VCP-WR 25	380 VCP-W 32 and 380 VCP-WR 32	380 VCP-W 21 and 380 VCP-WR 21	380 VCP-W 40 and 380 VCP-WR 40
<b>Rated Values</b>					
<b>Voltage</b>					
Nominal voltage class kV rms	34.5	34.5	34.5	34.5	34.5
Maximum voltage V kV rms	38	38	38	38	38
Voltage range factor K ③	1	1	1	1.65 ⑥	1
V/K ③ kV rms	38	38	38	23 ⑥	38
<b>Insulation Level Withstand Test</b>					
Power frequency (1 minute) kV rms	80	80	80	80	80
Lightning impulse 1.2 x 50 ④ kV peak	170	170	170	170	170
<b>Current</b>					
Continuous current at 60 Hz ⑤ A rms	600	600	600	1200	1200
	1200	1200	1200	2000	2000
	1600	1600	1600	3000FC	3000FC
	2000	2000	2000	2500	2500
	—	—	3000FC	—	—
	—	—	2500	—	—
<b>Short-Circuit Current</b>					
Sym. interrupting at V (Isc) kA rms	16	25	31.5	21	40
% DC component (Idc)	47	47	47	47	47
Asym. factor S (ref.)	1.2	1.2	1.2	1.2	1.2
Asym. interrupting (I <sub>l</sub> ) kA rms total	19.2	30.0	37.8	39.5	48.0
Maximum asym. interrupting at V/K (KxIsc) ③ kA rms	16	25	31.5	35 ⑥	40
Maximum asym. interrupting at V/K (SxKxIsc) ③ kA rms total	19.3	30.0	37.8	42.0	48.0
Closing and latching capability kA peak	43	68	85	95	107
Momentary current withstand capability kA rms total	26	40	50	56	63
Short-time current kA rms	16	25	31.5	35	40
Duration of short-time current s	3	3	3	3	3
Operating duty (duty cycle)	⑧⑩	⑧⑩	⑧⑩ (2500 only ⑧⑩)	⑧⑩ (2500 only ⑧⑩)	⑧⑩
Rated reclosing factor (R) %	100	100	100 (2500 only 0%)	100 (2500 only 0%)	100
<b>Interrupting time ⑥</b>					
rms	83	83	83	83	83
Cycle	5	5	5	5	5
Maximum permissible tripping delay sec.	2	2	2	2	2
Transient recovery voltage (RRRV) kV/μs	0.6	0.6	0.6	0.6	0.6
Mechanical endurance ⑦	2000	2000	2000	2000	2000

**Notes**

- ① KEMA tested to applicable ANSI standards C37.04-1979, C37.09-1979 and C37.06-1979 (operating duty sequence CO-15s-CO). Typical operating time values: operating 45 ms, closing 75 ms and reclosing 300 ms (18 cycles).
- ② The standard breaker is not rated for capacitor switching. If you require capacitor switching, please refer to the "C" breakers.
- ③  $K = 1.0$ , therefore  $E = E/K$  and  $I = KI$ . Refer to the *Consulting Application Guide* for more information.
- ④ The ANSI C37.06 standard requires 150 kV BIL. If higher BIL levels are required, please refer to the "C" breakers.
- ⑤ For forced air cooled fixed breaker applications, consult Eaton.
- ⑥ If you require 50 ms (3 cycle) interrupting time, please refer to the "C" breakers.
- ⑦ No-load operations.
- ⑧ At 23 kV rms (rated maximum voltage/K). Rated maximum symmetrical interrupting capability = 35 kA rms ( $K \times 1$ ).
- ⑨ CO-15s-CO.
- ⑩ Rated and tested also for rapid reclosing capability 0-0.3s-CO.
- ⑪ Not rated for rapid reclosing.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### Type VCP-WC Vacuum Circuit Breaker Ratings

#### Type VCP-WC Ratings on Symmetrical Current Rating Basis <sup>①②</sup>

Identification	Drawout Circuit Breaker Type				
	380 VCP-W 16C and 380 VCP-WR 16C	380 VCP-W 25C and 380 VCP-WR 25C	380 VCP-W 32C and 380 VCP-WR 32C	380 VCP-W 21C and 380 VCP-WR 21C	380 VCP-W 40C and 380 VCP-WR 40C
<b>Rated Values</b>					
<b>Voltage</b>					
Nominal voltage class kV rms	34.5	34.5	34.5	34.5	34.5
Maximum voltage V kV rms	38	38	38	38	38
Voltage range factor K <sup>③</sup>	1	1	1	1.65 <sup>⑥</sup>	1
V/K <sup>③</sup> kV rms	38	38	38	23 <sup>⑥</sup>	38
<b>Insulation Level Withstand Test</b>					
Power frequency (1 minute) kV rms	80	80	80	80	80
Lightning impulse 1.2 x 50 $\mu$ s <sup>④</sup> kV peak	170	170	170	170	170
<b>Current</b>					
Continuous current at 60 Hz <sup>⑤</sup> A rms	600	600	600	1200	1200
	1200	1200	1200	2000	2000
	1600	1600	1600	3000FC	3000FC
	2000	2000	2000	2500	2500
	—	—	3000FC	—	—
	—	—	2500	—	—
<b>Short-Circuit Current</b>					
Sym. interrupting at V (Isc) kA rms	16	25	33.1	21	40
% DC component (I <sub>dc</sub> )	75	65	57	52	63
Asym. factor S (ref.)	1.46	1.36	1.3	1.24	1.34
Asym. interrupting (I <sub>l</sub> ) kA rms total	23.3	34.0	42.5	26.1	53.5
Maximum sym. interrupting at V/K (K <sub>xlsc</sub> ) <sup>③</sup> kA rms	16	25	33.1	35 <sup>⑥</sup>	40
Maximum asym. interrupting at V/K (S <sub>x</sub> K <sub>xlsc</sub> ) <sup>③</sup> kA rms total	23.3	34.0	42.5	43.4	53.5
Closing and latching capability kA peak	50	75	91	102	107
Momentary current withstand capability kA rms total	30	44	54	60	65
Short-time current kA rms	16	25	31.5	35	40
Duration of short-time current s	3.09	3.09	3.09	3.21	3.04
Operating duty (duty cycle)	⑧⑨	⑧⑩	⑧⑩ (2500 A <sup>⑩</sup> )	⑧⑩ (2500 A <sup>⑩</sup> )	⑧⑩
Rapid reclosing factor (R) %	100	100	100 (2500 A N/A)	100 (2500 A N/A)	—
<b>Interrupting time <sup>⑥</sup></b>					
rms	50	50	50	50	50
Cycles	3	3	3	3	3
<b>Maximum permissible tripping delay sec.</b>					
	2	2	2	2	2
<b>Transient recovery voltage (RRRV) kV/<math>\mu</math>s</b>					
	0.7	0.7	0.7	0.7	—
	1.3	1.3	0.7	1.3	—
	—	—	0.7	1.3	—
	—	—	1.3	0.7	—
	—	—	1.3	—	—
	—	—	0.7	—	—

#### Notes

- ① KEMA tested to applicable ANSI standards C37.04-1979, C37.09-1979 and C37.06-1979 (operating duty sequence CO-15s-CO). Typical operating time values: operating 45 ms, closing 75 ms and reclosing 300 ms (18 cycles).
- ② The standard breaker is not rated for capacitor switching. If you require capacitor switching, please refer to the "C" breakers.
- ③ K = 1.0, therefore E = E/K and I = KI. Refer to the *Consulting Application Guide* for more information.
- ④ The ANSI C37.06 standard requires 150 kV BIL. If higher BIL levels are required, please refer to the "C" breakers.
- ⑤ For forced air cooled fixed breaker applications, consult Eaton.
- ⑥ If you require 50 ms (3 cycle) interrupting time, please refer to the "C" breakers.
- ⑦ At 23 kV rms (rated maximum voltage/K). Rated maximum symmetrical interrupting capability = 35 kA rms (K x 1).
- ⑧ CO-15s-CO.
- ⑨ Rated and tested also for rapid reclosing capability 0-0.3s-CO.
- ⑩ Not rated for rapid reclosing.

No-load operations.

**Type VCP-WC Vacuum Circuit Breaker Ratings**

**Type VCP-WC Ratings on Symmetrical Current Rating Basis, continued<sup>①②</sup>**

Identification	Drawout Circuit Breaker Type				
	380 VCP-W 16C and 380 VCP-WR 16C	380 VCP-W 25C and 380 VCP-WR 25C	380 VCP-W 32C and 380 VCP-WR 32C	380 VCP-W 21C and 380 VCP-WR 21C	380 VCP-W 40C and 380 VCP-WR 40C
<b>Capacitor Switching Ratings</b>					
<b>Definite Purpose</b>					
Overhead line current A rms	5	5	5 (2500 A N/A)	5 (2500 A N/A)	—
Isolated shunt capacitor bank current A rms	250	250	250	250	—
	250 and 1000 (2000 A)	250 and 1000 (2000 A)	250 and 1000 (2000 A and 3000FC) (2500 N/A)	250 and 1000 (2000 A and 3000FC) (2500 N/A)	—
<b>Definite Purpose—Back-to-Back Capacitor Switching</b>					
Cable charging current A rms	56	56	53	53	53
Capacitor bank current A rms	250	250	250	250	—
	250 and 1000 (200 A)	250 and 1000 (200 A)	250 and 1000 (2000 A and 3000FC) (2500 N/A)	250 and 1000 (2000 A and 3000FC) (2500 N/A)	—
Inrush current kA peak	20	20	20	20	—
	20 and 20 (2000 A)	20 and 20 (2000 A)	20 and 20 (2000 A and 3000FC) (2500 N/A)	20 and 20 (2000 A and 3000FC) (2500 N/A)	—
Inrush frequency kHz	4.4	4.4	4.4	4.4	—
	5 and 5 (2000 A)	5 and 5 (2000 A)	5 and 5 (2000 A and 3000FC) (2500 N/A)	5 and 5 (2000 A and 3000FC) (2500 N/A)	—
Mechanical endurance (no-load operations)	15,000	15,000	15,000	15,000	15,000



# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### IEC Standards

#### IEC Standards ①—VCP-W Vacuum Circuit Breaker Types Rated on Symmetrical Current Rating Basis

Identification	Rated Values							
	Circuit Breaker Type	Voltage kV rms	Insulation Level Power Frequency kV rms Peak	Impulse Withstand kV Peak	Normal Current Amperes	Short-Circuit Breaking Current and 3-Second Short-Time Current kA rms	Short-Circuit Making Current kV Peak	Cable Charging Breaking Current Amperes
36 VCP-WND25	3.6	10	40	630	25	65	10	350 (159)
	3.6	10	40	1250	25	65	10	350 (159)
36 VCP-WND32	3.6	10	40	630	31.5	82	10	350 (159)
	3.6	10	40	1250	31.5	82	10	350 (159)
72 VCP-WND25	7.2	20	60	630	25	65	10	350 (159)
	7.2	20	60	1250	25	65	10	350 (159)
72 VCP-WND32	7.2	20	60	630	31.5	82	10	350 (159)
	7.2	20	60	1250	31.5	82	10	350 (159)
36 VCP-W25	3.6	10	40	630	25	65	10	414 (188)
	3.6	10	40	1250	25	65	10	430 (195)
	3.6	10	40	2000	25	65	10	496 (225)
36 VCP-W32	3.6	10	40	1250	31.5	82	10	414 (188)
	3.6	10	40	2000	31.5	82	10	496 (225)
36 VCP-W40	3.6	10	40	1250	40	104	10	496 (225)
	3.6	10	40	2000	40	104	10	550 (250)
72 VCP-W25	7.2	20	60	630	25	65	10	414 (188)
	7.2	20	60	1250	25	65	10	414 (188)
	7.2	20	60	2000	25	65	10	496 (225)
72 VCP-W32	7.2	20	60	1250	31.5	82	10	414 (188)
	7.2	20	60	2000	31.5	82	10	430 (195)
72 VCP-W40	7.2	20	60	1250	40	104	10	430 (195)
	7.2	20	60	2000	40	104	10	496 (225)
120 VCP-W25	12.0	28	75	630	25	65	25	430 (195)
	12.0	28	75	1250	25	65	25	496 (225)
	12.0	28	75	2000	25	65	25	496 (225)
120 VCP-W32	12.0	28	75	1250	31.5	82	25	430 (195)
	12.0	28	75	2000	31.5	82	25	496 (225)
120 VCP-W40	12.0	28	75	1250	40	104	25	496 (225)
	12.0	28	75	2000	40	104	25	550 (250)
175 VCP-W25	17.5	38	95	630	25	65	—	430 (195)
	17.5	38	95	1250	25	65	—	496 (225)
	17.5	38	95	2000	25	65	—	496 (225)
175 VCP-W32	17.5	38	95	1250	31.5	82	—	430 (195)
	17.5	38	95	2000	31.5	82	—	496 (225)
175 VCP-W40	17.5	38	95	1250	40	104	—	496 (225)
	17.5	38	95	2000	40	104	—	550 (250)
175 VCP-W50	17.5	38	95	1250	50	130	—	1013 (460)
	17.5	38	95	2000	50	130	—	1079 (490)
	17.5	38	95	3150	50	130	—	1156 (525)

#### Note

① IEC Standards 60056 and 60694 apply.

**ANSI Standard Ratings—VCP-T and VCP-TR Vacuum Circuit Breakers (to ANSI C37.04 and C37.09)**

Identification	Rated Values						
	Circuit Breaker Type	Voltage Class kV rms	Insulation Level				Short-Circuit Making Current kA Peak
Power Frequency kV rms			Impulse Withstand kV Peak	Continuous Current Amperes	Short-Circuit <sup>③</sup> Breaking Current kA rms		
50 VCP-T16 and 50 VCP-TR16	4.76	19	60	600	16	42	20,000
	4.76	19	60	800	16	42	20,000
	4.76	19	60	1200	16	42	10,000
	4.76	19	60	1600 <sup>②</sup>	16	42	10,000
50 VCP-T20 and 50 VCP-TR20	4.6	19	60	600	16	52	10,000
	4.6	19	60	800	16	52	10,000
	4.6	19	60	1200	16	52	10,000
	4.6	19	60	1600 <sup>②</sup>	16	52	10,000
50 VCP-T25 and 50 VCP-TR25	4.76	19	60	600	25	65	10,000
	4.76	19	60	800	25	65	10,000
	4.76	19	60	1200	25	65	10,000
	4.76	19	60	1600 <sup>②</sup>	25	65	10,000
75 VCP-T16 and 75 VCP-TR16	8.25	20	60 <sup>①</sup>	600	16	42	20,000
	8.25	20	60 <sup>①</sup>	800	16	42	20,000
	8.25	20	60 <sup>①</sup>	1200	16	42	10,000
	8.25	20	60 <sup>①</sup>	1600 <sup>②</sup>	16	42	10,000
75 VCP-T20 and 75 VCP-TR20	8.25	20	60 <sup>①</sup>	600	20	52	10,000
	8.25	20	60 <sup>①</sup>	800	20	52	10,000
	8.25	20	60 <sup>①</sup>	1200	20	52	10,000
	8.25	20	60 <sup>①</sup>	1600 <sup>②</sup>	20	52	10,000
75 VCP-T25 and 75 VCP-TR25	8.25	20	60 <sup>①</sup>	600	25	65	10,000
	8.25	20	60 <sup>①</sup>	800	25	65	10,000
	8.25	20	60 <sup>①</sup>	1200	25	65	10,000
	8.25	20	60 <sup>①</sup>	1600 <sup>②</sup>	25	65	10,000
150 VCP-T16 and 150 VCP-TR16	15	36	95	600	16	42	10,000
	15	36	95	800	16	42	10,000
	15	36	95	1200	16	42	10,000
	15	36	95	1600 <sup>②</sup>	16	42	10,000
150 VCP-T20 and 150 VCP-TR20	15	36	95	600	20	52	10,000
	15	36	95	800	20	52	10,000
	15	36	95	1200	20	52	10,000
	15	36	95	1600 <sup>②</sup>	20	52	10,000
150 VCP-T25 and 150 VCP-TR25	15	36	95	600	25	65	10,000
	15	36	95	800	25	65	10,000
	15	36	95	1200	25	65	10,000
	15	36	95	1600 <sup>②</sup>	25	65	10,000

**Notes**

- ① Use 15 kV breaker and cassette when 95 kV impulse withstand required.
- ② 1600 A VCP-T breaker available.
- ③ Also 2 second short-time current rating.

# 3.1

## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

#### ANSI Standard Ratings—VCP-TL/VCP-TRL Vacuum Circuit Breakers (to ANSI C37.04 and C37.09)

Identification  Circuit Breaker Type ①	Rated Values			Continuous Current Amperes	Short-Circuit Breaking Current ② kA rms	Short-Circuit Making Current kA Peak	Mechanical Endurance ③ C-O Operations	Approx. Weight Fix/Drawout Lb
	Rated Maximum Voltage kV rms	Insulation Level Power Frequency kV rms	Impulse Withstand kV Peak					
50 VCP-TL16 and 50 VCP-TRL16	4.76	19	60	600	16	42	100,000	153/232
				1200	16	42	100,000	155/234
				1600 ④	16	42	100,000	157/NA
50 VCP-TL20 and 50 VCP-TRL20	4.76	19	60	600	20	52	100,000	159/237
				1200	20	52	100,000	161/239
				1600 ④	20	52	100,000	163/NA
50 VCP-TL25 and 50 VCP-TRL25	4.76	19	60	600	25	65	100,000	166/243
				1200	25	65	100,000	168/245
				1600 ④	25	65	100,000	170/NA
75 VCP-TL16 and 75 VCP-TRL16	8.25	20	75 ⑤	600	16	42	100,000	155/232
				1200	16	42	100,000	157/234
				1600 ④	16	42	100,000	159/NA
75 VCP-TL20 and 75 VCP-TRL20	8.25	20	75 ⑤	600	20	52	100,000	161/239
				1200	20	52	100,000	161/241
				1600 ④	20	52	100,000	163/NA
75 VCP-TL25 and 75 VCP-TRL25	8.25	20	75 ⑤	600	25	65	100,000	166/245
				1200	25	65	100,000	168/247
				1600 ④	25	65	100,000	170/NA
150 VCP-TL16 and 150 VCP-TRL16	15	36	95	600	16	42	100,000	155/234
				1200	16	42	100,000	157/237
				1600 ④	16	42	100,000	159/NA
150 VCP-TL20 and 150 VCP-TRL20	15	36	95	600	20	52	100,000	161/239
				1200	20	52	100,000	163/241
				1600 ④	20	52	100,000	166/NA
150 VCP-TL25 and 150 VCP-TRL25	15	36	95	600	25	65	100,000	168/245
				1200	25	65	100,000	170/247
				1600 ④	25	65	100,000	172/NA

#### Notes

- ① Independent shunt trips are available for use with traditional protective relaying schemes.
- ② Also 2-second short-time current rating.
- ③ Operating mechanism up to 100,000 operations, vacuum interrupter 30,000.
- ④ 1600 A available as fixed VCP-TRL/VCP-TRLC circuit breaker only.
- ⑤ Use 15 kV breaker and cassette when impulse withstand >75 kV is required.

IEC Standard Ratings—T-VAC and T-VACR Vacuum Circuit Breakers (to IEC 62271-100)

Identification	Rated Values						
	Circuit Breaker Type	Voltage Class kV rms	Insulation Level Power Frequency Withstand Voltage kV rms	Lightning Impulse (U <sub>w</sub> ) Withstand Voltage kV Peak	Normal Current (I <sub>n</sub> ) Amperes	Short-Circuit <sup>③</sup> Breaking Current kA rms	Short-Circuit Making Current kA Peak
72 T-VAC16 and 72 T-VACR16	7.2	20	60	630	16	40	20,000
	7.2	20	60	800	16	40	20,000
	7.2	20	60	1250	16	40	10,000
	7.2	20	60	1600 <sup>②</sup>	16	40	10,000
72 T-VAC20 and 72 T-VACR20	7.2	20	60	630	20	50	10,000
	7.2	20	60	800	20	50	10,000
	7.2	20	60	1250	20	50	10,000
	7.2	20	60	1600 <sup>②</sup>	20	50	10,000
72 T-VAC25 and 72 T-VACR25	7.2	20	60	630	25	63	10,000
	7.2	20	60	800	25	63	10,000
	7.2	20	60	1250	25	63	10,000
	7.2	20	60	1600 <sup>②</sup>	25	63	10,000
120 T-VAC16 and 120 T-VACR16	12	28	75 <sup>①</sup>	630	16	40	20,000
	12	28	75 <sup>①</sup>	800	16	40	20,000
	12	28	75 <sup>①</sup>	1250	16	40	10,000
	12	28	75 <sup>①</sup>	1600 <sup>②</sup>	16	40	10,000
120 T-VAC20 and 120 T-VACR20	12	28	75 <sup>①</sup>	630	20	50	10,000
	12	28	75 <sup>①</sup>	800	20	50	10,000
	12	28	75 <sup>①</sup>	1250	20	50	10,000
	12	28	75 <sup>①</sup>	1600 <sup>②</sup>	20	50	10,000
120 T-VAC25 and 120 T-VACR25	12	28	75 <sup>①</sup>	630	25	63	10,000
	12	28	75 <sup>①</sup>	800	25	63	10,000
	12	28	75 <sup>①</sup>	1250	25	63	10,000
	12	28	75 <sup>①</sup>	1600 <sup>②</sup>	25	63	10,000
175 T-VAC16 and 175 T-VACR16	17.5	38	95	630	16	40	10,000
	17.5	38	95	800	16	40	10,000
	17.5	38	95	1250	16	40	10,000
	17.5	38	95	1600 <sup>②</sup>	16	40	10,000
175 T-VAC20 and 175 T-VACR20	17.5	38	95	630	20	50	10,000
	17.5	38	95	800	20	50	10,000
	17.5	38	95	1250	20	50	10,000
	17.5	38	95	1600 <sup>②</sup>	20	50	10,000
175 T-VAC25 and 175 T-VACR25	17.5	38	95	630	25	63	10,000
	17.5	38	95	800	25	63	10,000
	17.5	38	95	1250	25	63	10,000
	17.5	38	95	1600 <sup>②</sup>	25	63	10,000

Notes

- ① Use 17.5 kV breaker and cassette when 95 kV impulse withstand required.
- ② 1600 A T-VAC breaker available.
- ③ Also 3-second short-time current rating.

# 3.1

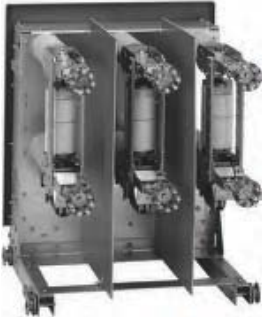
## Power Breakers, Contactors and Fuses

### Power Circuit Breakers

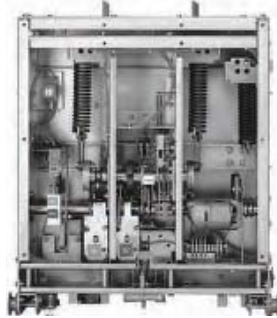
#### Dimensions

Approximate Dimensions in Inches (mm)

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Type VCP-W Circuit Breaker  
Shown from Rear



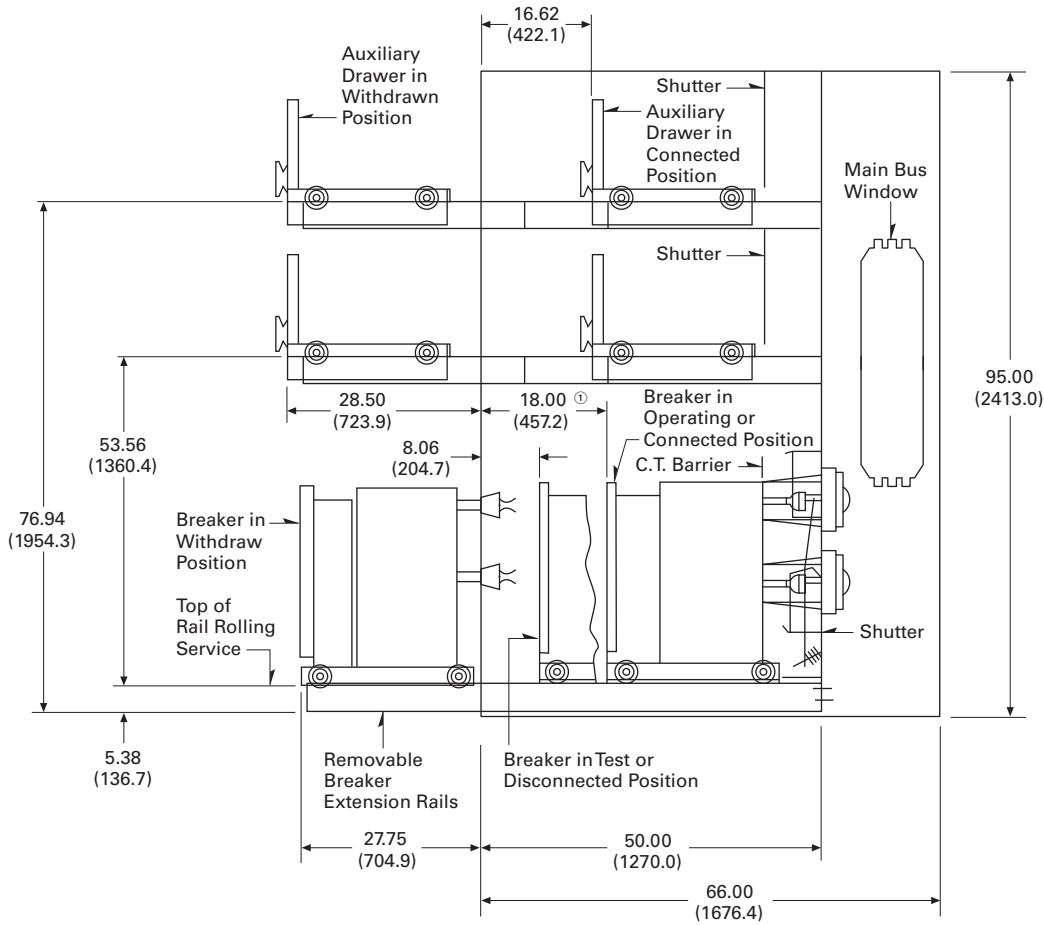
Type VCP-W Circuit Breaker  
with Deadfront Panel Removed



Mini Module

#### 5/15 kV VCPW-ND and VCP-W Power Modules

Power Module, 5/15 kV VCPW-ND 26.00 (660.4) Wide, VCP-W 36.00 (914.4) Wide



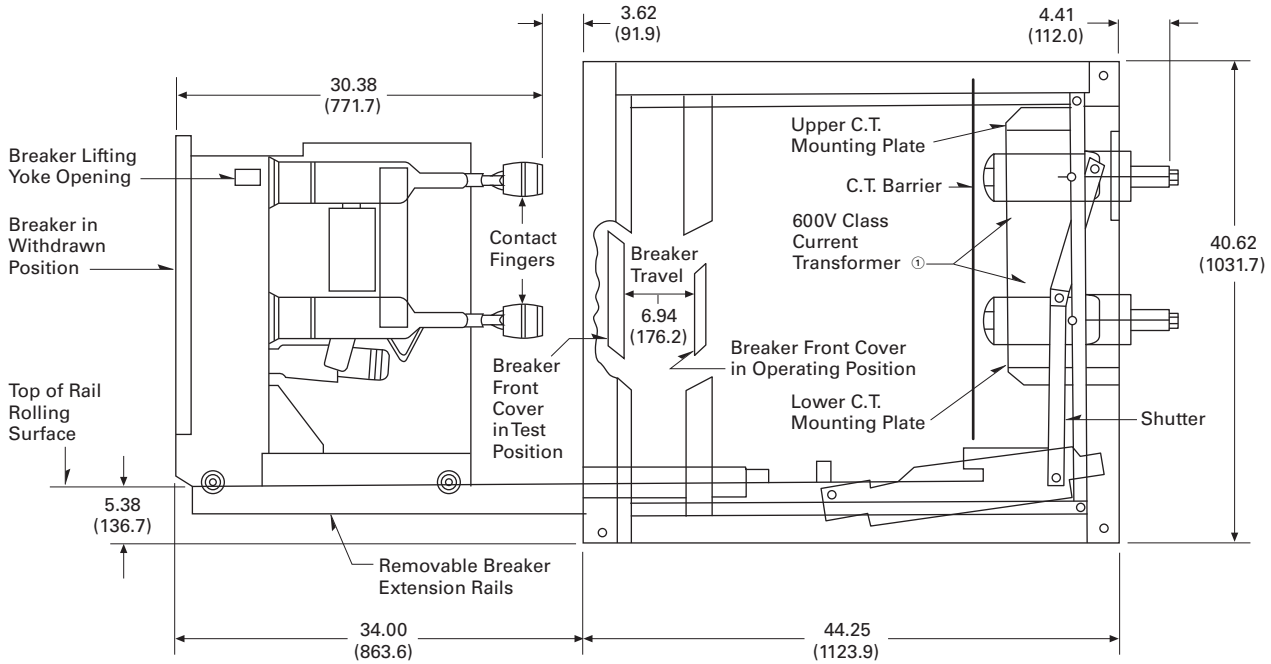
#### Note

① VCPW-ND dimensions of breaker travel 15.00 (381.0).

Approximate Dimensions in Inches (mm)

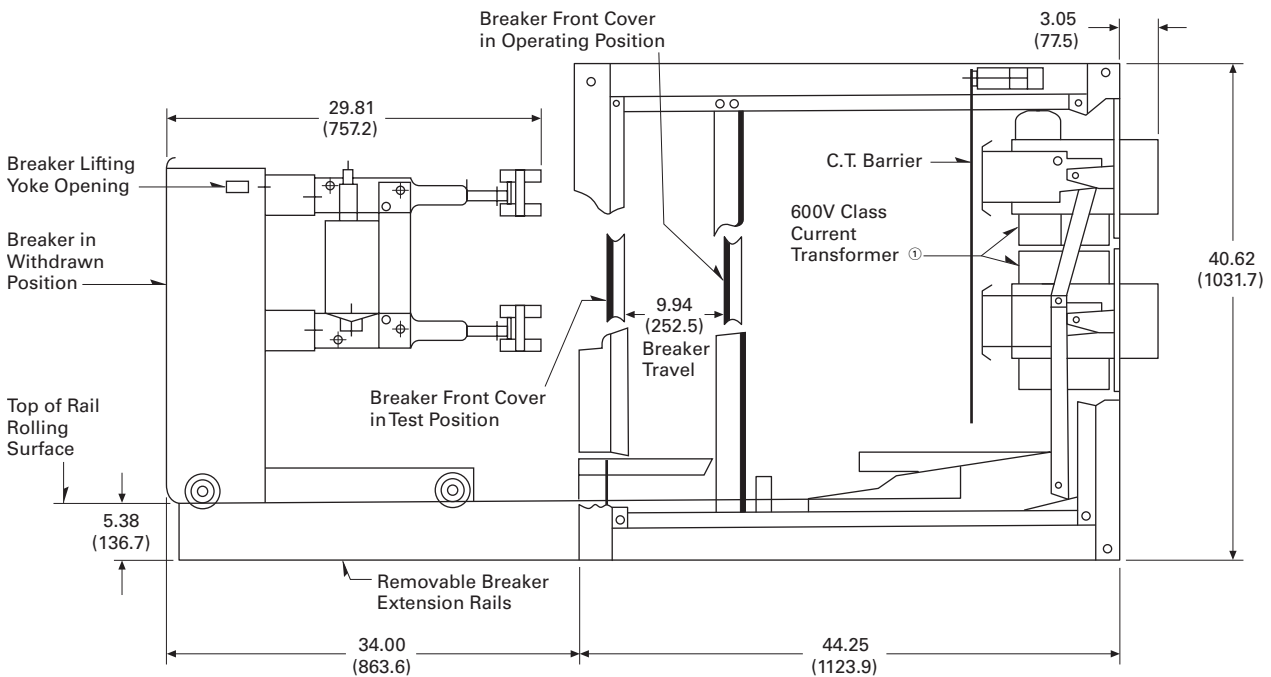
**5/15 kV VCPW-ND and VCP-W Mini Modules**

**5 kV VCPW-ND Mini Module 25.88 (657.4) Wide**



**5/15 kV VCP-W Mini Module**

**5/15 kV VCP-W Mini-Module 35.88 (911.4) Wide**



**Note**

① Current transformers not supplied.

#### Product Overview

##### Voltage Class

Eaton SL Medium Voltage Vacuum Contactors are designed to operate at voltages from 2200V to 15,000V, depending on contactor type. Typical system voltages are 2400V, 3300V, 4160V and 6600V for 7.2 kV contactors and 10,000V, 11,000V, 13,200V and 13,800V for 15 kV contactors.

##### Altitude

7.2 kV/160–400A SL Contactors are capable of operating in virtually any altitude range. Three versions are offered in Standard, High and Low altitude configurations. No de-rating is necessary for proper operation. Altitude designations are listed in the table below.

##### Altitude

	Altitude	Low	Standard	High
<b>7.2 kV/160–400A</b>				
Feet		–11,500 to –3300	–3300 to +6600	+6600 to +13,100
Meters		–3500 to –1000	–1000 to +2000	+2000 to +4000
<b>7.2 kV/800A and 15 kV/300A</b>				
Feet		N/A	–3300 to +11,800	+11,800 to +16,000
Meters		N/A	–1000 to +3600	+3600 to +4900

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SL MV Power Contactor 7.2 kV/160–400A . . . . .	<b>V4-T3-74</b>
SL MV Power Contactor 7.2 kV/800A . . . . .	<b>V4-T3-83</b>
SL MV Power Contactor 15 kV/300A . . . . .	<b>V4-T3-87</b>

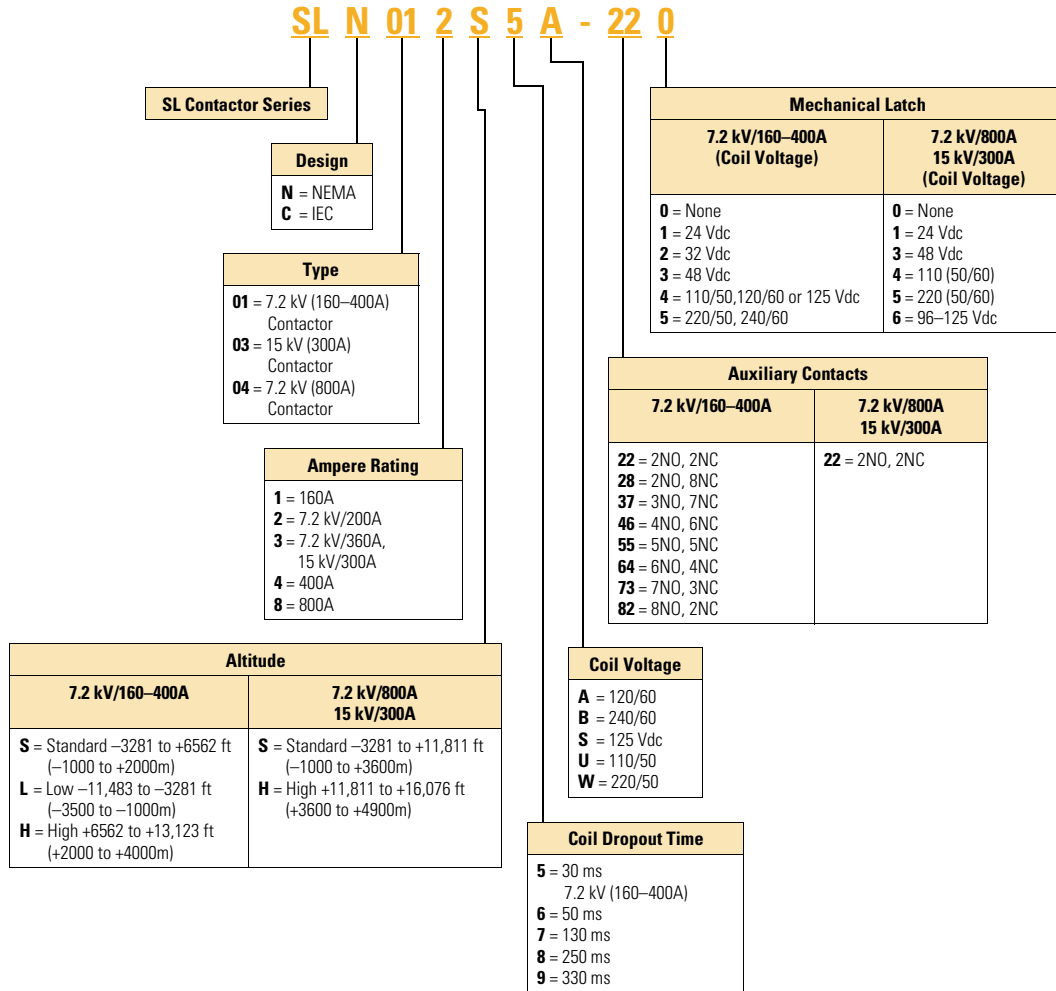
##### Control Voltage and Dropout Time

Control coil voltage and dropout time for all SL contactors are field selectable. Standard voltages available are 120/60V, 110/50V, 240/60V, 220/50V and 125 Vdc. Coil will pick up at 80% of rated coil voltage and dropout not sooner than 60% of rated coil voltage. Opening time is field selectable within the range of 30–330 ms for all 7.2 kV 160–400A contactors. Opening time is field selectable within the range of 50–330 ms for all 7.2 kV 800A and 15 kV 300A contactors.

### Catalog Number Selection

#### Power Contactors

3





SL 7.2 kV/160–400A Medium Voltage Contactor



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SL MV Power Contactor 7.2 kV/800A . . . . .	<b>V4-T3-83</b>
SL MV Power Contactor 15 kV/300A . . . . .	<b>V4-T3-87</b>

### SL MV Power Contactor 7.2 kV/160–400A

#### Product Description

- A single family of contactors for any medium voltage control application. Voltage range of 2200–7200V
- Ampere ratings from 160 to 400A with induction motor horsepower ranges from 600 to 5500 hp
- Three different altitude versions
- Leading-edge vacuum technology
- Fully complies with global standards

#### Application Description

##### *Eaton's SL Medium Voltage Contactor starting applications:*

- Squirrel-cage induction motors
- Synchronous motors
- Wound-rotor

##### *Fully applicable to:*

- Full voltage starting
- Reduced voltage starting

##### *The perfect choice for harsh duty applications:*

- Mining
- Pulp and paper
- HVAC
- Petrochemical
- Automotive
- Many others

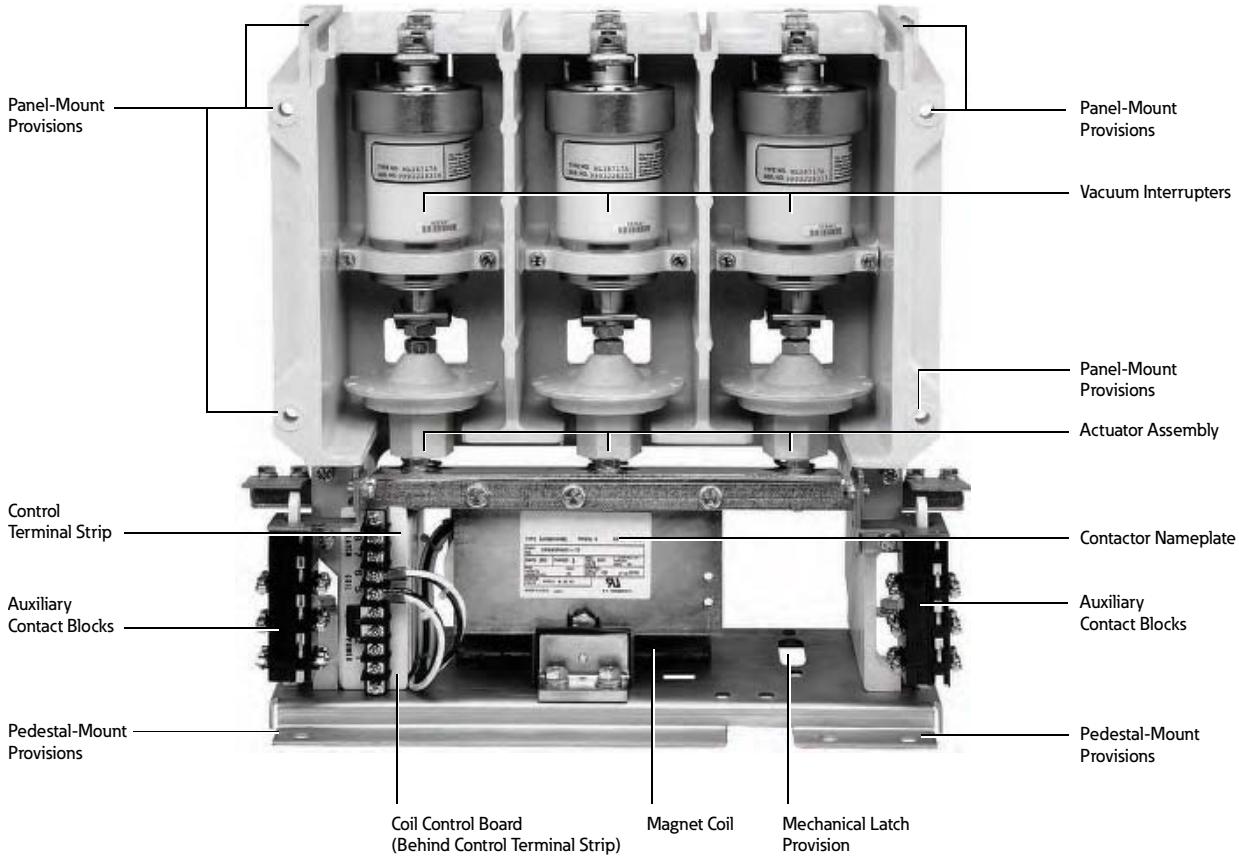
#### Features, Benefits and Functions

- Long life—300,000 electrical and over 2 million mechanical
- Mounting flexibility—panel or pedestal mounting provisions are standard. Unit can be mounted in horizontal or vertical position
- Field-selectable settings for coil voltage, AC/DC, and coil dropout time
- Field kits available for auxiliary contacts and mechanical latch. Accessories are common for all sizes
- Special ordering allows unit to be factory pre-set to customer specification, including field kit installation
- Highest quality available—all contactors manufactured within state-of-the-art "ISO-Certified" facilities. 100% made in America

##### *Easy-to-Install Option Kits (Field Addition)*

- Up to six extra auxiliary contacts
- Mechanical latch—many coil voltages

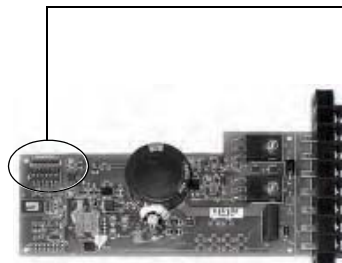
### SL Series Features (7.2 kV/160–400A)



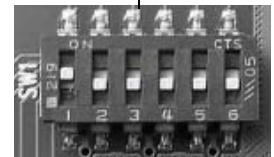
### Control Settings



**Control Terminal Strip**



**Coil Control Board**



**DIP Switches**

#### Standards and Certifications

##### Global Acceptability

- NEMA
- ANSI
- IEC

##### Third-Party Verification

- UL
- CSA
- KEMA
- Third-party qualified by UL, CSA, KEMA

##### Design and Test Standards

- UL 347, File No. E63257
- CSA File No. LR28548
- IEC No. 60470
- ANSI/NEMA ICS 3



#### Product Selection

Contact Eaton for pricing.

#### Options and Accessories

##### SL Vacuum Contactor Series—Sizes 7.2 kV/160–400A Accessory Kits

##### Mechanical Latch Kit

Field Mount to 7.2 kV/160–400A SL Vacuum Contactor. Coil voltages available in a wide range of AC and DC selections. Easy to install on new and existing units.



Mechanical Latch Kit

##### Auxiliary Contact Kit

Field Mount auxiliary contact kits for 7.2 kV/160–400A SL Vacuum Contactor. Contact kits are available in many configurations of NO-NC.



Auxiliary Contact Kit

##### Mechanical Interlock Kit

Field Mount mechanical interlock kits for 7.2 kV/160–400A SL Vacuum Contactor.



Mechanical Interlock Kit

#### Ordering Information—Mechanical Latch Kit

Coil Voltage	Catalog Number
24 Vdc	<b>SLA-ML24</b>
32 Vdc	<b>SLA-ML32</b>
48 Vdc	<b>SLA-ML48</b>
110/50, 120/60, 125 Vdc selectable	<b>SLA-ML120</b>
220/50, 240/60 selectable	<b>SLA-ML240</b>

#### Ordering Information—Auxiliary Contact Kit

Description	Catalog Number
3NO–3NC additional	<b>SLA-AS33</b>
6NO additional	<b>SLA-AS60</b>
6NC additional	<b>SLA-AS06</b>
5NO–1NC additional	<b>SLA-AS51</b>
4NO–2NC additional	<b>SLA-AS42</b>
2NO–4NC additional	<b>SLA-AS24</b>
1NO–5NC additional	<b>SLA-AS15</b>

#### Ordering Information—Mechanical Interlock Kit

Description	Catalog Number
Vertical or horizontal arrangement	<b>SLA-MI</b>

### Technical Data and Specifications

#### The SL 400 Contactor Ratings

- Voltages of 2200–7200V
- Amperages from 160 to 400A
- Interrupting ratings as high as 8500A

#### Control Voltages (Field Adjustable)

- 110, 220 Vac, 50 Hz
- 120, 240 Vac, 60 Hz

- 125 Vdc

#### Dropout Time (Field Adjustable)

- 30 ms
- 50 ms
- 130 ms
- 250 ms
- 330 ms

#### Front and Rear View (7.2 kV/160–400A)



Front View



Rear View

#### Control Voltage Settings (7.2 kV/160–400A)

Setting	SW1	SW2	SW3
110 Vac, 50 Hz	Off	Off	Off
120 Vac, 60 Hz	On	Off	Off
220 Vac, 50 Hz	Off	On	Off
240 Vac, 60 Hz	On	On	Off
125 Vdc	Off	Off	On

#### Dropout Time Settings (7.2 kV/160–400A)

Delay Setting	SW4	SW5	SW6
30 ms	Off	Off	Off
50 ms	On	Off	Off
130 ms	Off	On	Off
250 ms	On	On	Off
330 ms	Off	Off	On

#### Altitude Designations (7.2 kV/160–400A)

Altitude	Low	Standard	High
Feet	–11,483 to –3281	–3281 to +6562	+6562 to +13,123
Meters	–3500 to –1000	–1000 to +2000	+2000 to +4000

#### Note

Stock units pre-set to 120/60 Vac.

# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

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#### SL Series Fuses

Fuse Application Table for SL Contactors—7.2 kV/160A

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	130
137–160	2400–4800	5BCLS-12R	230–12R	130
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	50
137–160	5500–6600	7BCLS-12R	230–12R	250

Fuse Application Table for SL Contactors—7.2 kV/200A

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	130
137–200 ①	2400–4800	5BCLS-12R	230–12R	130
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	50
137–200 ①	5500–6600	7BCLS-12R	230–12R	250

Fuse Application Table for SL Contactors—7.2 kV/360A

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	130
137–187	2400–4800	5BCLS-12R	230–12R	130
187–200	2400–4800	5BCLS-12R	230–12R	130
200–360	2400–4800	N/A	—	—
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	50
137–200 ①	5500–6600	7BCLS-12R	230–12R	250
200–360	5500–6600	N/A	—	—

Fuse Application Table for SL Contactors—7.2 kV/400A

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
11–18	2400–4800	5BCLS-30	30–1R	30
18–31	2400–4800	5BCLS-2R	70–2R	30
31–46	2400–4800	5BCLS-3R	100–3R	30
46–62	2400–4800	5BCLS-4R	130–4R	30
62–74	2400–4800	5BCLS-5R	150–5R	30
74–93	2400–4800	5BCLS-6R	170–6R	30
93–137	2400–4800	5BCLS-9R	200–9R	30
137–187	2400–4800	5BCLS-12R	230–12R	30
187–273	2400–4800	5BCLS-18R	390–18R	50
273–400 ②	2400–4800	5BCLS-24R	450–24R	130
11–34	5500–6600	7BCLS-2R	70–2R	30
34–46	5500–6600	7BCLS-3R	100–3R	30
46–56	5500–6600	7BCLS-4R	130–4R	30
56–68	5500–6600	7BCLS-5R	150–5R	30
68–85	5500–6600	7BCLS-6R	170–6R	30
85–137	5500–6600	7BCLS-9R	200–9R	30
137–187 ①	5500–6600	7BCLS-12R	230–12R	30
273–400 ②	5500–6600	7BCLS-24R	450–24R	250

**Notes**

① For FLA >180, maximum acceleration time = 4.5 seconds.

② For FLA >360, maximum acceleration time = 6 seconds.

Fuse selections based on LRC = FLA x 6 with acceleration time of 10 seconds except where otherwise noted.

### SL Series Ratings

#### Type SL Vacuum Contactor Ratings (7.2 kV/160–400A)

Rated Utilization Voltage	Interrupting Rating		Application Table					Maximum Insulation Voltage
	NEMA Unfused (E1) kA	NEMA Fused (E2) kA	Induction Motor Horsepower	Synchronous Motor Horsepower (0.8 PF) (1.0 PF)		Transformer kVA	Capacitor kVAR	
<b>7.2 kV/160A Frame</b>								
2200–2500	4.5	50	600	600	800	600	480	7200
3000–3600	4.5	50	900	900	1000	800	640	7200
3800–4800	4.5	50	1200	1200	1400	1000	960	7200
6000–6900	4.5	50	1800	1800	2200	1600	1320	7200
<b>7.2 kV/200A Frame</b>								
2200–2500	4.5	50	800	800	1000	750	600	7200
3000–3600	4.5	50	1100	1100	1250	1000	800	7200
3800–4800	4.5	50	1500	1500	1750	1250	1200	7200
6000–6900	4.5	50	2250	2250	2750	2000	1650	7200
<b>7.2 kV/360A Frame</b>								
2200–2500	4.5	50	1500	1500	1750	1200	1000	7200
3000–3600	4.5	50	2000	2000	2500	1600	1475	7200
3800–4800	4.5	50	2500	2500	3000	2000	2150	7200
6000–6900	4.5	50	4000	4000	5000	3200	2950	7200
<b>7.2 kV/400A Frame</b>								
2200–2500	8.5	50	1750	1750	2000	1500	1200	7200
3000–3600	8.5	50	2250	2250	2500	2000	1650	7200
3800–4800	8.5	50	3000	3000	3500	2500	2400	7200
6000–6900	8.5	50	4500	4500	5500	4000	3300	7200

#### Rating Specifications (7.2 kV/160–400A)

Ampere Rating	7.2 kV/160A	7.2 kV/200A	7.2 kV/360A	7.2 kV/400A
<b>Maximum Interrupting Current</b> (Three operations—amperes)	4500	4500	4500	8500
<b>Rated Current</b>	160	200	360	400
<b>IEC Make-Break Capability—AC4 (Amperes)</b>				
Make	1600	2000	3600	4000
Break	1280	1600	2880	3200

# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

3

#### Product Specifications

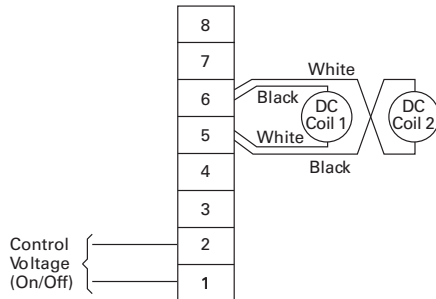
##### 7.2 kV/160–400A

- Short-time current:
  - 30 seconds: 2400A
  - 1 second: 6000A
  - 8.7 ms: 63 kA peak (0.5 cycle)
- Normal service altitude: –3281 to +6562 ft (–1000 to +2000m)
- Mechanical life: 2.5 million
- Electrical life:
  - 6 x Rated Make/1x Rated Break: 300,000 operations
  - 6 x Rated Make/6 x Rated Break: 300,000 operations
- BIL (impulse withstand): 60 kV (1.2 x 50 microseconds)
- Dielectric strength: 20 kV rms (1 minute)
- Closing time: 80 ms (energization to contact touch)
- Selectable opening times:
  - 30 ms (2 cycles)
  - 50 ms (3 cycles)
  - 130 ms (8 cycles)
  - 250 ms (15 cycles)
  - 330 ms (20 cycles)
- Arcing time: 12 ms (0.75 cycle) or less
- Pickup voltage: 80% rated coil voltage
- Dropout voltage: 60% rated coil voltage
- Control voltages:
  - AC/Hz: 110/50, 120/60, 220/50, 240/60
  - DC: 125
- Control circuit burden:
  - Closing: (200 ms)
    - 110/120 AC, 125 DC 1 kVA
    - 220/240 AC 1.8 kVA
  - Holding:
    - 110/120 AC, 125 DC 40 VA
    - 220/240 AC 50 VA
- Auxiliary contact rating:
  - 600V (maximum)
  - 10A continuous current
  - Making capacity
    - AC: 7200 VA
    - DC: 125 VA
  - Breaking capacity
    - AC: 720 VA
    - DC: 125 VA
- Latch (when specified)
  - Mechanical life: 250,000 operations
  - Trip voltage
    - DC: 24V
    - DC: 125V
    - AC: 110/120V
  - Minimum trip voltage: 80% rated coil voltage
  - Trip burden
    - 24 Vdc: 400 VA
    - 48 and 125 Vdc: 400 VA
    - 110 and 120 Vac: 400 VA
    - 220 and 240 Vac: 400 VA
  - Trip time (2 cycles): 30 ms
- Weight
  - 150–360A: 47 lbs (21.3 kg)
  - 400A: 49 lbs (22.2 kg)

#### Wiring Diagrams

##### Electrical Connections Diagrams (7.2 kV/160–400A)

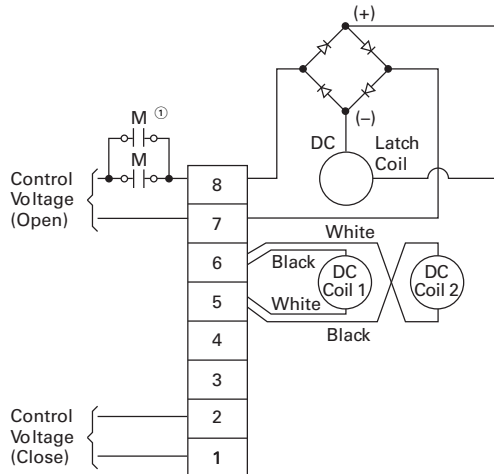
##### Connection for Magnetically Held Contactor



#### Note

- ① M contacts are connected in parallel for AC voltages and for ≤48 Vdc. M contacts are connected in series for >48 Vdc.

##### Connections for Mechanically Latched Contactor

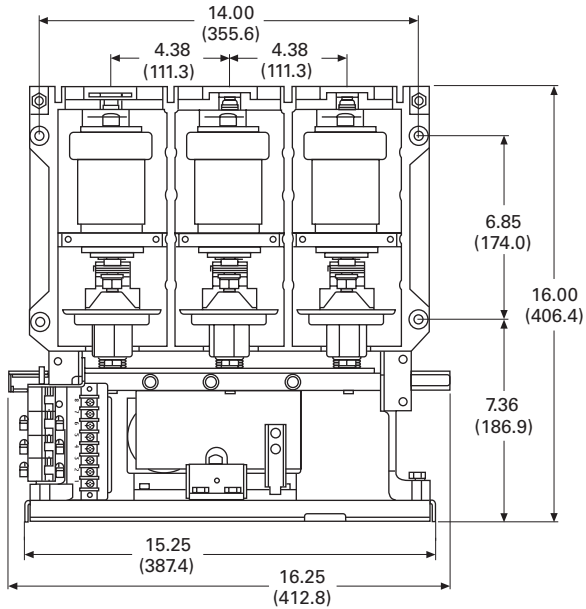


**Dimensions**

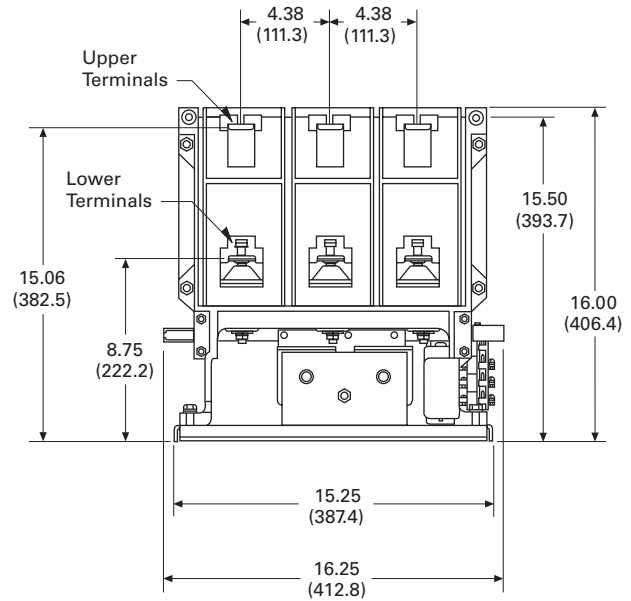
Approximate Dimensions in Inches (mm)

**Dimensional Drawings 7.2 kV/160–400A**

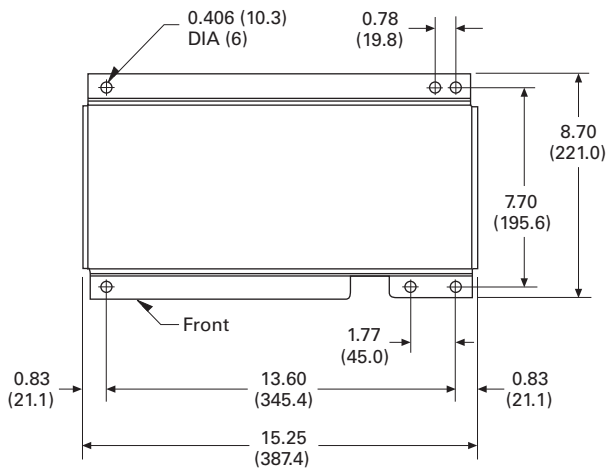
**Front**



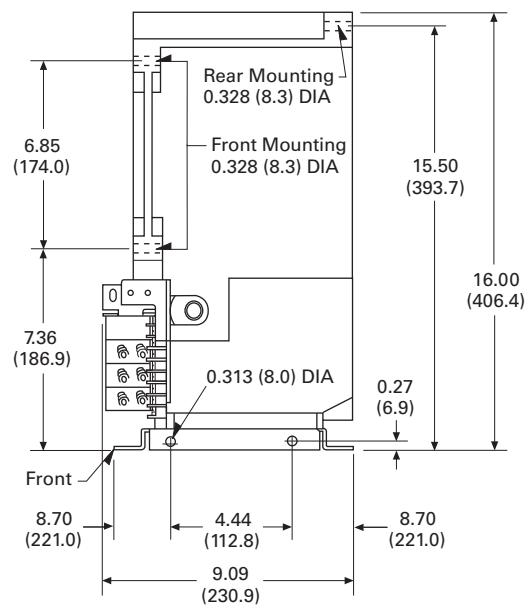
**Rear**



**Base Plate**



**Side**





# 3.2

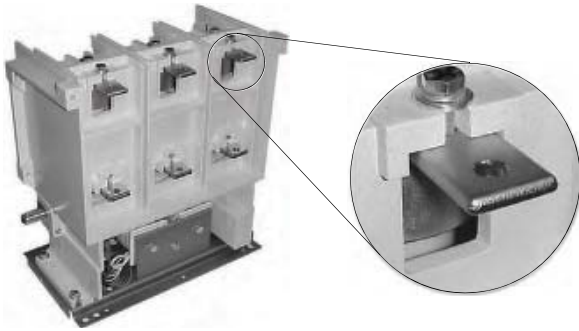
## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

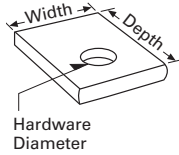
Approximate Dimensions in Inches (mm)

#### Lug Terminal

3



#### Lug Terminal



#### Upper Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/160	0.75 (19.1)	1.31 (33.3)	10
7.2 kV/200	1.00 (25.4)	1.31 (33.3)	10
7.2 kV/360	1.00 (25.4)	1.31 (33.3)	10
7.2 kV/400	1.00 (25.4)	1.31 (33.3)	10

#### Lower Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/160	1.25 (31.8)	1.10 (27.9)	10
7.2 kV/200	1.25 (31.8)	1.10 (27.9)	10
7.2 kV/360	1.25 (31.8)	1.10 (27.9)	10
7.2 kV/400	1.25 (31.8)	1.10 (27.9)	10

SL 7.2 kV/800A Medium Voltage Contactor



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SL MV Power Contactor 7.2 kV/800A	
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Technical Data and Specifications . . . . .	<b>V4-T3-84</b>
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SL MV Power Contactor 15 kV/300A. . . . .	<b>V4-T3-87</b>

### SL MV Power Contactor 7.2 kV/800A

#### Product Description

- A single family of contactors for any medium voltage control application. Voltage range of 2200–7200V
- 800A rating with induction motor horsepower ranges from 3000 to 10,000 hp

#### Application Description

##### *Eaton's SL Medium Voltage Contactors starting applications:*

- Squirrel-cage induction motors
- Synchronous motors
- Wound-rotor

##### *Fully applicable to:*

- Full voltage starting
- Reduced voltage starting

##### *The perfect choice for harsh duty applications:*

- Mining
- Pulp and paper
- HVAC
- Petrochemical
- Automotive
- Many others

#### Features, Benefits and Functions

- Two different altitude versions
- Leading-edge vacuum technology
- Long life—200,000 electrical and 250,000 mechanical
- Special ordering allows unit to be factory pre-set to customer specification, including field kit installation
- Highest quality available—all contactors manufactured within state-of-the-art "ISO-Certified" facilities. 100% made in America

##### *Factory Installed Option Kit*

- Mechanical latch—many coil voltages

#### Standards and Certifications

##### *Acceptability*

- NEMA
- ANSI
- IEC

##### *Third-Party Verification*

- UL
- CSA
- KEMA

##### *Design and Test Standards*

- UL 347, File No. E63257
- CSA
- ANSI/NEMA ICS 3
- IEC 60470



#### Product Selection

Contact Eaton for pricing.

# 3.2

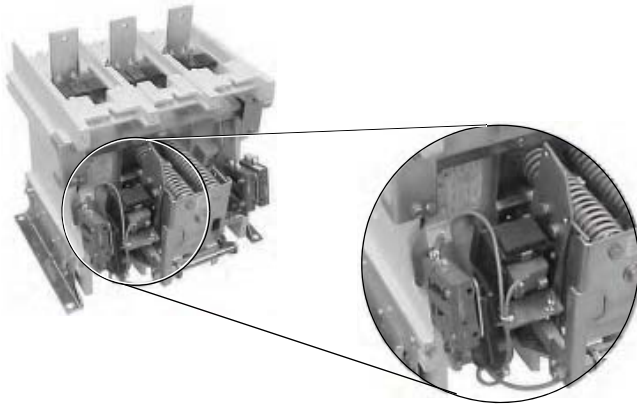
## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

#### Options and Accessories

##### SL Series—Accessory Options 800A

3



**Mechanical Latch Assembly 800A**

##### Mechanical Latch Option— SL Vacuum Contactor Size 800A

Factory installed for 800A SL Vacuum Contactor. Coil voltages available in a wide range of AC and DC selections.

#### Technical Data and Specifications

##### The SL Contactor Ratings

- Voltages of 2200–7200V
- 800A (720A enclosed)
- Interrupting rating of 12,500A

##### Control Voltages

- 110, 220 Vac, 50 Hz
- 120, 240 Vac, 60 Hz
- 125 Vdc

##### Dropout Time

- 50–330 ms, field selectable

#### Front and Rear View 7.2 kV/800A



**Front View**



**Rear View**

#### SL Series Fuses

##### Fuse Application Table for SL Contactors 7.2 kV/SL-800

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
225–360	2400–4800	5BCLS-24R	450–24R	50
360–449	2400–4800	5BCLS-36R	650–36R	130
450–720	2400–4800	5BCLS-44R	800–44R	250
225–400	5500–6600	7BCLS-24R	450–24R	50
400–449	5500–6600	7BCLS-36R	650–36R	130
450–720	5500–6600	7BCLS-44R	800–44R	250

##### Note

Fuse selections based on LRC = FLA x 6 with acceleration time of 10 seconds.

### SL Series Ratings

#### Type SL Vacuum Contactor Ratings 7.2 kV/SL-800

Rated Utilization Voltage	Interrupting Rating		Application Table					
	NEMA Unfused (E1) kA	NEMA Fused (E2) kA	Induction Motor Horsepower	Synchronous Motor Horsepower (0.8 PF) (1.0 PF)		Transformer kVA	Capacitor kVAR	Maximum Insulation Voltage
2200–2500	12.5 (50 MVA)	50 (200 MVA at 2300V)	3000	3000	3500	2500	2400	7200
3000–3600	12.5 (50 MVA)	50 (285 MVA at 3300V)	4000	4000	5000	3500	3200	7200
3800–5000	12.5 (75 MVA)	50 (400 MVA at 4600V)	5000	5000	6000	4500	4000	7200
6000–7200	12.5 (100 MVA)	50 (570 MVA at 6600V)	8000	8000	10,000	6000	4800	7200

3

#### Rating Specifications 7.2 kV/SL-800

Ampere Rating	7.2 kV/800A
<b>Maximum Interrupting Current</b> (Three operations—amperes)	12,500
<b>Rated Current</b>	800 (720 enclosed)
<b>IEC Make-Break Capability—AC4 (Amperes)</b>	
Make	7650
Break	6120

#### Product Specifications

##### 7.2 kV/800A

- Short-time current
  - 30 seconds: 4320A
  - 1 second: 10,800A
  - 8.7 ms (0.5 cycle) 86 kA peak
- Normal service altitude: –3281 to +6562 ft (–1000 to +2000m)
- Mechanical life: 250,000
- Electrical life: 200,000 operations
- BIL (impulse withstand): 60 kV (1.2 x 50 microseconds)
- Dielectric strength: 18.2 kV rms (1 minute)
- Closing time (energization to contact touch): 80 ms
- Opening times (de-energization to full open):
  - 50 ms (3 cycles)
  - 130 ms (8 cycles)
  - 200 ms (12 cycles)
  - 330 ms (20 cycles)
- Arcing time: 12 ms (0.75 cycle) or less
- Pickup voltage: 80% rated coil voltage
- Dropout voltage: 60% rated coil voltage
- Control voltages:
  - AC/Hz: 110/50, 120/60 Vac, 220/50, 240/60
  - DC: 125 Vdc
- Control circuit burden:
  - Closing (120/240): 2600 VA
  - Holding (120/240): 50 VA
- Auxiliary contact rating:
  - 600V (maximum)
  - 10A continuous current
- Making capacity
  - AC: 7200 VA
  - DC: 200 VA
- Breaking capacity
  - AC: 720 VA
  - DC: 200 VA
- Latch (when specified):
  - Mechanical life: 250,000 operations
  - Trip voltage
    - DC: 24, 48, 96V
    - AC: 110/120, 220/240V 50/60 Hz
  - Minimum trip voltage: 80% rated coil voltage
  - Trip burden
    - 24 Vdc: 1200 VA
    - 48 and 96 Vdc: 400 VA
    - 110 and 220 Vac: 500 VA
  - Trip time (2 cycles): 30 ms
- Weight: 95 lbs (43.1 kg)

# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

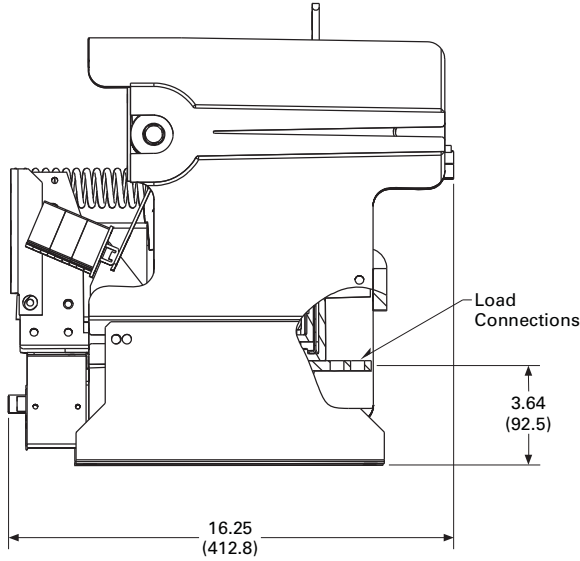
#### Dimensions

Approximate Dimensions in Inches (mm)

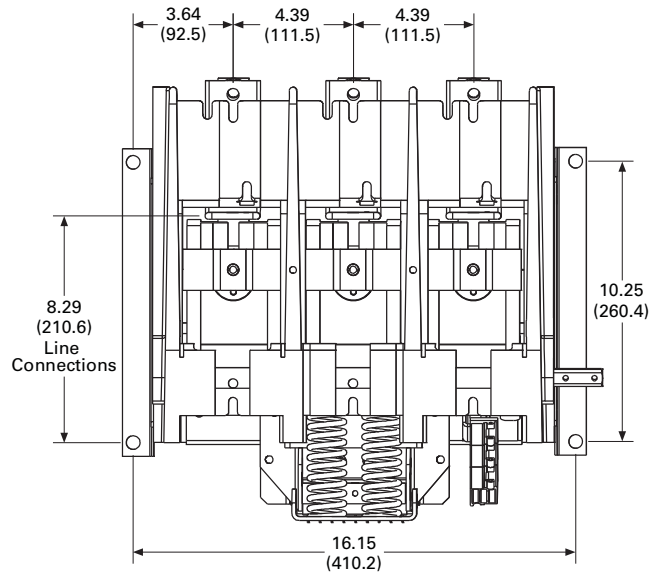
#### Dimensional Drawings 7.2 kV/800A

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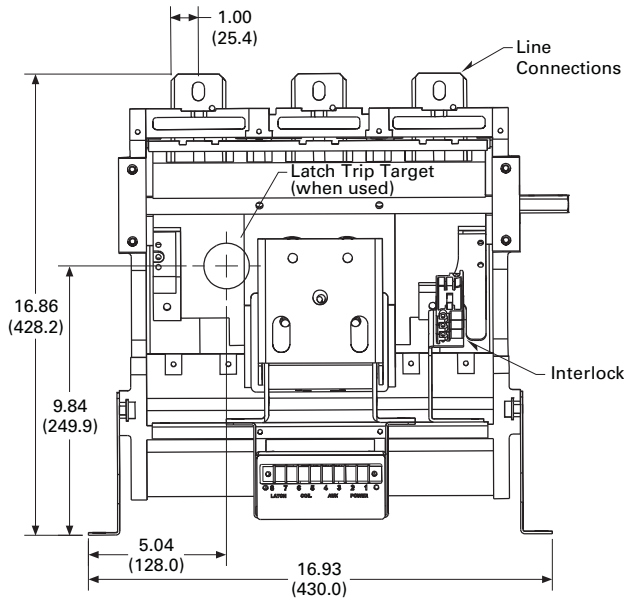
#### Side



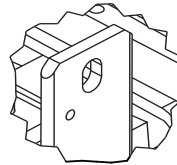
#### Top



#### Front

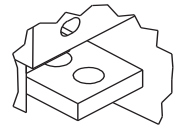


#### Lug Terminal



**Detail A**

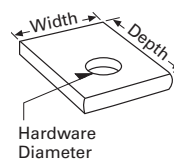
Line Lug Terminal  
Use 10 mm or 3/8 inch Bolt



**Detail B**

Load Lug Terminal  
Use 10 mm or 3/8 inch Bolt

#### Lug Terminal



#### Upper Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/800	1.75 (44.5)	2.00 (50.8)	10

#### Lower Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
7.2 kV/800	1.50 (38.1)	1.50 (38.1)	10

SL 15 kV/300A Medium Voltage Contactor



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Dimensions . . . . .	<b>V4-T3-90</b>

**SL MV Power Contactor 15 kV/300A**

**Product Description**

- A single family of contactors for any medium voltage control application. Voltage range of 7200–15,000V
- 300A rating with induction motor horsepower ranges from 500 to 7500 hp
- Two different altitude versions
- Leading-edge vacuum technology
- Long life—200,000 electrical and 250,000 mechanical operations
- Special ordering allows unit to be factory pre-set to customer specification, including field kit installation
- Highest quality available—all contactors manufactured within state-of-the-art “ISO-Certified” facilities. 100% made in America

**Application Description**

**Eaton’s SL Medium Voltage Contactors starting applications:**

- Squirrel-cage induction motors
- Synchronous motors
- Wound-rotor

**Fully applicable to:**

- Full voltage starting
- Reduced voltage starting

**The perfect choice for harsh duty applications:**

- Mining
- Pulp and paper
- HVAC
- Petrochemical
- Automotive
- Many others

**Features, Benefits and Functions**

**Factory Installed Option Kit**

- Mechanical latch—many coil voltages

**Standards and Certifications**

**Acceptability**

- NEMA
- ANSI
- IEC

**Third-Party Verification**

- UL
- CSA
- KEMA

**Design and Test Standards**

- UL 347, File No. E63257
- CSA
- ANSI/NEMA ICS 3
- IEC 60470



**Product Selection**

Contact Eaton for pricing.

# 3.2

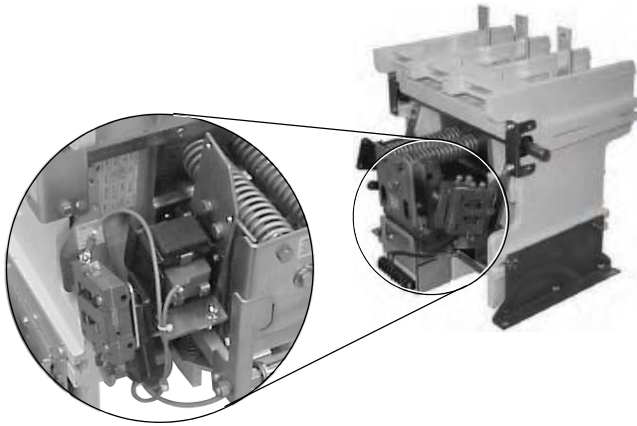
## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

3

#### Options and Accessories

##### SL Series—Accessory Options 15 kV/300A



**Mechanical Latch Assembly 15 kV/300A**

##### Mechanical Latch Option— SL Vacuum Contactor

Factory installed for 15 kV/300A SL Vacuum Contactor. Coil voltages available in a wide range of AC and DC selections.

#### Technical Data and Specifications

##### The SL Contactor Ratings

- Voltages to 15,000V
- 300A
- Interrupting rating of 5000A

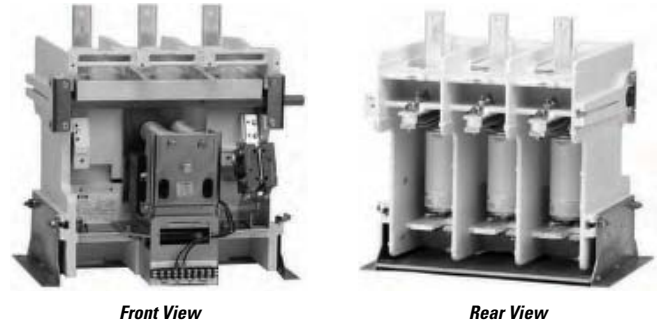
##### Control Voltages

- 110, 220 Vac, 50 Hz
- 120, 240 Vac, 60 Hz
- 125 Vdc

##### Dropout Time

- 50–330 ms
- Field selectable

#### Front and Rear View 15 kV/300A



#### SL Series Fuses

##### Fuse Application Table for SL Contactors 15 kV/SL-300A

Motor FLA	Voltage	Suggested Eaton Fuse	Rating	Minimum Opening Time
50–300 ①	10,000–13,800	15BHCLS-400	400	130 ms

##### Notes

① For FLA >275, contact factory for maximum acceleration time.

Fuse selections based on LRC = FLA x 6 with acceleration time of 10 seconds except where otherwise noted.

### SL Series Ratings

#### Type SL Vacuum Contactor Ratings 15 kV/300A

Rated Utilization Voltage	Interrupting Rating		Application Table					
	NEMA Unfused (E1) kA	NEMA Fused (E2) kA	Induction Motor Horsepower	Synchronous Motor Horsepower (0.8 PF) (1.0 PF)		Transformer kVA	Capacitor kVAR	Maximum Insulation Voltage
10,000–11,000	5	50 (950 MVA at 11,000V)	6000	6000	6750	5500	Consult factory	15,000
12,400–13,800	5	50 (1190 MVA at 13,800V)	7500	7500	8500	6800	Consult factory	15,000

#### Rating Specifications 15 kV/300A

Ampere Rating	15 kV/300A
<b>Maximum Interrupting Current</b> (Three operations—amperes)	5000
<b>Rated Current</b>	300
<b>IEC Make-Break Capability—AC4 (Amperes)</b>	
Make	3000
Break	3000

### Product Specifications

#### 15 kV/300A

- Short-time current
  - 30 seconds: 1800A
  - 1 second: 4500A
  - 8.7 ms (0.5 cycle) 25 kA peak
- Normal service altitude: –3281 to +6562 ft (–1000 to +2000m)
- Mechanical life: 250,000 operations
- Electrical life: 200,000 operations
- BIL (impulse withstand): 75 kV (1.2 x 50 microseconds)
- Dielectric strength: 36 kV rms (1 minute)
- Closing time (energization to contact touch): 80 ms
- Selectable opening times (de-energization to full open):
  - 50 ms (3 cycles)
  - 130 ms (8 cycles)
  - 250 ms (12 cycles)
  - 330 ms (20 cycles)
- Arcing time: 12 ms (0.75 cycle) or less
- Pickup voltage: 80% rated coil voltage
- Dropout voltage: 60% rated coil voltage
- Control voltages:
  - AC/Hz: 110/50, 120/60 Vac, 220/50, 240/60
  - DC: 125 Vdc
- Control circuit burden:
  - Closing (120/240): 1700/2600 VA
  - Holding (120/240): 80 VA
- Auxiliary contact rating:
  - 600V (maximum)
  - 10A continuous current
  - Making capacity
    - AC: 7200 VA
    - DC: 200 VA
  - Breaking capacity
    - AC: 720 VA
    - DC: 200 VA
- Latch (when specified):
  - Mechanical life: 250,000 operations
  - Trip voltage
    - DC: 24, 48, 96V
    - AC: 110/120, 220/240V, 50/60 Hz
  - Minimum trip voltage: 80% rated coil voltage
  - Trip burden
    - 24 Vdc: 1200 VA
    - 48 and 96 Vdc: 400 VA
    - 110 and 220 Vac: 500 VA
  - Trip time (2 cycles): 30 ms
- Weight: 95 lbs (43.1 kg)



# 3.2

## Power Breakers, Contactors and Fuses

### Medium Voltage Power Contactors

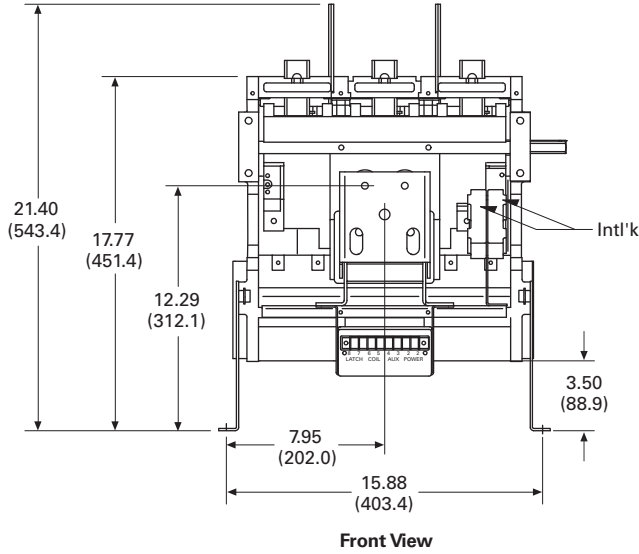
#### Dimensions

Approximate Dimensions in Inches (mm)

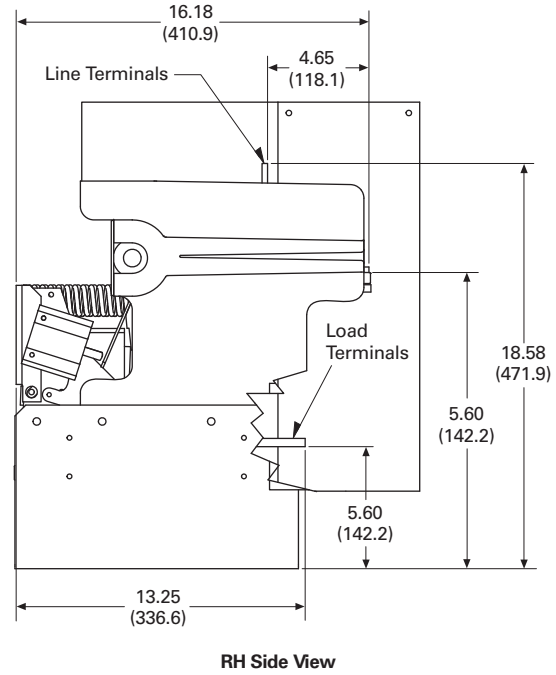
#### Dimensional Drawings 15 kV/300A

3

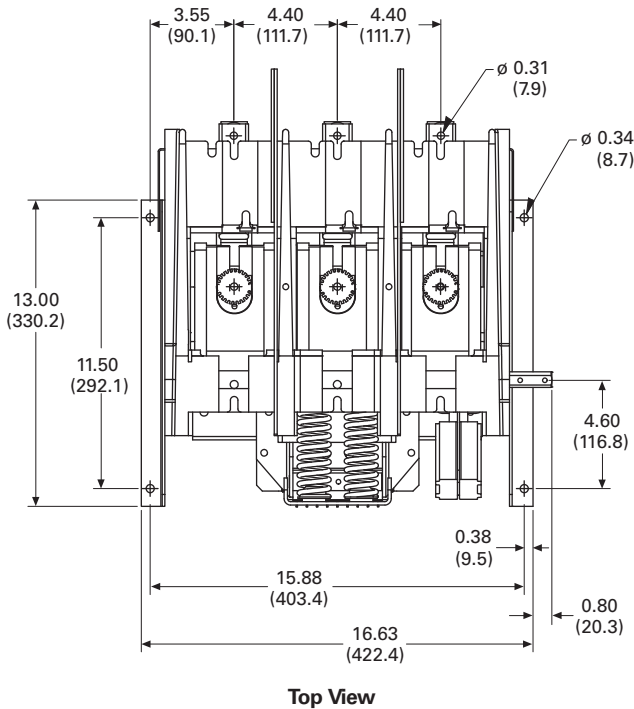
#### Front



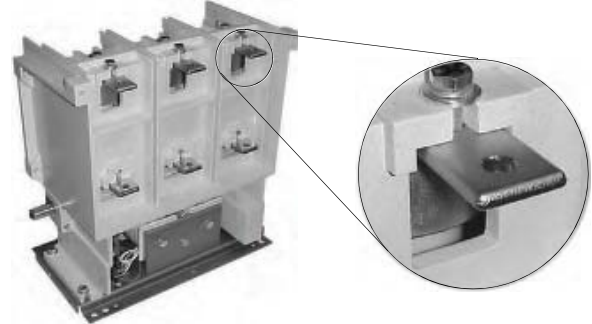
#### Side 15 kV/300A



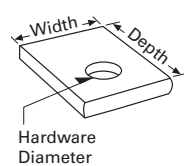
#### Top



#### Lug Terminal



#### Lug Terminal



#### Upper Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
15 kV/300	1.25 (31.8)	1.25 (31.8)	10

#### Lower Lug Terminal

Contactor Ampere Rating	Width	Depth	Hardware (Bolt Diameter)
15 kV/300	1.50 (38.1)	1.25 (38.1)	10

**Contents****Description**

Fuses General

**Product Overview****Power Fuse**

Eaton's roots in the medium voltage power fuse business began over 75 years ago under Westinghouse® Electric. In 1935, Westinghouse introduced the medium voltage boric acid expulsion fuse followed by the medium voltage current limiting fuse. Even today, medium voltage fuses continue to use that core technology. Eaton continues to build on the technology legacy by engineering higher performance, cost-effective power fuse products.

Eaton's medium voltage fuses are manufactured and tested to the requirements of the C37-4X series of standards, which are maintained and updated regularly to maintain currency with industry practices. These standards are:

**IEEE Std. C37.40™**

IEEE Standard Service Conditions and Definitions for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories (ANSI).

**IEEE Std. C37.41™**

IEEE Standard Design Tests for High-Voltage (>1000V) Fuses, Fuse and Disconnecting Cutouts, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Fuse Links and Accessories used with These Devices (ANSI).

**ANSI C37.42™**

IEEE Standard Specifications for High-Voltage (>1000V) Expulsion-Type Distribution-Class Fuses, Fuse and Disconnecting Cutouts, Fuse Disconnecting Switches, and Fuse Links, and Accessories used with These Devices (ANSI).

**ANSI C37.46**

American National Standard for High Voltage Expulsion and Current Limiting Type Power Class Fuses and Fuse Disconnecting Switches.

**ANSI C37.47**

American National Standard for High Voltage Current Limiting Type Distribution Class Fuses and Fuse Disconnecting Switches.

The following IEEE standards are also applicable to the fuse products covered in this publication:

**IEEE Std. C37.48™**

IEEE Guide for the Application, Operation, and Maintenance of High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories (ANSI).

**IEEE Std. C37.48.1™**

IEEE Guide for the Classification, Application, and Coordination of Current-Limiting Fuses with Rated Voltages 1–38 kV.

A better understanding of some fuse terminology will help you understand and select the correct fuse. The following is a brief overview of those terms.

**Power vs. Distribution**

The differentiation is intended to indicate the test conditions and where fuses are normally applied on an electrical system, based on specific requirements for generating sources, substations and distribution lines. Each class has its own unique set of voltage, current and construction requirements (see C37.42, .46 and .47).

**Low vs. Medium vs. High Voltage**

While fuses are defined in the ANSI standards as either low or high voltage, Eaton has elected to name their fuses to correspond with the equipment in which they are installed. Therefore, per ANSI C84, our fuses are named as follows:

- Low voltage—1000V and below
- Medium voltage—greater than 1000 to 69,000V
- High voltage—greater than 69,000V

**Expulsion vs. Current Limiting (Definitions per ANSI C47.40-1993)**

An expulsion fuse is a vented fuse in which the expulsion effect of the gases produced by internal arcing, either alone or aided by other mechanisms, results in current interruption.

An expulsion fuse is not current limiting and as a result limits the duration of a fault on the electrical system, not the magnitude.

A current limiting fuse is a fuse that, when its current responsive element is melted by a current within the fuse's specified current limiting range, abruptly introduces a high resistance to reduce current magnitude and duration, resulting in subsequent current interruption. Refer to Fuse Types Protection Range figure on **Page V4-T3-93** for a features comparison.

**Fuse Types**

There are three current limiting fuse types: Backup, General Purpose and Full Range. It is important that the user have an understanding of these definitions to ensure proper application of the fuse (see Fuse Types Protection Range figure on **Page V4-T3-93**).

**Backup Fuses**

A fuse capable of interrupting all currents from the maximum rated interrupting current down to the rated minimum interrupting current.

Backup fuses are always used in a series with another interrupting device capable of interrupting currents below the fuse's minimum interrupting current.

**General Purpose Fuses**

A fuse capable of interrupting all currents from the rated interrupting current down to the current that causes melting of the fusible element in no less than one hour.

General Purpose fuses are typically used to protect feeders and components such as transformers.

**Full Range Fuses**

A fuse capable of interrupting all currents from the rated interrupting current down to the minimum continuous current that causes melting of the fusible element, with the fuse applied at the maximum ambient temperature specified by the manufacturer.

**General Fuse Component Terms****Fuse Refill Unit (of an Expulsion Fuse)**

A fuse refill unit is a replaceable assembly containing the calibrated current-responsive fuse element and certain other items that facilitate current interruption. On its own, the refill unit has no interrupting ability. A refill unit must be mounted in a fuseholder with a spring assembly to form a refillable fuse unit. The refill unit is the section of the fuse that must be replaced after a fuse operation.

**Fuseholder (of an Expulsion Fuse)**

A fuseholder is a reusable holder that when equipped with a fuse refill unit forms a fuse unit, capable of interrupting an overload or fault current. A fuseholder is supplied with a spring and shunt assembly, necessary to complete the internal interrupting assembly. The spring and shunt assembly is supplied with the fuseholder but is also available as a replacement part, as it may need replacement after several of heavy operations.

**Fuse Unit**

A fuse unit is a replaceable unit or assembly that is able, on its own, to perform current interruption. In the case of a refillable fuse unit, the refill unit must be replaced after a fuse operation. Where a complete fuse unit is supplied from the factory, the complete fuse unit must be replaced after a fuse operation. All current-limiting fuses are fuse units.

**Exhaust Control Device**

When expulsion fuses are used in enclosures, exhaust control devices (filters, condensers or mufflers) are used to control the sound of the fuse operation, and to de-ionize and absorb the fuse exhaust products. These devices are normally supplied separately, because of different characteristics and ratings. They are reusable but may need replacement after several heavy operations.

**Mounting**

A mounting provides all the necessary parts to safely mount a fuse in its intended piece of equipment. The base is the metal support to which all other pieces attach. Insulators attach to the base and insulate the live fuse unit from the base and everything beyond the base. Live parts are the parts of the mounting that are energized once electricity is flowing. The live parts provide the means to hold the fuse unit in place, electrical contact, and a place to make line and load connections.

**Non-Disconnect Mounting**

A non-disconnect mounting does not provide a means for removing the fuse unit until the circuit is dead and the fuse unit can be removed manually. The fuse unit is held in place by friction through the use of fuse clips or by a cross bar.

**Disconnect Mounting**

The disconnect mounting allows the fuse unit to be removed (off load) using an insulated hook stick. The hookstick grabs a pull ring and disconnects the fuse unit, which may then be lifted out of its mounting.

**Dropout Mounting**

Dropout mountings are used in outdoor applications. The fuse unit is equipped with a mechanical trigger that unlatches the upper contact, allowing the fuse unit to drop out, increasing the dielectric separation, and providing visible indication of a blown fuse.

**Live Parts**

Live parts were briefly discussed as part of the "Mounting" definition. Everything above the insulators on the mounting excluding the fuse unit, fuse holder, and the fuse end fittings (if required) are considered the live parts. Fuse end fittings are discussed next and are not required with non-disconnect live parts, but are required and included with disconnect live parts. Live parts may be sold separately as replacement parts or for new OEM applications.

**End Fittings**

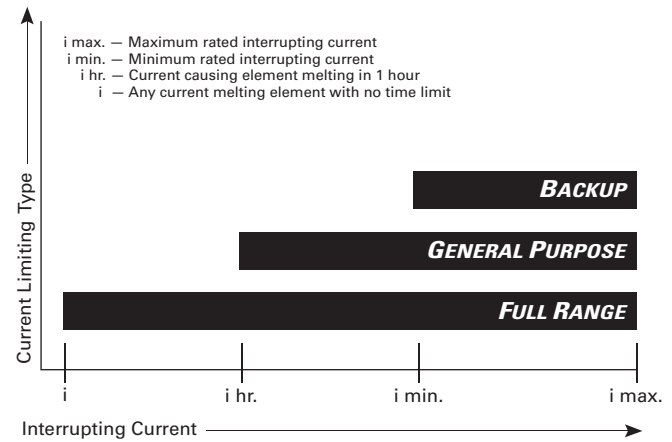
End fittings are metal parts that attach to each end of a fuse unit's ferrules (end caps). As previously mentioned, they are used solely with disconnect fuse applications or when converting a non-disconnect to a disconnect fuse configuration.

When end fittings are ordered, a fitting for each end of the fuse is included. Keep in mind that end fittings can become damaged in use and, therefore, are sold separately from the live parts when necessary. It is not necessary to purchase an entire set of live parts when only the end fittings are required.

**General High Voltage Fuse Comparison**

Expulsion	Current Limiting
Vented	Sealed
Electromechanical	Static
Interrupts at current zero	Limits fault current
Generally higher voltage and current application capabilities	Generally higher interrupting ratings
Different time/current characteristics	Different time/current characteristics

**Fuse Types Protection Range**



#### Product Description

Eaton's expulsion fuses use boric acid as the interrupting medium. Under a fault condition, arc heat decomposes the boric acid into water vapor. The water vapor blast deionizes the arc path preventing arc re-ignition after a natural current zero.

Type RBA indoor expulsion fuses must be fitted with a discharge filter or condenser, that moderates the discharge exhaust. The discharge filter limits the exhaust to a small and relatively inert amount of gas and lowers the noise level without affecting the fuse interrupting rating. Steam discharge, that can effect the interrupting, is fully restricted by the condenser.

Type RDB outdoor dropout fuses include an ejector spring that forces the arcing rod through the top of the fuse. The arcing rod strikes a latch on the mounting that forces the fuse to swing outward through a 180° arc into the dropout position.

Refill units can be field installed into RBA and RDB expulsion fuses. Once the operated unit has been removed, the separately purchased unit can be easily installed into the fuse holder.

Type DBU fuse units are designed for new and aftermarket utility applications. End fittings are available, in both indoor and outdoor versions, as well as live parts and mountings. Mufflers confine the arc within the fuse and substantially reduce the noise and exhaust when the fuse interrupts.



**RBA E-Rated Refillable Boric Acid**



**RDB E-Rated Refillable Outdoor Dropout Boric Acid**



**DBU Dropout Boric Acid—for Use Indoors, Inside Switchgear or Outdoors**

#### Contents

<i>Description</i>	<i>Page</i>
Catalog Number Selection . . . . .	<b>V4-T3-95</b>
Product Selection . . . . .	<b>V4-T3-96</b>

#### Accessories

The following accessories are available for expulsion fuses:

##### Mountings

Mountings include a base, porcelain or glass polyester insulators, and live parts. They help enable the fuse to be safely attached to the gear. Mountings can be either disconnect, nondisconnect or dropout. Non-disconnect mountings are available in bolt-on or clamp-type arrangements. Fuses may be vertical or underhung.

##### Live Parts

Live parts attach the fuse to the insulators and are considered part of the mounting. All parts above the insulators are live parts.

##### End Fittings

End fittings are metal parts that attach to each end of the fuse at the ferrules. They are used only on disconnect fuses or when converting a nondisconnect to a disconnect fuse.

### Catalog Number Selection

#### Expulsion Fuse

##### Easy to Use, Easy to Order!

Eaton's fuse catalog numbering system makes it easy to order the right fuse. The catalog numbers are easy to remember, unique to each fuse, and are broken down in three descriptive segments: Fuse Type, Voltage Rating and Current Rating.

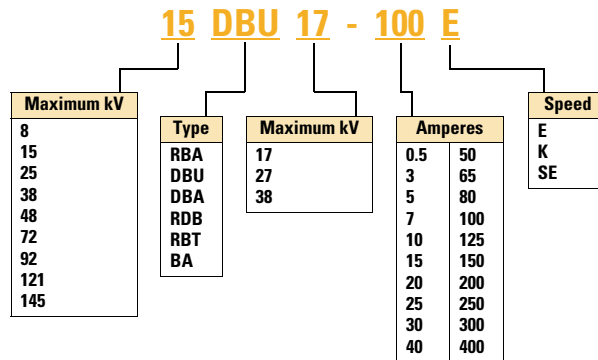
These Catalog numbers can be entered directly and easily:

- No change in order processing will occur if you use either a style number or its corresponding catalog number. You will get the same fuse
- If you are ordering a replacement for an older Westinghouse fuse, it will only have the style number. Order under this style number and you will get the correct fuse

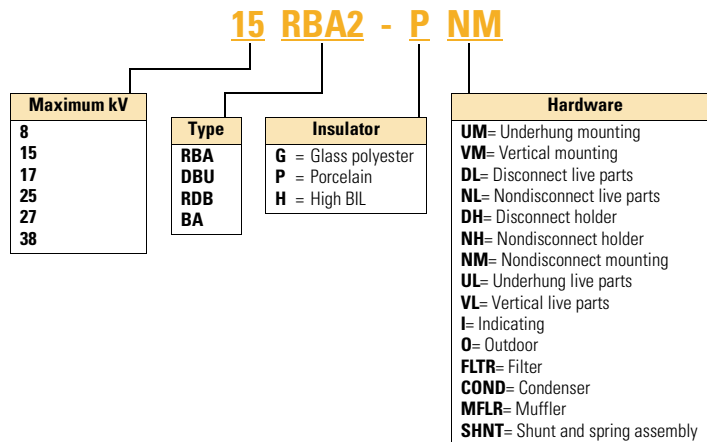
##### Examples:

8RBA2-10E	8.3 max. kV, RBA-200 refill, 10E amperes
DBU17-30K	17.1 max. kV, DBU fuse unit, 30 amperes
15RBA8-INH	15.5 max. kV, RBA-800, indicating nondisconnect holder
RBA4-FLTR	RBA-400 filter

#### Expulsion Fuse Units



#### Expulsion Fuse Accessories



# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

#### Product Selection

Contact Eaton for pricing.

#### Type RBA and RDB

3

#### Type 8RBA2 Expulsion Fuse Refill Units—8.3 kV Maximum (7.2 kV Nominal) 200A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	8RBA2-10E	1, 2	—	—	1.0 (0.45)
15E	8RBA2-15E	1, 2	—	—	1.0 (0.45)
20E	8RBA2-20E	1, 2	8RBT2-20E	3, 4	1.0 (0.45)
25E	8RBA2-25E	1, 2	8RBT2-25E	3, 4	1.0 (0.45)
30E	8RBA2-30E	1, 2	8RBT2-30E	3, 4	1.0 (0.45)
40E	8RBA2-40E	1, 2	8RBT2-40E	3, 4	1.0 (0.45)
50E	8RBA2-50E	1, 2	8RBT2-50E	3, 4	1.0 (0.45)
65E	8RBA2-65E	1, 2	8RBT2-65E	3, 4	1.0 (0.45)
80E	8RBA2-80E	1, 2	8RBT2-80E	3, 4	1.0 (0.45)
100E	8RBA2-100E	1, 2	8RBT2-100E	3, 4	1.0 (0.45)
125E	8RBA2-125E	1, 2	8RBT2-125E	3, 4	1.0 (0.45)
150E	8RBA2-150E	1, 2	8RBT2-150E	3, 4	1.0 (0.45)
200E	8RBA2-200E	1, 2	8RBT2-200E	3, 4	1.0 (0.45)

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—8.3 kV Maximum (7.2 kV Nominal) 200A (For Use with 8RBA2 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
10E–200E	Non-disconnect	8RBA2-NH	8RBA2-INH	4.8	5.5	60	5RBA2-PNM	5RBA2-GNM	15RBA2-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
				7.2	8.3	75	8RBA2-PNM	8RBA2-GNM	15RBA2-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
	Disconnect	8RBA2-DH	8RBA2-IDH	4.8	5.5	60	5RBA2-PDM	5RBA2-GDM	14RBA2-DL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
				7.2	8.3	75	8RBA2-PDM	8RBA2-GDM	14RBA2-DL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
	Bolt-in	—	8RBA2-INH-B	4.8	5.5	60	5RBA8-PNM	5RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT
				7.2	8.3	75	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	8RBA2-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors—8.3 kV Maximum (7.2 kV Nominal) 200A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
10E–200E	Dropout	8RDB2-DH	7.2	8.3	95	8RDB2-VM	8RDB2-UM	RDB2-VL	RDB2-UL	8RDB2-SHNT
			7.2	8.3	110	8RDB2-HVM	8RDB2-HUM	RDB2-VL	RDB2-UL	8RDB2-SHNT

#### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 8RBA4 Expulsion Fuse Refill Units—8.3 kV Maximum (7.2 kV Nominal) 400A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	8RBA4-5	5, 6	—	—	2.1 (0.95)
3	8RBA4-3	5, 6	—	—	2.1 (0.95)
5E	8RBA4-5E	5, 6	—	—	2.1 (0.95)
7E	8RBA4-7E	5, 6	—	—	2.1 (0.95)
10E	8RBA4-10E	5, 6	—	—	2.1 (0.95)
15E	8RBA4-15E	5, 6	—	—	2.1 (0.95)
20E	8RBA4-20E	5, 6	8RBT4-20E	7, 8	2.1 (0.95)
25E	8RBA4-25E	5, 6	8RBT4-25E	7, 8	2.1 (0.95)
30E	8RBA4-30E	5, 6	8RBT4-30E	7, 8	2.1 (0.95)
40E	8RBA4-40E	5, 6	8RBT4-40E	7, 8	2.1 (0.95)
50E	8RBA4-50E	5, 6	8RBT4-50E	7, 8	2.1 (0.95)
65E	8RBA4-65E	5, 6	8RBT4-65E	7, 8	2.1 (0.95)
80E	8RBA4-80E	5, 6	8RBT4-80E	7, 8	2.1 (0.95)
100E	8RBA4-100E	5, 6	8RBT4-100E	7, 8	2.1 (0.95)
125E	8RBA4-125E	5, 6	8RBT4-125E	7, 8	2.1 (0.95)
150E	8RBA4-150E	5, 6	8RBT4-150E	7, 8	2.1 (0.95)
200E	8RBA4-200E	5, 6	8RBT4-200E	7, 8	2.1 (0.95)
250E	8RBA4-250E	5, 6	8RBT4-250E	10, 11	2.1 (0.95)
300E	8RBA4-300E	5, 6	8RBT4-300E	10, 11	2.1 (0.95)
400E	8RBA4-400E	5, 6	8RBT4-400E	10, 11	2.1 (0.95)

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—8.3 kV Maximum (7.2 kV Nominal) 400A (For Use with 8RBA4 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.	
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester				
0.5–400E	Non-disconnect	8RBA4-NH	8RBA4-INH	4.8	5.5	60	5RBA4-PNM	5RBA4-GNM	15RBA4-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Non-disconnect	8RBA4-NH	8RBA4-INH	7.2	8.3	75	8RBA4-PNM	8RBA4-GNM	15RBA4-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Disconnect	8RBA4-DH	8RBA4-IDH	4.8	5.5	60	5RBA4-PDM	5RBA4-GDM	14RBA4-DL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Disconnect	8RBA4-DH	8RBA4-IDH	7.2	8.3	75	8RBA4-PDM	8RBA4-GDM	14RBA4-DL	RBA4-FLTR RBA4-COND	8RBA4-SHNT	
	Bolt-in	—	—	8RBA2-INH-B	4.8	5.5	60	5RBA8-PNM	5RBA8-GNM	15RBA8-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT
	Bolt-in	—	—	8RBA4-INH-B	7.2	8.3	75	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA4-FLTR RBA4-COND	8RBA4-SHNT

**Type RDB Expulsion Fuses for Use Outdoors—8.3 kV Maximum (7.2 kV Nominal) 400A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
0.5–400E	Dropout	8RDB4-DH	7.2	8.3	95	8RDB4-VM	8RDB4-UM	RDB4-VL	RDB4-UL	8RDB4-SHNT
	Dropout	8RDB4-DH	7.2	8.3	110	8RDB4-HVM	8RDB4-HUM	RDB4-VL	RDB4-UL	8RDB4-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.



# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 8RBA4 Expulsion Fuse Refill Units Used in 8RBA8/8RDB4 Fuseholders— 8.3 kV Maximum (7.2 kV Nominal) 800A

##### RBA/RBT Refill Units

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	8RBA4-250E	9	2	8RBT4-250E	12	①
540E	2	8RBA4-300E	9	2	8RBT4-300E	12	①
720E	2	8RBA4-400E	9	2	8RBT4-400E	12	①

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure— 8.3 kV Maximum (7.2 kV Nominal) 800A (For Use with 8RBA8 Fuseholders) ②

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
450E-720E	Non-disconnect	8RBA8-NH	8RBA8-INH	4.8	5.5	60	5RBA8-PNM	5RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	8RBA4-SHNT
										RBA4-COND ③	
	Non-disconnect	8RBA8-NH	8RBA8-INH	7.2	8.3	75	8RBA8-PNM	8RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	8RBA4-SHNT
										RBA4-COND ③	

#### Type RDB Expulsion Fuses for Use Outdoors—8.3 kV Maximum (7.2 kV Nominal) 800A ④

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
450E-720E	Disconnect	8RDB4-NH	7.2	8.3	95	8RDB8-VM	8RDB8-UM	RDB8-VL	RDB8-UL	8RDB4-SHNT
	Disconnect	8RDB4-NH	7.2	8.3	110	8RDB8-HVM	8RDB8-HUM	RDB8-VL	RDB8-UL	8RDB4-SHNT

##### Notes

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 8.3 kV fuse, order two pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 15RBA2 Expulsion Fuse Refill Units— 15.5 kV Maximum (14.4 kV Nominal) 200A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	15RBA2-10E	1, 2	—	—	1.1 (0.5)
15E	15RBA2-15E	1, 2	—	—	1.1 (0.5)
20E	15RBA2-20E	1, 2	15RBT2-20E	3, 4	1.1 (0.5)
25E	15RBA2-25E	1, 2	15RBT2-25E	3, 4	1.1 (0.5)
30E	15RBA2-30E	1, 2	15RBT2-30E	3, 4	1.1 (0.5)
40E	15RBA2-40E	1, 2	15RBT2-40E	3, 4	1.1 (0.5)
50E	15RBA2-50E	1, 2	15RBT2-50E	3, 4	1.1 (0.5)
65E	15RBA2-65E	1, 2	15RBT2-65E	3, 4	1.1 (0.5)
80E	15RBA2-80E	1, 2	15RBT2-80E	3, 4	1.1 (0.5)
100E	15RBA2-100E	1, 2	15RBT2-100E	3, 4	1.1 (0.5)
125E	15RBA2-125E	1, 2	15RBT2-125E	3, 4	1.1 (0.5)
150E	15RBA2-150E	1, 2	15RBT2-150E	3, 4	1.1 (0.5)
200E	15RBA2-200E	1, 2	15RBT2-200E	3, 4	1.1 (0.5)

**Type RBA Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 200A (For Use with 15RBA2 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum	LIWL (BIL)	Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
10E–200E	Non-disconnect	15RBA2-NH	15RBA2-INH	13.8	15.5	95	14RBA2-PNM	14RBA2-GNM	15RBA2-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Non-disconnect	15RBA2-NH	15RBA2-INH	13.8	15.5	110	15RBA2-PNM	—	15RBA2-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Disconnect	15RBA2-DH	15RBA2-IDH	13.8	15.5	95	14RBA2-PDM	14RBA2-GDM	38RBA2-DL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Disconnect	15RBA2-DH	15RBA2-IDH	13.8	15.5	110	15RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Bolt-in	—	15RBA2-INH-B	13.8	15.5	95	14RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT
	Bolt-in	—	15RBA2-INH-B	13.8	15.5	110	15RBA8-PNM	15RBA8-GNM	15RBA8-NL	RBA2-FLTR RBA2-COND	15RBA2-SHNT

**Type RDB Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 200A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum	LIWL (BIL)	Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
										Catalog Number
10E–200E	Dropout	15RDB2-DH	13.8	15.5	110	15RDB2-VM	15RDB2-UM	RDB2-VL	RDB2-UL	15RDB2-SHNT
	Dropout	15RDB2-DH	13.8	15.5	150	15RDB2-HVM	15RDB2-HUM	RDB2-VL	RDB2-UL	15RDB2-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 15RBA4 Expulsion Fuse Refill Units— 15.5 kV Maximum (14.4 kV Nominal) 400A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	15RBA4-5	5, 6	—	—	2.3 (1.0)
3	15RBA4-3	5, 6	—	—	2.3 (1.0)
5E	15RBA4-5E	5, 6	—	—	2.3 (1.0)
7E	15RBA4-7E	5, 6	—	—	2.3 (1.0)
10E	15RBA4-10E	5, 6	—	—	2.3 (1.0)
15E	15RBA4-15E	5, 6	—	—	2.3 (1.0)
20E	15RBA4-20E	5, 6	15RBT4-20E	7, 8	2.3 (1.0)
25E	15RBA4-25E	5, 6	15RBT4-25E	7, 8	2.3 (1.0)
30E	15RBA4-30E	5, 6	15RBT4-30E	7, 8	2.3 (1.0)
40E	15RBA4-40E	5, 6	15RBT4-40E	7, 8	2.3 (1.0)
50E	15RBA4-50E	5, 6	15RBT4-50E	7, 8	2.3 (1.0)
65E	15RBA4-65E	5, 6	15RBT4-65E	7, 8	2.3 (1.0)
80E	15RBA4-80E	5, 6	15RBT4-80E	7, 8	2.3 (1.0)
100E	15RBA4-100E	5, 6	15RBT4-100E	7, 8	2.3 (1.0)
125E	15RBA4-125E	5, 6	15RBT4-125E	7, 8	2.3 (1.0)
150E	15RBA4-150E	5, 6	15RBT4-150E	7, 8	2.3 (1.0)
200E	15RBA4-200E	5, 6	15RBT4-200E	7, 8	2.3 (1.0)
250E	15RBA4-250E	5, 6	15RBT4-250E	10, 11	2.3 (1.0)
300E	15RBA4-300E	5, 6	15RBT4-300E	10, 11	2.3 (1.0)
400E	15RBA4-400E	5, 6	15RBT4-400E	10, 11	2.3 (1.0)

#### Type RBA Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 400A (For Use with 15RBA4 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
0.5–400E	Non-disconnect	15RBA4-NH	15RBA4-INH	13.8	15.5	95	14RBA4-PNM	14RBA4-GNM	15RBA4-NL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Non-disconnect	15RBA4-NH	15RBA4-INH	13.8	15.5	110	15RBA4-PNM	—	15RBA4-NL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Disconnect	15RBA4-DH	15RBA2-IDH	13.8	15.5	95	14RBA4-PDM	14RBA4-GDM	15RBA4-DL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Disconnect	15RBA4-DH	15RBA2-IDH	13.8	15.5	110	15RBA4-PDM	—	15RBA4-DL	RBA4-FLTR RBA4-COND	15RBA4-SHNT
	Bolt-in	—	15RBA4-INH-B	13.8	15.5	95	14RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA-FLTR RBA4-COND	15RBA4-SHNT
	Bolt-in	—	15RBA4-INH-B	13.8	15.5	110	15RBA8-PNM	15RBA8-GNM	15RBA8-NL	RBA-FLTR RBA4-COND	15RBA4-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors— 15.5 kV Maximum (14.4 kV Nominal) 400A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
0.5–400E	Dropout	15RDB4-DH	13.8	15.5	110	15RDB4-VM	15RDB4-UM	RDB4-VL	RDB4-UL	15RDB4-SHNT
	Dropout	15RDB4-DH	13.8	15.5	150	15RDB4-HVM	15RDB4-HUM	RDB4-VL	RDB4-UL	15RDB4-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 15RBA4 Expulsion Fuse Refill Units Used in 15RBA8/15RDB4 Fuseholders—  
15.5 kV Maximum (14.4 kV Nominal) 800A**

**RBA/RBT Refill Units**

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	15RBA4-250E	9	2	15RBT4-250E	12	①
540E	2	15RBA4-300E	9	2	15RBT4-300E	12	①
720E	2	15RBA4-400E	9	2	15RBT4-400E	12	①

**Type RBA Expulsion Fuses for Use Outdoors—  
15.5 kV Maximum (14.4 kV Nominal) 800A (For Use with 15RBA8 Fuseholders) ②**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
450E–720E	Non-disconnect	15RBA8-NH	15RBA8-INH	13.8	15.5	95	14RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	15RBA4-SHNT
	Non-disconnect	15RBA8-NH	15RBA8-INH	13.8	15.5	110	15RBA8-PNM	14RBA8-GNM	15RBA8-NL	RBA4-FLTR ③	15RBA4-SHNT

**Type RDB Expulsion Fuses for Use Outdoors—15.5 kV Maximum (14.4 kV Nominal) 800A ④**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
450E–720E	Disconnect	15RDB4-NH		13.8	15.5	110	15RDB8-VM	15RDB8-UM	RDB8-VL	RDB8-UL	15RDB4-SHNT
	Disconnect	15RDB4-NH		13.8	15.5	150	15RDB8-HVM	15RDB8-HUM	RDB8-VL	RDB8-UL	15RDB4-SHNT

**Notes**

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 15 kV fuse, order two pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 25RBA2 Expulsion Fuse Refill Units—25.5 kV Maximum (23.0 kV Nominal) 200A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	25RBA2-10E	1, 2	—	—	1.3 (0.6)
15E	25RBA2-15E	1, 2	—	—	1.3 (0.6)
20E	25RBA2-20E	1, 2	25RBT2-20E	3, 4	1.3 (0.6)
25E	25RBA2-25E	1, 2	25RBT2-25E	3, 4	1.3 (0.6)
30E	25RBA2-30E	1, 2	25RBT2-30E	3, 4	1.3 (0.6)
40E	25RBA2-40E	1, 2	25RBT2-40E	3, 4	1.3 (0.6)
50E	25RBA2-50E	1, 2	25RBT2-50E	3, 4	1.3 (0.6)
65E	25RBA2-65E	1, 2	25RBT2-65E	3, 4	1.3 (0.6)
80E	25RBA2-80E	1, 2	25RBT2-80E	3, 4	1.3 (0.6)
100E	25RBA2-100E	1, 2	25RBT2-100E	3, 4	1.3 (0.6)
125E	25RBA2-125E	1, 2	25RBT2-125E	3, 4	1.3 (0.6)
150E	25RBA2-150E	1, 2	25RBT2-150E	3, 4	1.3 (0.6)
200E	25RBA2-200E	1, 2	25RBT2-200E	3, 4	1.3 (0.6)

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—25.5 kV Maximum (23.0 kV Nominal) 200A (For Use with 25RBA2 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
10E–200E	Non-disconnect	25RBA2-NH	25RBA2-INH	23.0	25.5	150	25RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Non-disconnect	25RBA2-NH	25RBA2-INH	23.0	25.5	150	25RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Disconnect	25RBA2-DH	25RBA2-IDH	23.0	25.5	150	25RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Disconnect	25RBA2-DH	25RBA2-IDH	23.0	25.5	150	25RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	25RBA2-SHNT
	Bolt-in	—	25RBA2-INH-B	23.0	25.5	150	25RBA8-PNM	24RBA8-GNM	38RBA8-NL	RBA2-FLTR RBA2-COND	25RBA2-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors—25.5 kV Maximum (23.0 kV Nominal) 200A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
10E–200E	Dropout	25RDB2-DH	23.0	25.5	150	25RDB2-VM	25RDB2-UM	RDB2-VL	RDB2-UL	25RDB2-SHNT
	Dropout	25RDB2-DH	23.0	25.5	200	25RDB2-HVM	25RDB2-HUM	RDB2-VL	RDB2-UL	25RDB2-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 25RBA4 Expulsion Fuse Refill Units—25.5 kV Maximum (23.0 kV Nominal) 400A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	25RBA4-.5	5, 6	—	—	2.7 (1.2)
3	25RBA4-3	5, 6	—	—	2.7 (1.2)
5E	25RBA4-5E	5, 6	—	—	2.7 (1.2)
7E	25RBA4-7E	5, 6	—	—	2.7 (1.2)
10E	25RBA4-10E	5, 6	—	—	2.7 (1.2)
15E	25RBA4-15E	5, 6	—	—	2.7 (1.2)
20E	25RBA4-20E	5, 6	25RBT4-20E	7, 8	2.7 (1.2)
25E	25RBA4-25E	5, 6	25RBT4-25E	7, 8	2.7 (1.2)
30E	25RBA4-30E	5, 6	25RBT4-30E	7, 8	2.7 (1.2)
40E	25RBA4-40E	5, 6	25RBT4-40E	7, 8	2.7 (1.2)
50E	25RBA4-50E	5, 6	25RBT4-50E	7, 8	2.7 (1.2)
65E	25RBA4-65E	5, 6	25RBT4-65E	7, 8	2.7 (1.2)
80E	25RBA4-80E	5, 6	25RBT4-80E	7, 8	2.7 (1.2)
100E	25RBA4-100E	5, 6	25RBT4-100E	7, 8	2.7 (1.2)
125E	25RBA4-125E	5, 6	25RBT4-125E	7, 8	2.7 (1.2)
150E	25RBA4-150E	5, 6	25RBT4-150E	7, 8	2.7 (1.2)
200E	25RBA4-200E	5, 6	25RBT4-200E	7, 8	2.7 (1.2)
250E	25RBA4-250E	5, 6	25RBT4-250E	10, 11	2.7 (1.2)
300E	25RBA4-300E	5, 6	25RBT4-300E	10, 11	2.7 (1.2)

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—25.5 kV Maximum (23.0 kV Nominal) 400A (For Use with 25RBA4 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
0.5–300E	Non-disconnect	25RBA4-NH	25RBA4-INH	23.0	25.5	150	25RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Non-disconnect	25RBA4-NH	25RBA4-INH	23.0	25.5	150	25RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Disconnect	25RBA4-DH	25RBA4-IDH	23.0	25.5	150	25RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Disconnect	25RBA4-DH	25RBA4-IDH	23.0	25.5	150	25RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	25RBA4-SHNT
	Bolt-in	—	25RBA4-INH-B	23.0	25.5	150	25RBA8-PNM	25RBA8-GNM	38RBA8-NL	RBA4-FLTR RBA4-COND	25RBA4-SHNT

**Type RDB Expulsion Fuses for Use Outdoors—25.5 kV Maximum (23.0 kV Nominal) 400A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
0.5–300E	Dropout	25RDB4-DH	23.0	25.5	150	25RDB4-VM	25RDB4-UM	RDB4-VL	RDB4-UL	25RDB4-SHNT
	Dropout	25RDB4-DH	23.0	25.5	200	25RDB4-HVM	25RDB4-HUM	RDB4-VL	RDB4-UL	25RDB4-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

3

#### Type 25RBA4 Expulsion Fuse Refill Units Used in 25RBA8/15RDB4 Fuseholders— 25.5 kV Maximum (23.0 kV Nominal) 800A

##### RBA/RBT Refill Units

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	25RBA4-250E	9	2	25RBT4-250E	12	①
540E	2	25RBA4-300E	9	2	25RBT4-300E	12	①

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure— 25.5 kV Maximum (23.0 kV Nominal) 800A (For Use with 25RBA8 Fuseholders) ②

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
450E–540E	Non-disconnect	25RBA8-NH	25RBA8-INH	23.0	25.5	150	25RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	25RBA4-SHNT
	Non-disconnect	25RBA8-NH	25RBA8-INH	23.0	25.5	150	25RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	25RBA4-SHNT

#### Type RDB Expulsion Fuses for Use Outdoors—25.5 kV Maximum (23.0 kV Nominal) 800A ④

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
		Catalog Number		Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
450E–540E	Disconnect	25RDB4-NH		23.0	25.5	150	25RDB8-VM	25RDB8-UM	RDB8-VL	RDB8-UL	25RDB4-SHNT
	Disconnect	25RDB4-NH		23.0	25.5	200	25RDB8-HVM	25RDB8-HUM	RDB8-VL	RDB8-UL	25RDB4-SHNT

##### Notes

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 25 kV fuse, order two pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 38RBA2 Expulsion Fuse Refill Units—38.0 kV Maximum (34.5 kV Nominal) 200A**

**RBA/RBT Refill Units**

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
10E	38RBA2-10E	1, 2	—	—	1.4 (0.6)
15E	38RBA2-15E	1, 2	—	—	1.4 (0.6)
20E	38RBA2-20E	1, 2	38RBT2-20E	3, 4	1.4 (0.6)
25E	38RBA2-25E	1, 2	38RBT2-25E	3, 4	1.4 (0.6)
30E	38RBA2-30E	1, 2	38RBT2-30E	3, 4	1.4 (0.6)
40E	38RBA2-40E	1, 2	38RBT2-40E	3, 4	1.4 (0.6)
50E	38RBA2-50E	1, 2	38RBT2-50E	3, 4	1.4 (0.6)
65E	38RBA2-65E	1, 2	38RBT2-65E	3, 4	1.4 (0.6)
80E	38RBA2-80E	1, 2	38RBT2-80E	3, 4	1.4 (0.6)
100E	38RBA2-100E	1, 2	38RBT2-100E	3, 4	1.4 (0.6)
125E	38RBA2-125E	1, 2	38RBT2-125E	3, 4	1.4 (0.6)
150E	38RBA2-150E	1, 2	38RBT2-150E	3, 4	1.4 (0.6)
200E	38RBA2-200E	1, 2	38RBT2-200E	3, 4	1.4 (0.6)

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 200A (For Use with 38RBA2 Fuseholders) ①**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
10E–200E	Non-disconnect	38RBA2-NH	38RBA2-INH	34.5	38.0	150	38RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Non-disconnect	38RBA2-NH	38RBA2-INH	34.5	38.0	150	38RBA2-PNM	—	38RBA2-NL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Disconnect	38RBA2-DH	38RBA2-IDH	34.5	38.0	150	38RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Disconnect	38RBA2-DH	38RBA2-IDH	34.5	38.0	150	38RBA2-PDM	—	38RBA2-DL	RBA2-FLTR RBA2-COND	38RBA2-SHNT
	Bolt-in	—	38RBA2-INH-B	34.5	38.0	150	38RBA8-PNM	38RBA8-GNM	38RBA8-NL	RBA2-FLTR RBA2-COND	38RBA2-SHNT

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 200A ②**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.
			Nominal	Maximum		Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number		
10E–200E	Dropout	38RDB2-DH	34.5	38.0	200	38RDB2-VM	38RDB2-UM	RDB2-VL	RDB2-UL 38RDB2-SHNT
	Dropout	38RDB2-DH	34.5	38.0	250	38RDB2-HVM	38RDB2-HUM	RDB2-VL	RDB2-UL 38RDB2-SHNT

**Notes**

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.



# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### Type 38RBA4 Expulsion Fuse Refill Units—38.0 kV Maximum (34.5 kV Nominal) 400A

##### RBA/RBT Refill Units

Ampere Rating	Standard Speed (Fuse Refills)		Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
	Catalog Number	Curve Reference 36-635	Catalog Number	Curve Reference 36-635	
0.5	38RBA4-5	5, 6	—	—	3.1 (1.4)
3	38RBA4-3	5, 6	—	—	3.1 (1.4)
5E	38RBA4-5E	5, 6	—	—	3.1 (1.4)
7E	38RBA4-7E	5, 6	—	—	3.1 (1.4)
10E	38RBA4-10E	5, 6	—	—	3.1 (1.4)
15E	38RBA4-15E	5, 6	—	—	3.1 (1.4)
20E	38RBA4-20E	5, 6	38RBT4-20E	7, 8	3.1 (1.4)
25E	38RBA4-25E	5, 6	38RBT4-25E	7, 8	3.1 (1.4)
30E	38RBA4-30E	5, 6	38RBT4-30E	7, 8	3.1 (1.4)
40E	38RBA4-40E	5, 6	38RBT4-40E	7, 8	3.1 (1.4)
50E	38RBA4-50E	5, 6	38RBT4-50E	7, 8	3.1 (1.4)
65E	38RBA4-65E	5, 6	38RBT4-65E	7, 8	3.1 (1.4)
80E	38RBA4-80E	5, 6	38RBT4-80E	7, 8	3.1 (1.4)
100E	38RBA4-100E	5, 6	38RBT4-100E	7, 8	3.1 (1.4)
125E	38RBA4-125E	5, 6	38RBT4-125E	7, 8	3.1 (1.4)
150E	38RBA4-150E	5, 6	38RBT4-150E	7, 8	3.1 (1.4)
200E	38RBA4-200E	5, 6	38RBT4-200E	7, 8	3.1 (1.4)
250E	38RBA4-250E	5, 6	38RBT4-250E	10, 11	3.1 (1.4)
300E	38RBA4-300E	5, 6	38RBT4-300E	(0, 11)	3.1 (1.4)

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 400A (For Use with 38RBA4 Fuseholders) ①

##### RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Indoor or Enclosure Applications)

Ampere Rating	Style	Fuseholder		Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum		Porcelain Insulator	Glass Polyester			
0.5–300E	Non-disconnect	38RBA4-NH	38RBA4-INH	34.5	38.0	150	38RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	38RBA4-SHNT
	Non-disconnect	38RBA4-NH	38RBA4-INH	34.5	38.0	150	38RBA4-PNM	—	38RBA4-NL	RBA4-FLTR RBA4-COND	38RBA4-SHNT
	Disconnect	38RBA4-DH	38RBA2-IDH	34.5	38.0	150	38RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	38RBA4-SHNT
	Disconnect	38RBA4-DH	38RBA2-IDH	34.5	38.0	150	38RBA4-PDM	—	38RBA4-DL	RBA4-FLTR RBA4-COND	38RBA4-SHNT
	Bolt-in	—	38RBA4-INH-B	34.5	38.0	150	38RBA8-PNM	38RBA8-GNM	38RBA8-NL	RBA4-FLTR RBA4-COND	38RBA4-SHNT

#### Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 400A ②

##### RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/Holders for Outdoor Applications)

Ampere Rating	Style	Fuseholder Catalog Number	Voltage (kV)		LIWL (BIL)	Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.	
			Nominal	Maximum		Vertical (180°) Mounting	Underhung (90°) Mounting			
0.5–300E	Dropout	38RDB4-DH	34.5	38.0	150	38RDB4-VM	38RDB4-UM	RDB4-VL	RDB4-UL	38RDB4-SHNT
	Dropout	38RDB4-DH	34.5	38.0	200	38RDB4-HVM	38RDB4-HUM	RDB4-VL	RDB4-UL	38RDB4-SHNT

##### Notes

- ① For new installation, order one refill (Standard Speed or Time Lag), one fuseholder, one mounting, and one filter or condenser per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ② For new installation, order one refill (Standard Speed or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

**Type 38RBA4 Expulsion Fuse Refill Units Used in 38RBA8/15RDB4 Fuseholders—  
38.0 kV Maximum (34.5 kV Nominal) 800A**

**RBA/RBT Refill Units**

Ampere Rating	Quantity	Standard Speed (Fuse Refills)		Quantity	Time Lag (Fuse Refills)		Approximate Shipping Weight Lbs (kg)
		Catalog Number	Curve Reference 36-635		Catalog Number	Curve Reference 36-635	
450E	2	38RBA4-250E	9	2	38RBT4-250E	12	①
540E	2	38RBA4-300E	9	2	38RBT4-300E	12	①

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—  
38.0 kV Maximum (34.5 kV Nominal) 800A (For Use with 38RBA8 Fuseholders) ②**

**RBA Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Indoor or Enclosure Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Fuse Filters and Condensers	Spring and Shunt Assy.
		Non-Indicating Catalog Number	Indicating Catalog Number	Nominal	Maximum	LIWL (BIL)	Porcelain Insulator Catalog Number	Glass Polyester Catalog Number			
450E–540E	Non-disconnect	38RBA8-NH	38RBA8-INH	34.5	38.0	150	38RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	38RBA4-SHNT
	Non-disconnect	38RBA8-NH	38RBA8-INH	34.5	38.0	150	38RBA8-PNM	—	38RBA8-NL	RBA4-FLTR ③ RBA4-COND ③	38RBA4-SHNT

**Type RBA Expulsion Fuses for Use Indoors or in an Enclosure—38.0 kV Maximum (34.5 kV Nominal) 800A ④**

**RDB Fuseholders, Mountings and Hardware (For Use with RBA/RBT Refills/holders for Outdoor Applications)**

Ampere Rating	Style	Fuseholder		Voltage (kV)			Mounting (Including Live Parts Less Holder)		Live Parts	Spring and Shunt Assy.
		Catalog Number	Nominal	Maximum	LIWL (BIL)	Vertical (180°) Mounting Catalog Number	Underhung (90°) Mounting Catalog Number			
								Catalog Number		
450E–540E	Disconnect	38RDB4-NH	34.5	38.0	150	38RDB8-VM	38RDB8-UM	RDB8-VL	RDB8-UL	38RDB4-SHNT
	Disconnect	38RDB4-NH	34.5	38.0	200	38RDB8-HVM	38RDB8-HUM	RDB8-VL	RDB8-UL	38RDB4-SHNT

**Notes**

- ① Requires two fuse refills as shown. Price each refill individually. Example: To order refill units for a 720E, 38 kV fuse, order 2 pieces of an 8RBA4-400E.
- ② For new installation, order two refills (Standard or Time Lag), one fuseholder, one mounting, and two filters or condensers per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.
- ③ Two filters or condensers required.
- ④ For new installation, order two refills (Standard or Time Lag), one fuseholder and one mounting per phase. Live parts can be substituted for the mounting if the user is supplying base support and insulators.

# 3.4

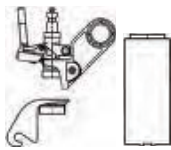
## Power Breakers, Contactors and Fuses

### Expulsion Fuses

#### Type DBU

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##### DBU-EFID



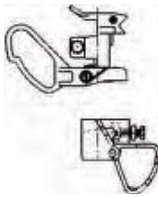
##### DBU17-GNM



##### DBU17-GDM



##### DBU-EFOD



#### Type DBU Expulsion Fuse Units 17.1 kV Maximum, 14.4 kV Nominal

Ampere Rating	Standard Speed			Slow Speed			Ampere Rating	K Speed		
	Catalog Number ①②	Curve Reference 36-643	Curve Reference 36-643	Ampere Rating	Catalog Number ①②	Curve Reference 36-643		Catalog Number ①②	Curve Reference 36-643	Curve Reference 36-643
5E	DBU17-5E	11,14	—	—	—	—	3K	DBU17-3K	12, 15	
7E	DBU17-7E	11,14	—	—	—	—	6K	DBU17-6K	12, 15	
10E	DBU17-10E	11,14	—	—	—	—	8K	DBU17-8K	12, 15	
13E	DBU17-13E	11,14	—	—	—	—	10K	DBU17-10K	12, 15	
15E	DBU17-15E	11,14	15SE	DBU17-15SE	10, 13	—	12K	DBU17-12K	12, 15	
20E	DBU17-20E	11,14	20SE	DBU17-20SE	10, 13	—	15K	DBU17-15K	12, 15	
25E	DBU17-25E	11,14	25SE	DBU17-25SE	10, 13	—	20K	DBU17-20K	12, 15	
30E	DBU17-30E	11,14	30SE	DBU17-30SE	10, 13	—	25K	DBU17-25K	12, 15	
40E	DBU17-40E	11,14	40SE	DBU17-40SE	10, 13	—	30K	DBU17-30K	12, 15	
50E	DBU17-50E	11,14	50SE	DBU17-50SE	10, 13	—	40K	DBU17-40K	12, 15	
65E	DBU17-65E	11,14	65SE	DBU17-65SE	10, 13	—	50K	DBU17-50K	12, 15	
80E	DBU17-80E	11,14	80SE	DBU17-80SE	10, 13	—	65K	DBU17-65K	12, 15	
100E	DBU17-100E	11,14	100SE	DBU17-100SE	10, 13	—	80K	DBU17-80K	12, 15	
125E	DBU17-125E	11,14	125SE	DBU17-125SE	10, 13	—	100K	DBU17-100K	12, 15	
150E	DBU17-150E	11,14	150SE	DBU17-150SE	10, 13	—	140K	DBU17-140K	12, 15	
175E	DBU17-175E	11,14	175SE	DBU17-175SE	10, 13	—	200K	DBU17-200K	12, 15	
200E	DBU17-200E	11,14	200SE	DBU17-200SE	10, 13	—	—	—	—	

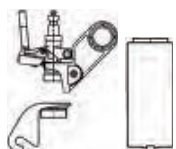
#### Type DBU Expulsion Fuse Mountings 17.1 kV Maximum, 14.4 kV Nominal

Ampere Rating	Style	Style	Voltage (kV)			Mounting	Live Parts	End Fittings	Muffler
			Nominal	Maximum	LIWL (BIL)				
5E–200E, 15SE–200SE, 3K–200K	Indoor	Non loadbreak	13.8	17.1	95	DBU17-GNM ③	DBU17-NL ③	DBU-EFID ④	DBU-MFLR
	Indoor	Loadbreak	13.8	17.1	95	DBU17-GDM ③	DBU17-DL ③	DBU-EFID ④	DBU-MFLR
	Outdoor	Dropout	13.8	17.1	125	DBU-17-DM	—	DBU-EFOD	—

##### Notes

- ① Maximum interrupting rating 14 kA symmetrical.
- ② Approximate shipping weight 2.1 lb (0.95 kg).
- ③ To complete the mounting catalog number, specify -R for right side cable terminator or -L for left side cable terminator.
- ④ End fittings DBU-EFID include a muffler.

**DBU-EFID**



**Type DBU Expulsion Fuse Units 27.0 kV Maximum, 25 kV Nominal**

Ampere Rating	Standard Speed			Slow Speed			K Speed		
	Catalog Number ①②	Curve Reference 36-643	Ampere Rating	Catalog Number ①②	Curve Reference 36-643	Ampere Rating	Catalog Number ①②	Curve Reference 36-643	
5E	DBU27-5E	11,17	—	—	—	3K	DBU27-3K	12, 18	
7E	DBU27-7E	11,17	—	—	—	6K	DBU27-6K	12, 18	
10E	DBU27-10E	11,17	—	—	—	8K	DBU27-8K	12, 18	
13E	DBU27-13E	11,17	—	—	—	10K	DBU27-10K	12, 18	
15E	DBU27-15E	11,17	15SE	DBU27-15SE	10, 16	12K	DBU27-12K	12, 18	
20E	DBU27-20E	11,17	20SE	DBU27-20SE	10, 16	15K	DBU27-15K	12, 18	
25E	DBU27-25E	11,17	25SE	DBU27-25SE	10, 16	20K	DBU27-20K	12, 18	
30E	DBU27-30E	11,17	30SE	DBU27-30SE	10, 16	25K	DBU27-25K	12, 18	
40E	DBU27-40E	11,17	40SE	DBU27-40SE	10, 16	30K	DBU27-30K	12, 18	
50E	DBU27-50E	11,17	50SE	DBU27-50SE	10, 16	40K	DBU27-40K	12, 18	
65E	DBU27-65E	11,17	65SE	DBU27-65SE	10, 16	50K	DBU27-50K	12, 18	
80E	DBU27-80E	11,17	80SE	DBU27-80SE	10, 16	65K	DBU27-65K	12, 18	
100E	DBU27-100E	11,17	100SE	DBU27-100SE	10, 16	80K	DBU27-80K	12, 18	
125E	DBU27-125E	11,17	125SE	DBU27-125SE	10, 16	100K	DBU27-100K	12, 18	
150E	DBU27-150E	11,17	150SE	DBU27-150SE	10, 16	140K	DBU27-140K	12, 18	
175E	DBU27-175E	11,17	175SE	DBU27-175SE	10, 16	200K	DBU27-200K	12, 18	
200E	DBU27-200E	11,17	200SE	DBU27-200SE	10, 16	—	—	—	

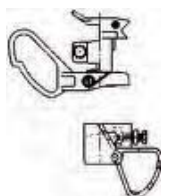
**DBU17-GNM**



**DBU17-GDM**



**DBU-EFOD**



**Type DBU Expulsion Fuse Mountings 27.0 kV Maximum, 25 kV Nominal**

Ampere Rating	Style	Style	Voltage (kV)			Mounting	Live Parts	End Fittings	Muffler
			Nominal	Maximum	LIWL (BIL)				
5E–200E, 15SE–200SE, 3K–200K	Indoor	Non loadbreak	23.5	27.0	110	DBU27-GNM ③	DBU27-NL ③	DBU-EFID ④	DBU-MFLR
	Indoor	Loadbreak	23.5	27.0	110	DBU27-GDM ③	DBU27-DL ③	DBU-EFID ④	DBU-MFLR
	Outdoor	Dropout	23.5	27.0	150	DBU-27-DM	—	DBU-EFOD	—

**Notes**

- ① Maximum interrupting rating 12.5 kA symmetrical.
- ② Approximate shipping weight 2.1 lb (0.95 kg).
- ③ To complete the mounting catalog number, specify -R for right side cale terminator or -L for left side cale terminator.
- ④ End fittings DBU-EFID include a muffler.

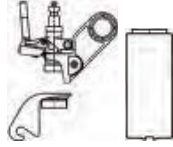
# 3.4

## Power Breakers, Contactors and Fuses

### Expulsion Fuses

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#### DBU-EFID



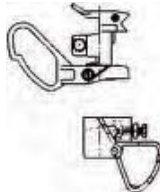
#### DBU17-GNM



#### DBU17-GDM



#### DBU-EFOD



#### Type DBU Expulsion Fuse Units 38.8 kV Maximum, 34.5 kV Nominal

Ampere Rating	Standard Speed			Slow Speed			K Speed		
	Catalog Number <sup>①②</sup>	Curve Reference 36-643	Ampere Rating	Catalog Number <sup>②</sup>	Curve Reference 36-643	Ampere Rating	Catalog Number <sup>①②</sup>	Curve Reference 36-643	
5E	DBU38-5E	11,17	—	—	—	3K	DBU38-3K	12, 18	
7E	DBU38-7E	11,17	—	—	—	6K	DBU38-6K	12, 18	
10E	DBU38-10E	11,17	—	—	—	8K	DBU38-8K	12, 18	
13E	DBU38-13E	11,17	—	—	—	10K	DBU38-10K	12, 18	
15E	DBU38-15E	11,17	15SE	DBU38-15SE	10, 16	12K	DBU38-12K	12, 18	
20E	DBU38-20E	11,17	20SE	DBU38-20SE	10, 16	15K	DBU38-15K	12, 18	
25E	DBU38-25E	11,17	25SE	DBU38-25SE	10, 16	20K	DBU38-20K	12, 18	
30E	DBU38-30E	11,17	30SE	DBU38-30SE	10, 16	25K	DBU38-25K	12, 18	
40E	DBU38-40E	11,17	40SE	DBU38-40SE	10, 16	30K	DBU38-30K	12, 18	
50E	DBU38-50E	11,17	50SE	DBU38-50SE	10, 16	40K	DBU38-40K	12, 18	
65E	DBU38-65E	11,17	65SE	DBU38-65SE	10, 16	50K	DBU38-50K	12, 18	
80E	DBU38-80E	11,17	80SE	DBU38-80SE	10, 16	65K	DBU38-65K	12, 18	
100E	DBU38-100E	11,17	100SE	DBU38-100SE	10, 16	80K	DBU38-80K	12, 18	
125E	DBU38-125E	11,17	125SE	DBU38-125SE	10, 16	100K	DBU38-100K	12, 18	
150E	DBU38-150E	11,17	150SE	DBU38-150SE	10, 16	140K	DBU38-140K	12, 18	
175E	DBU38-175E	11,17	175SE	DBU38-175SE	10, 16	200K	DBU38-200K	12, 18	
200E	DBU38-200E	11,17	200SE	DBU38-200SE	10, 16	—	—	—	

#### Type DBU Expulsion Fuse Mountings 38.0 kV Maximum, 34.5 kV Nominal

Ampere Rating	Style	Style	Voltage (kV)			Mounting	Live Parts	End Fittings	Muffler
			Nominal	Maximum	LIWL (BIL)				
5E–200E, 15SE–200SE, 3K–200K	Indoor	Non loadbreak	34.5	38	150	DBU38-GNM <sup>③</sup>	DBU38-NL <sup>③</sup>	DBU-EFID <sup>④</sup>	DBU-MFLR

#### Notes

- ① Maximum interrupting rating 10 kA symmetrical (outdoor dropout, 8.5 kA indoor with muffler).
- ② Approximate shipping weight 2.1 lb (0.95 kg).
- ③ To complete the mounting catalog number, specify -R for right side cale terminator or -L for left side cale terminator.
- ④ End fittings DBU-EFID includes a muffler.

Technical Data and Specifications

Type DBA

Type DBA Expulsion Fuses for Use Indoors or Outdoors

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-1 Fuse Refills</b>			
<b>8.3 kV Maximum (7.2 kV Nominal)</b>			
0.5	8DBA1-5	10, 11	1.5 (0.7)
3	8DBA1-3	10, 11	1.5 (0.7)
5E	8DBA1-5E	10, 11	1.5 (0.7)
7E	8DBA1-7E	10, 11	1.5 (0.7)
10E	8DBA1-10E	10, 11	1.5 (0.7)
15E	8DBA1-15E	10, 11	1.5 (0.7)
20E	8DBA1-20E	10, 11	1.5 (0.7)
25E	8DBA1-25E	10, 11	1.5 (0.7)
30E	8DBA1-30E	10, 11	1.5 (0.7)
40E	8DBA1-40E	10, 11	1.5 (0.7)
50E	8DBA1-50E	10, 11	1.5 (0.7)
65E	8DBA1-65E	10, 11	1.5 (0.7)
80E	8DBA1-80E	10, 11	1.5 (0.7)
100E	8DBA1-100E	10, 11	1.5 (0.7)
125E	8DBA1-125E	10, 11	1.5 (0.7)
150E	8DBA1-150E	10, 11	1.5 (0.7)
200E	8DBA1-200E	10, 11	1.5 (0.7)
<b>15.5 kV Maximum (14.4 kV Nominal)</b>			
0.5	15DBA1-5	10, 11	2.1 (0.95)
3	15DBA1-3	10, 11	2.1 (0.95)
5E	15DBA1-5E	10, 11	2.1 (0.95)
7E	15DBA1-7E	10, 11	2.1 (0.95)
10E	15DBA1-10E	10, 11	2.1 (0.95)
15E	15DBA1-15E	10, 11	2.1 (0.95)
20E	15DBA1-20E	10, 11	2.1 (0.95)
25E	15DBA1-25E	10, 11	2.1 (0.95)
30E	15DBA1-30E	10, 11	2.1 (0.95)
40E	15DBA1-40E	10, 11	2.1 (0.95)
50E	15DBA1-50E	10, 11	2.1 (0.95)
65E	15DBA1-65E	10, 11	2.1 (0.95)
80E	15DBA1-80E	10, 11	2.1 (0.95)
100E	15DBA1-100E	10, 11	2.1 (0.95)
125E	15DBA1-125E	10, 11	2.1 (0.95)
150E	15DBA1-150E	10, 11	2.1 (0.95)
200E	15DBA1-200E	10, 11	2.1 (0.95)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>25 kV Maximum (23 kV Nominal)</b>			
0.5	25DBA1-5	10, 11	3.1 (1.4)
3	25DBA1-3	10, 11	3.1 (1.4)
5E	25DBA1-5E	10, 11	3.1 (1.4)
7E	25DBA1-7E	10, 11	3.1 (1.4)
10E	25DBA1-10E	10, 11	3.1 (1.4)
15E	25DBA1-15E	10, 11	3.1 (1.4)
20E	25DBA1-20E	10, 11	3.1 (1.4)
25E	25DBA1-25E	10, 11	3.1 (1.4)
30E	25DBA1-30E	10, 11	3.1 (1.4)
40E	25DBA1-40E	10, 11	3.1 (1.4)
50E	25DBA1-50E	10, 11	3.1 (1.4)
65E	25DBA1-65E	10, 11	3.1 (1.4)
80E	25DBA1-80E	10, 11	3.1 (1.4)
100E	25DBA1-100E	10, 11	3.1 (1.4)
125E	25DBA1-125E	10, 11	3.1 (1.4)
150E	25DBA1-150E	10, 11	3.1 (1.4)
200E	25DBA1-200E	10, 11	3.1 (1.4)

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## Power Breakers, Contactors and Fuses

### Expulsion Fuses

#### Type DBA Expulsion Fuses for Use Indoors or Outdoors, continued

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Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-1 Fuse Refills</b>			
<b>38 kV Maximum (34.5 kV Nominal)</b>			
0.5	<b>38DBA1-5</b>	10, 12	4.2 (1.9)
3	<b>38DBA1-3</b>	10, 12	4.2 (1.9)
5E	<b>38DBA1-5E</b>	10, 12	4.2 (1.9)
7E	<b>38DBA1-7E</b>	10, 12	4.2 (1.9)
10E	<b>38DBA1-10E</b>	10, 12	4.2 (1.9)
15E	<b>38DBA1-15E</b>	10, 12	4.2 (1.9)
20E	<b>38DBA1-20E</b>	10, 12	4.2 (1.9)
25E	<b>38DBA1-25E</b>	10, 12	4.2 (1.9)
30E	<b>38DBA1-30E</b>	10, 12	4.2 (1.9)
40E	<b>38DBA1-40E</b>	10, 12	4.2 (1.9)
50E	<b>38DBA1-50E</b>	10, 12	4.2 (1.9)
65E	<b>38DBA1-65E</b>	10, 12	4.2 (1.9)
80E	<b>38DBA1-80E</b>	10, 12	4.2 (1.9)
100E	<b>38DBA1-100E</b>	10, 12	4.2 (1.9)
125E	<b>38DBA1-125E</b>	10, 12	4.2 (1.9)
150E	<b>38DBA1-150E</b>	10, 12	4.2 (1.9)
200E	<b>38DBA1-200E</b>	10, 12	4.2 (1.9)
<b>48 kV Maximum (46 kV Nominal)</b>			
0.5	<b>48DBA1-5</b>	10, 12	6.5 (3.0)
3	<b>48DBA1-3</b>	10, 12	6.5 (3.0)
5E	<b>48DBA1-5E</b>	10, 12	6.5 (3.0)
7E	<b>48DBA1-7E</b>	10, 12	6.5 (3.0)
10E	<b>48DBA1-10E</b>	10, 12	6.5 (3.0)
15E	<b>48DBA1-15E</b>	10, 12	6.5 (3.0)
20E	<b>48DBA1-20E</b>	10, 12	6.5 (3.0)
25E	<b>48DBA1-25E</b>	10, 12	6.5 (3.0)
30E	<b>48DBA1-30E</b>	10, 12	6.5 (3.0)
40E	<b>48DBA1-40E</b>	10, 12	6.5 (3.0)
50E	<b>48DBA1-50E</b>	10, 12	6.5 (3.0)
65E	<b>48DBA1-65E</b>	10, 12	6.5 (3.0)
80E	<b>48DBA1-80E</b>	10, 12	6.5 (3.0)
100E	<b>48DBA1-100E</b>	10, 12	6.5 (3.0)
125E	<b>48DBA1-125E</b>	10, 12	6.5 (3.0)
150E	<b>48DBA1-150E</b>	10, 12	6.5 (3.0)
200E	<b>48DBA1-200E</b>	10, 12	6.5 (3.0)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>72 kV Maximum (69 kV Nominal)</b>			
0.5	<b>72DBA1-5</b>	10, 12	7.1 (3.2)
3	<b>72DBA1-3</b>	10, 12	7.1 (3.2)
5E	<b>72DBA1-5E</b>	10, 12	7.1 (3.2)
7E	<b>72DBA1-7E</b>	10, 12	7.1 (3.2)
10E	<b>72DBA1-10E</b>	10, 12	7.1 (3.2)
15E	<b>72DBA1-15E</b>	10, 12	7.1 (3.2)
20E	<b>72DBA1-20E</b>	10, 12	7.1 (3.2)
25E	<b>72DBA1-25E</b>	10, 12	7.1 (3.2)
30E	<b>72DBA1-30E</b>	10, 12	7.1 (3.2)
40E	<b>72DBA1-40E</b>	10, 12	7.1 (3.2)
50E	<b>72DBA1-50E</b>	10, 12	7.1 (3.2)
65E	<b>72DBA1-65E</b>	10, 12	7.1 (3.2)
80E	<b>72DBA1-80E</b>	10, 12	7.1 (3.2)
100E	<b>72DBA1-100E</b>	10, 12	7.1 (3.2)
125E	<b>72DBA1-125E</b>	10, 12	7.1 (3.2)
150E	<b>72DBA1-150E</b>	10, 12	7.1 (3.2)
200E	<b>72DBA1-200E</b>	10, 12	7.1 (3.2)

Type DBA Expulsion Fuses for Use Indoors or Outdoors, continued

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-2 Fuse Refills 38 kV Maximum (34.5 kV Nominal)</b>			
0.5	38DBA2-.5	10, 12	10 (4.5)
3	38DBA2-3	10, 12	10 (4.5)
5E	38DBA2-5E	10, 12	10 (4.5)
7E	38DBA2-7E	10, 12	10 (4.5)
10E	38DBA2-10E	10, 12	10 (4.5)
15E	38DBA2-15E	10, 12	10 (4.5)
20E	38DBA2-20E	10, 12	10 (4.5)
25E	38DBA2-25E	10, 12	10 (4.5)
30E	38DBA2-30E	10, 12	10 (4.5)
40E	38DBA2-40E	10, 12	10 (4.5)
50E	38DBA2-50E	10, 12	10 (4.5)
65E	38DBA2-65E	10, 12	10 (4.5)
80E	38DBA2-80E	10, 12	10 (4.5)
100E	38DBA2-100E	10, 12	10 (4.5)
125E	38DBA2-125E	10, 12	10 (4.5)
150E	38DBA2-150E	10, 12	10 (4.5)
200E	38DBA2-200E	10, 12	10 (4.5)
<b>48 kV Maximum (46 kV Nominal)</b>			
0.5	48DBA2-.5	10, 12	12 (5.4)
3	48DBA2-3	10, 12	12 (5.4)
5E	48DBA2-5E	10, 12	12 (5.4)
7E	48DBA2-7E	10, 12	12 (5.4)
10E	48DBA2-10E	10, 12	12 (5.4)
15E	48DBA2-15E	10, 12	12 (5.4)
20E	48DBA2-20E	10, 12	12 (5.4)
25E	48DBA2-25E	10, 12	12 (5.4)
30E	48DBA2-30E	10, 12	12 (5.4)
40E	48DBA2-40E	10, 12	12 (5.4)
50E	48DBA2-50E	10, 12	12 (5.4)
65E	48DBA2-65E	10, 12	12 (5.4)
80E	48DBA2-80E	10, 12	12 (5.4)
100E	48DBA2-100E	10, 12	12 (5.4)
125E	48DBA2-125E	10, 12	12 (5.4)
150E	48DBA2-150E	10, 12	12 (5.4)
200E	48DBA2-200E	10, 12	12 (5.4)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>72 kV Maximum (69 kV Nominal)</b>			
0.5	72DBA2-.5	10, 12	15 (6.8)
3	72DBA2-3	10, 12	15 (6.8)
5E	72DBA2-5E	10, 12	15 (6.8)
7E	72DBA2-7E	10, 12	15 (6.8)
10E	72DBA2-10E	10, 12	15 (6.8)
15E	72DBA2-15E	10, 12	15 (6.8)
20E	72DBA2-20E	10, 12	15 (6.8)
25E	72DBA2-25E	10, 12	15 (6.8)
30E	72DBA2-30E	10, 12	15 (6.8)
40E	72DBA2-40E	10, 12	15 (6.8)
50E	72DBA2-50E	10, 12	15 (6.8)
65E	72DBA2-65E	10, 12	15 (6.8)
80E	72DBA2-80E	10, 12	15 (6.8)
100E	72DBA2-100E	10, 12	15 (6.8)
125E	72DBA2-125E	10, 12	15 (6.8)
150E	72DBA2-150E	10, 12	15 (6.8)
200E	72DBA2-200E	10, 12	15 (6.8)



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## Power Breakers, Contactors and Fuses

### Expulsion Fuses

#### Type DBA Expulsion Fuses for Use Indoors or Outdoors, continued

3

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>Type DBA-2 Fuse Refills</b>			
<b>92 kV Maximum (92 kV Nominal)</b>			
3	92DBA2-3	10, 13	19 (8.6)
5E	92DBA2-5E	10, 13	19 (8.6)
7E	92DBA2-7E	10, 13	19 (8.6)
10E	92DBA2-10E	10, 13	19 (8.6)
15E	92DBA2-15E	10, 13	19 (8.6)
20E	92DBA2-20E	10, 13	19 (8.6)
25E	92DBA2-25E	10, 13	19 (8.6)
30E	92DBA2-30E	10, 13	19 (8.6)
40E	92DBA2-40E	10, 13	19 (8.6)
50E	92DBA2-50E	10, 13	19 (8.6)
65E	92DBA2-65E	10, 13	19 (8.6)
80E	92DBA2-80E	10, 13	19 (8.6)
100E	92DBA2-100E	10, 13	19 (8.6)
125E	92DBA2-125E	10, 13	19 (8.6)
150E	92DBA2-150E	10, 13	19 (8.6)
200E	92DBA2-200E	10, 13	19 (8.6)
<b>121 kV Maximum (115 kV Nominal)</b>			
3	121DBA2-3	10, 13	22 (10)
5E	121DBA2-5E	10, 13	22 (10)
7E	121DBA2-7E	10, 13	22 (10)
10E	121DBA2-10E	10, 13	22 (10)
15E	121DBA2-15E	10, 13	22 (10)
20E	121DBA2-20E	10, 13	22 (10)
25E	121DBA2-25E	10, 13	22 (10)
30E	121DBA2-30E	10, 13	22 (10)
40E	121DBA2-40E	10, 13	22 (10)
50E	121DBA2-50E	10, 13	22 (10)
65E	121DBA2-65E	10, 13	22 (10)
80E	121DBA2-80E	10, 13	22 (10)
100E	121DBA2-100E	10, 13	22 (10)
125E	121DBA2-125E	10, 13	22 (10)
150E	121DBA2-150E	10, 13	22 (10)
200E	121DBA2-200E	10, 13	22 (10)

Ampere Rating	DBA-1 Fuse Units Catalog Number	Curve Reference 36-623	Approximate Shipping Weight Lbs (kg)
<b>145 kV Maximum (138 kV Nominal)</b>			
3	145DBA2-3	10, 13	25 (11.4)
5E	145DBA2-5E	10, 13	25 (11.4)
7E	145DBA2-7E	10, 13	25 (11.4)
10E	145DBA2-10E	10, 13	25 (11.4)
15E	145DBA2-15E	10, 13	25 (11.4)
20E	145DBA2-20E	10, 13	25 (11.4)
25E	145DBA2-25E	10, 13	25 (11.4)
30E	145DBA2-30E	10, 13	25 (11.4)
40E	145DBA2-40E	10, 13	25 (11.4)
50E	145DBA2-50E	10, 13	25 (11.4)
65E	145DBA2-65E	10, 13	25 (11.4)
80E	145DBA2-80E	10, 13	25 (11.4)
100E	145DBA2-100E	10, 13	25 (11.4)
125E	145DBA2-125E	10, 13	25 (11.4)
150E	145DBA2-150E	10, 13	25 (11.4)
200E	145DBA2-200E	10, 13	25 (11.4)

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Type HCL . . . . .	<b>V4-T3-126</b>
Type CLS . . . . .	<b>V4-T3-128</b>
Type CLPT . . . . .	<b>V4-T3-133</b>
Type CX . . . . .	<b>V4-T3-138</b>
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Type CXF . . . . .	<b>V4-T3-143</b>
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**Catalog Number Selection**

**Easy to Use, Easy to Order!**

Eaton’s fuse catalog numbering system makes it easy to order the right fuse. The catalog numbers are easy to remember, unique to each fuse, and are broken down in three descriptive segments: Fuse type, voltage rating and current rating.

These catalog numbers can be entered directly and easily:

- No change in order processing will occur if you use either a style number or its corresponding catalog number. You will get the same fuse

**Examples:**

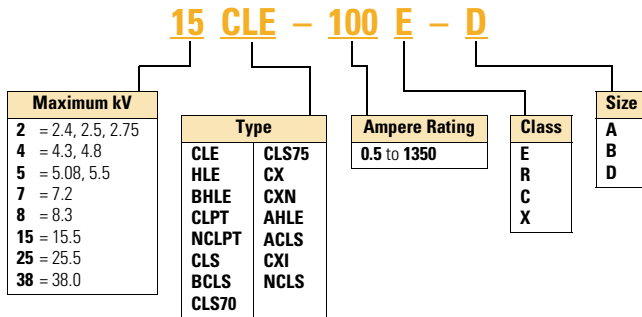
**5CLE-30E**—5.5 max. kV, CLE fuse unit, 30E amperes

**15CXN-45C**—15.5 max. kV, CXN fuse unit, 45C amperes

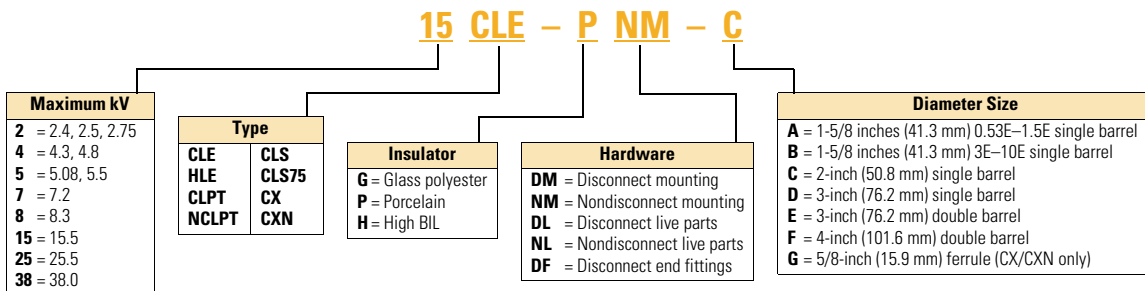
**5CLS-GDM-E**—5.5 max. kV, CLS fuse unit, glass polyester nondisconnect mounting

**CLE-DL-D**—CLE, disconnect live parts Size D

**Current Limiting Fuses**



**Current Limiting Fuse Accessories**



# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Product Selection

#### Type CLE

3



#### Type CLE Current Limiting Fuses 2.75 kV Maximum (2.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	50	H	Indoor	56353202	56353302	63931702	2CLE-15E
20E	1	50	H	Indoor	56353202	56353302	63931702	2CLE-20E
25E	1	50	H	Indoor	56353202	56353302	63931702	2CLE-25E
10E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-10E
30E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-30E
40E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-40E
50E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-50E
65E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-65E
80E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-80E
100E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-100E
125E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-125E
150E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-150E
200E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-200E
225E	1	50	H	Indoor	53686104	53686204	63931704	2CLE-225E
250E	2	50	H	Indoor	53690002	53690102	63931802	2CLE-250E
300E	2	50	H	Indoor	53690002	53690102	63931802	2CLE-300E
350X	2	50	H	Indoor	53690002	53690102	63931802	2CLE-350X
400X	2	50	H	Indoor	53690002	53690102	63931802	2CLE-400X
450X	2	50	H	Indoor	53690002	53690102	63931802	2CLE-450X

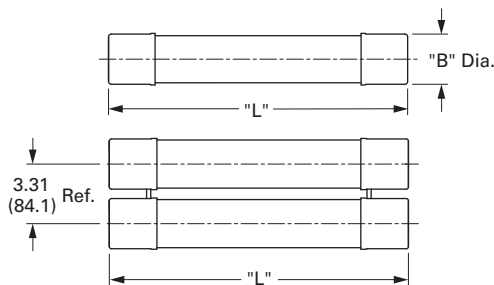
#### Type CLE Mountings and Hardware 2.75 kV Maximum (2.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
15E-25E	Non-disconnect	60	2.00 (50.8)	8.13 (206.5)	9.50 (241.3)	2 (0.91)	2CLE-PNM-C	2CLE-GNM-C	CLE-NL-C	—
	Disconnect	60					2CLE-PDM-C	2CLE-GDM-C	CLE-DL-C	CLE-DF-C
10E-250E	Non-disconnect	60	3.00 (76.2)	7.00 (177.8)	10.90 (276.9)	7 (3.18)	2CLE-PNM-D	2CLE-GNM-D	CLE-NL-D	—
	Disconnect	60					2CLE-PDM-D	2CLE-GDM-D	CLE-DL-D	CLE-DF-D
300E-450E	Non-disconnect	60	3.00 (76.2)	7.00 (177.8)	10.90 (276.9)	15 (6.81)	2CLE-PNM-E	2CLE-GNM-E	CLE-NL-E	—
	Disconnect	60					2CLE-PDM-E	2CLE-GDM-E	CLE-DL-E	CLE-DF-E

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E-25E	9.50 (241.3)	2.00 (50.8)
10E-450E	10.90 (276.9)	3.00 (76.2)

#### Notes

- ① See Page V4-T3-145 for diagram of typical mounting.
- ② End fittings supplied only when required.



Type CLE Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	50	H	Indoor	56353204	56353304	63931702	5CLE-15E
20E	1	50	H	Indoor	56353204	56353304	63931702	5CLE-20E
25E	1	50	H	Indoor	56353204	56353304	63931702	5CLE-25E
10E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-10E-D
15E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-15E-D
20E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-20E-D
25E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-25E-D
30E	1	63	—	Indoor/outdoor	70548501	70548601	70548701	5CLE-30E
40E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-40E
50E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-50E
65E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-65E
80E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-80E
100E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-100E
125E	1	50	—	Indoor/outdoor	70545801	70545901	70546701	5CLE-125E
150E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-150E
175E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-175E
200E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-200E
250E	1	63	—	Indoor/outdoor	70545801	70545901	70547601	5CLE-250E
300E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-300E
350E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-350E
400E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-400E
450E	2	63	—	Indoor/outdoor	70546001	70546101	70547601	5CLE-450E
600E	2	40	—	Indoor	62908902	62908903	62908904	5CLE-600E
750E	2	40	—	Indoor	62908902	62908903	62908904	5CLE-750E
1100E	4	31	—	Indoor	62908902	62908903	62908904	5CLE-1100E
1350E	4	31	—	Indoor	62908902	62908903	62908904	5CLE-1350E

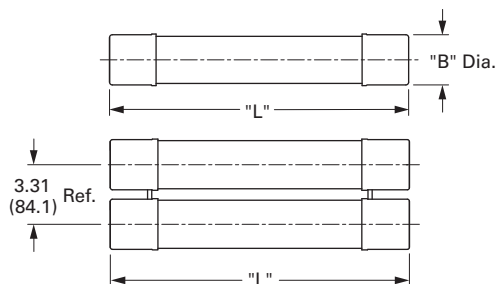
Type CLE Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E-D-25E-D 30E-250E	Non-disconnect	60	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	9 (4.09)	5CLE-PNM-D	5CLE-GNM-D	CLE-NL-D	—
	Disconnect	60					5CLE-PDM-D	5CLE-GDM-D	CLE-DL-D	CLE-DF-D
15E-25E	Non-disconnect	60	2.00 (50.8)	11.50 (292.1)	12.90 (327.7)	3 (1.36)	5CLE-PNM-C	5CLE-GNM-C	CLE-NL-C	—
	Disconnect	60					5CLE-PDM-C	5CLE-GDM-C	CLE-DL-C	CLE-DF-C
300E-450E	Non-disconnect	60	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	19 (8.63)	5CLE-PNM-E	5CLE-GNM-E	CLE-NL-E	—
	Disconnect	60					5CLE-PDM-E	5CLE-GDM-E	CLE-DL-E	CLE-DF-E
600E and 750E	Consult factory	60	4.00 (101.6)	N/A	N/A	40 (18.16)	—	—	—	—
1100E and 1350E	Consult factory	—	4.00 (101.6)	N/A	N/A	80 (36.32)	—	—	—	—

Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E-25E	12.90 (327.7)	2.00 (50.8)
10E-450E	17.90 (454.7)	3.00 (76.2)

Notes

- ① See Page V4-T3-145 for diagram of typical mounting.
- ② End fittings supplied only when required.

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

3



#### Type CLE Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	50	H	Indoor	56353204	56353304	63931703	8CLE-15E
20E	1	50	H	Indoor	56353204	56353304	63931703	8CLE-20E
25E	1	50	H	Indoor	56353204	56353304	63931703	8CLE-25E
10E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-10E-D
15E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-15E-D
20E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-20E-D
25E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-25E-D
30E	1	50	—	Indoor/outdoor	70548501	70548601	70548801	8CLE-30E
40E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-40E
50E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-50E
65E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-65E
80E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-80E
100E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-100E
125E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-125E
150E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-150E
175E	1	50	—	Indoor/outdoor	70546201	70546301	70547301	8CLE-175E
200E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-200E
250E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-250E
300E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-300E
350E	2	50	—	Indoor/outdoor	70546401	70546501	70547301	8CLE-350E

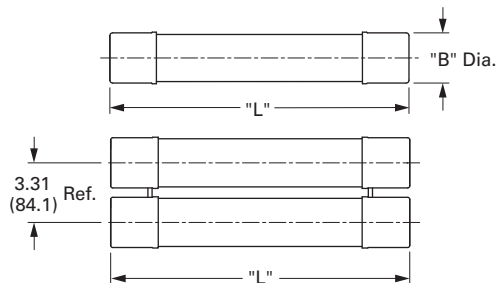
#### Type CLE Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
15E–25E	Non-disconnect	75	2.00 (50.8)	14.00 (355.6)	15.50 (393.7)	3 (1.36)	8CLE-PNM-C	8CLE-GNM-C	CLE-NL-C	—
	Disconnect	75					8CLE-PDM-C	8CLE-GDM-C	CLE-DL-C	CLE-DF-C
10E-D–25E-D 30E–175E	Non-disconnect	75	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	9 (4.09)	8CLE-PNM-D	8CLE-GNM-D	CLE-NL-D	—
	Disconnect	75					8CLE-PDM-D	8CLE-GDM-D	CLE-DL-D	CLE-DF-D
200E–350E	Non-disconnect	75	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	19 (8.63)	8CLE-PNM-E	8CLE-GNM-E	CLE-NL-E	—
	Disconnect	75					8CLE-PDM-E	8CLE-GDM-E	CLE-DL-E	CLE-DF-E

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E–25E	15.50 (393.7)	2.00 (50.8)
10E–350E	17.90 (454.7)	3.00 (76.2)

#### Notes

- ① See Page V4-T3-145 for diagram of typical mounting.
- ② End fittings supplied only when required.



Type CLE Current Limiting Fuses 15.5 kV Maximum (4.8 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Heritage Product	Indoor/Outdoor	Performance Curves			Catalog Number
					Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
15E	1	31.5	H	Indoor	56353204	56353304	63931703	15CLE-15E
20E	1	31.5	H	Indoor	56353204	56353304	63931703	15CLE-20E
25E	1	31.5	H	Indoor	56353204	56353304	63931703	15CLE-25E
10E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-10E-D
15E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-15E-D
20E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-20E-D
25E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-25E-D
30E	1	63	—	Indoor/outdoor	70548501	70548601	70548802	15CLE-30E
40E	1	63	—	Indoor/outdoor	70546801	70546901	70547501	15CLE-40E
50E	1	63	—	Indoor/outdoor	70546801	70546901	70547501	15CLE-50E
65E	1	63	—	Indoor/outdoor	70546801	70546901	70547501	15CLE-65E
80E	1	63	Ⓢ	Indoor/outdoor	70546801	70546901	70547501	15CLE-80E
100E	1	63	Ⓢ	Indoor/outdoor	70546801	70546901	70547501	15CLE-100E
125E	1	63	Ⓢ	Indoor/outdoor	70546801	70546901	70547501	15CLE-125E
150E	1	63	Ⓢ	Indoor/outdoor	70546801	70546901	70547501	15CLE-150E
175E	2	63	Ⓢ	Indoor/outdoor	70547001	70547101	70547501	15CLE-175E
200E	2	63	Ⓢ	Indoor/outdoor	70547001	70547101	70547501	15CLE-200E
250E	2	63	Ⓢ	Indoor/outdoor	70547001	70547101	70547501	15CLE-250E
300E	2	63	Ⓢ	Indoor/outdoor	70547001	70547101	70547501	15CLE-300E
80E	2	85	H Ⓢ	Indoor	59878302	59878402	63931604	15CLE2-80E
100E	2	85	H Ⓢ	Indoor	59878302	59878402	63931604	15CLE2-100E
125X	2	85	H Ⓢ	Indoor	59878302	59878402	63931604	15CLE2-125X
150E	3	50	H Ⓢ	Indoor	59878302	59878402	63931604	15CLE3-150E
175E/200X	3	50	H Ⓢ	Indoor	59878302	59878402	63931604	15CLE3-175E/200X

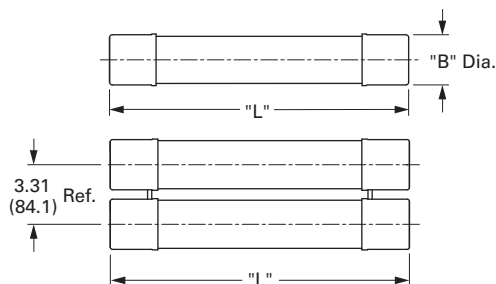
Type CLE Mountings and Hardware 15.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type ②	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ③		Live Parts (Including End Fittings) ③	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
15E-25E	Non-disconnect	95	2.00 (50.8)	20.00 (508.0)	21.50 (546.1)	4.5 (2.04)	15CLE-PNM-C	15CLE-GNM-C	CLE-NL-D	—
		110					15CLE-HPNM-C	—	—	—
	Disconnect	95	15CLE-PDM-C	15CLE-GDM-C	CLE-DL-C	CLE-DF-C				
		110	15CLE-HPDM-C	—	—	—				
10E-D-25E-D 30E-150E	Non-disconnect	95	3.00 (76.2)	20.00 (508.0)	23.90 (607.1)	11 (4.99)	15CLE-PNM-D	15CLE-GNM-D	CLE-NL-D	—
		110					15CLE-HPM-D	—	—	—
	Disconnect	95	15CLE-PDM-D	15CLE-GNM-D	CLE-DL-D	CLE-DF-D				
		110	15CLE-HPDM-D	—	—	—				
175E-300E	Non-disconnect	110	3.00 (76.2)	20.00 (508.0)	23.90 (607.1)	23 (10.44)	15CLE-PNM-E	—	CLE-DL-E	CLE-DF-E
	Disconnect	110					15CLE-PDM-E	—	—	—

Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

Type CLE Fuse



CLE kV	"L"	"B" Dia.
15E-25E	21.50 (546.1)	2.00 (50.8)
10E-300E	23.90 (607.1)	3.00 (76.2)

Notes

- ① For mountings, consult factory.
- ② See Page V4-T3-145 for diagram of typical mounting.
- ③ End fittings supplied only when required.

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type HLE



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#### Type HLE Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal) Interrupting Rating 63 (kA rms Sym.) ①

Current Rating (Amperes)	Barrel Number	Indoor/Outdoor	Performance Curves			Catalog Number	Bolt-In Ferrule Catalog Number	AMPGARD Catalog Number
			Minimum Melting Time	Total Clearing Time	Peak Let-Through Current			
10E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-10E	5BHLE-10E	5AHLE-10E
15E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-15E	5BHLE-15E	5AHLE-15E
20E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-20E	5BHLE-20E	5AHLE-20E
25E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-25E	5BHLE-25E	5AHLE-25E
30E	1	Indoor/outdoor	70548507	70548607	70548703	5HLE-30E	5BHLE-30E	5AHLE-30E
40E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-40E	5BHLE-40E	5AHLE-40E
50E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-50E	5BHLE-50E	5AHLE-50E
65E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-65E	5BHLE-65E	5AHLE-65E
80E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-80E	5BHLE-80E	5AHLE-80E
100E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-100E	5BHLE-100E	5AHLE-100E
125E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-125E	5BHLE-125E	5AHLE-125E
150E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-150E	5BHLE-150E	5AHLE-150E
175E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-175E	5BHLE-175E	5AHLE-175E
200E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-200E	5BHLE-200E	5AHLE-200E
250E	1	Indoor/outdoor	70545805	70545905	70547603	5HLE-250E	5BHLE-250E	5AHLE-250E
300E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-300E	5BHLE-300E	5AHLE-300E
350E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-350E	5BHLE-350E	5AHLE-350E
400E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-400E	5BHLE-400E	5AHLE-400E
450E	2	Indoor/outdoor	70546005	70546105	70547603	5HLE-450E	5BHLE-450E	5AHLE-450E

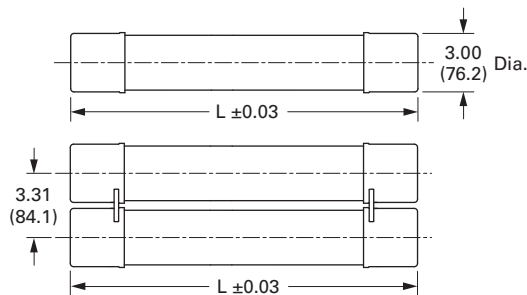
#### Type HLE Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type ②	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ③		Live Parts (Including End Fittings) ③	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E–250E	Non-disconnect	60	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	5HLE-PNM-D	5HLE-GNM-D	CLE-NL-D	—
	Disconnect	60					5HLE-PDM-D	5HLE-GDM-D	CLE-DL-D	CLE-DF-D
300E–450E	Non-disconnect	60	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	5HLE-PNM-E	5HLE-GNM-E	CLE-NL-E	—
	Disconnect	60					5HLE-PDM-E	5HLE-GDM-E	CLE-DL-E	CLE-DF-D

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type HLE Fuse



HLE kV	L ± 0.03
5.5	15.88 (403.4)

#### Notes

- ① For mountings, consult factory.
- ② See Page V4-T3-145 for diagram of typical mounting.
- ③ End fittings supplied only when required.



**Type HLE Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal) Interrupting Rating 50 (kA Sym.)**

Current Rating (Amperes)	Barrel Number	Indoor/Outdoor	Performance Curves			Catalog Number	Bolt-In Ferrule Catalog Number	AMPGARD Catalog Number
			Minimum Melting Time	Total Clearing Time	Peak Let-Through Current			
10E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-10E	8BHLE-10E	8AHLE-10E
15E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-15E	8BHLE-15E	8AHLE-15E
20E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-20E	8BHLE-20E	8AHLE-20E
25E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-25E	8BHLE-25E	8AHLE-25E
30E	1	Indoor/outdoor	70548507	70548607	70548804	8HLE-30E	8BHLE-30E	8AHLE-30E
40E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-40E	8BHLE-40E	8AHLE-40E
50E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-50E	8BHLE-50E	8AHLE-50E
65E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-65E	8BHLE-65E	8AHLE-65E
80E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-80E	8BHLE-80E	8AHLE-80E
100E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-100E	8BHLE-100E	8AHLE-100E
125E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-125E	8BHLE-125E	8AHLE-125E
150E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-150E	8BHLE-150E	8AHLE-150E
175E	1	Indoor/outdoor	70546203	70546303	70547201	8HLE-175E	8BHLE-175E	8AHLE-175E
200E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-200E	8BHLE-200E	8AHLE-200E
250E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-250E	8BHLE-250E	8AHLE-250E
300E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-300E	8BHLE-300E	8AHLE-300E
350E	2	Indoor/outdoor	70546403	70546503	70547201	8HLE-350E	8BHLE-350E	8AHLE-350E

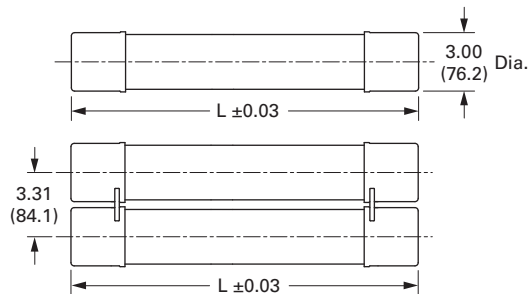
**Type HLE Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E–175E	Non-disconnect	75	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	8HLE-PNM-D	8HLE-GNM-D	CLE-NL-D	—
	Disconnect	75					8HLE-PDM-D	8HLE-GDM-D	CLE-DL-D	CLE-DF-D
200E–350E	Non-disconnect	75					8HLE-PNM-E	8HLE-GNM-E	CLE-NL-E	—
	Disconnect	75					8HLE-PDM-E	8HLE-GDM-E	CLE-DL-E	CLE-DF-E

**Fuse Dimensional Details**

Approximate Dimensions in Inches (mm)

**Type HLE Fuse**



HLE kV	L ± 0.03
8.3	15.88 (403.4)

**Notes**

- ① See Page V4-T3-145 for diagram of typical mounting.
- ② End fittings supplied only when required.





#### Type HLE Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Indoor/Outdoor	Performance Curves		Peak Let-Through Current	Catalog Number	Bolt-In Ferrule Catalog Number
				Minimum Melting Time	Total Clearing Time			
10E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-10E	15BHLE-10E
15E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-15E	15BHLE-15E
20E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-20E	15BHLE-20E
25E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-25E	15BHLE-25E
30E	1	63	Indoor/outdoor	70548507	70548607	70548805	15HLE-30E	15BHLE-30E
40E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-40E	15BHLE-40E
50E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-50E	15BHLE-50E
65E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-65E	15BHLE-65E
80E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-80E	15BHLE-80E
100E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-100E	15BHLE-100E
125E	1	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-125E	15BHLE-125E
150E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-150E	15BHLE-150E
175E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-175E	15BHLE-175E
200E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-200E	15BHLE-200E
250E	2	63	Indoor/outdoor	70546601	70546701	70547401	15HLE-250E	15BHLE-250E

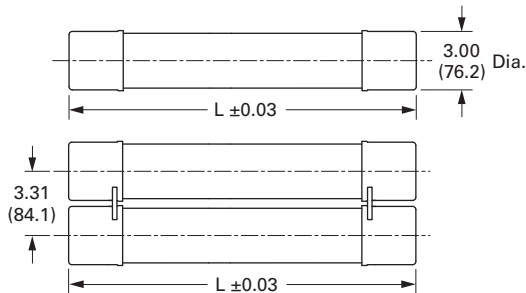
#### Type HLE Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
							Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
10E-175E	Non-disconnect	95	3.00 (76.2)	15.00 (381.0)	18.90 (480.1)	10 (4.54)	15HLE-PNM-D	15HLE-GNM-D	CLE-NL-D	—
	Disconnect	95					15HLE-PDM-D	15HLE-GDM-D	CLE-DL-D	CLE-DF-D
150E-250E	Non-disconnect	95	3.00 (76.2)	15.00 (381.0)	18.90 (480.1)	21 (9.53)	15HLE-PNM-E	—	CLE-NL-E	—
	Disconnect	95					15HLE-PDM-E	—	CLE-DL-E	CLE-DF-E

#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

#### Type HLE Fuse



HLE kV	L ± 0.03
15.5	18.88 (479.6)

#### Notes

- ① See Page V4-T3-145 for diagram of typical mounting.
- ② End fittings supplied only when required.

**Type BHLE**

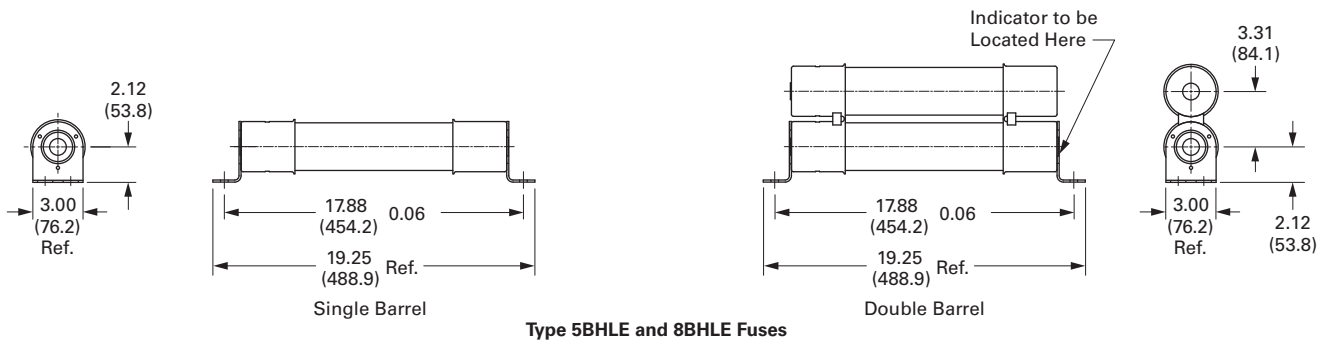
Approximate Dimensions in Inches (mm)

**Type BHLE Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal), Indoor, Bolt-In**

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
						Minimum Melting Time	Total Clearing Time		
10E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-10E</b>
15E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-15E</b>
20E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-20E</b>
25E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-25E</b>
30E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548703	<b>5BHLE-30E</b>
40E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-40E</b>
50E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-50E</b>
65E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-65E</b>
80E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-80E</b>
100E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-100E</b>
125E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-125E</b>
150E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-150E</b>
175E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-175E</b>
200E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-200E</b>
250E	1	63	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70545805	70545905	70547603	<b>5BHLE-250E</b>
300E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-300E</b>
350E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-350E</b>
400E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-400E</b>
450E	2	63	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546005	70546105	70547603	<b>5BHLE-450E</b>

**Fuse Dimensional Details**

**Type BHLE Fuse**



**Type 5BHLE and 8BHLE Fuses**

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

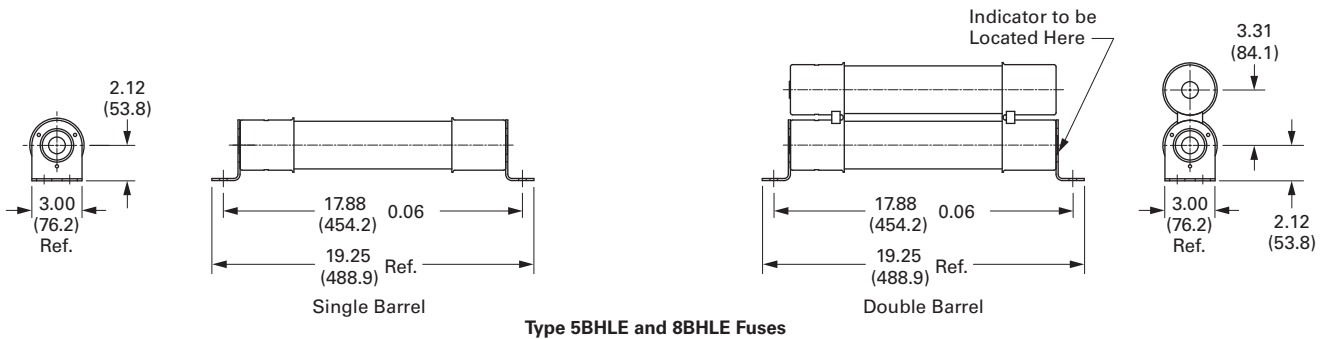
Approximate Dimensions in Inches (mm)

#### Type BHLE Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal), Indoor, Bolt-In

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-10E
15E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-15E
20E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-20E
25E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-25E
30E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70548507	70548607	70548804	8BHLE-30E
40E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-40E
50E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-50E
65E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-65E
80E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-80E
100E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-100E
125E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-125E
150E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-150E
175E	1	50	3.00 (76.2)	15.90 (403.9)	8 (3.63)	70546203	70546303	70547201	8BHLE-175E
200E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-200E
250E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-250E
300E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-300E
350E	2	50	3.00 (76.2)	15.90 (403.9)	17 (7.72)	70546403	70546503	70547201	8BHLE-350E

#### Fuse Dimensional Details

##### Type BHLE Fuse



Approximate Dimensions in Inches (mm)

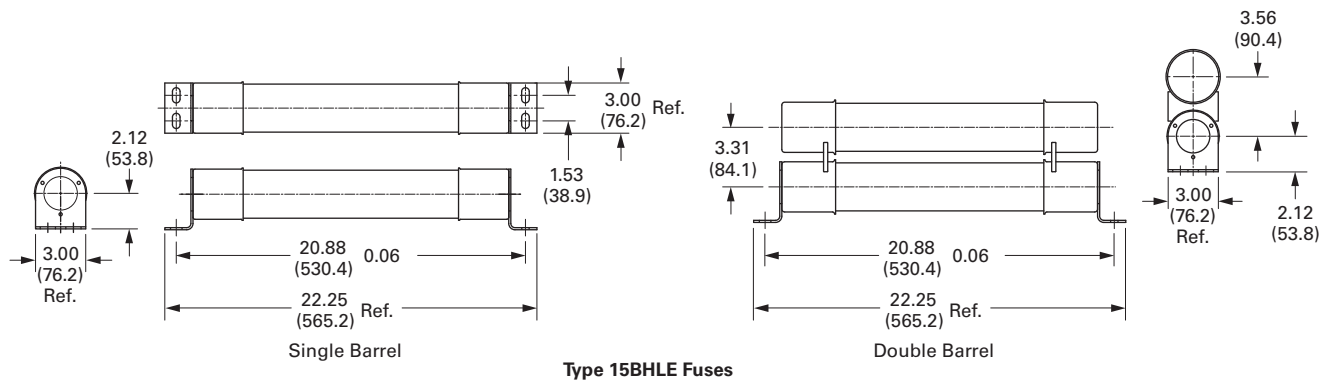
**Type BHLE Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal), Indoor/Outdoor, Bolt-In**

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-10E</b>
15E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-15E</b>
20E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-20E</b>
25E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-25E</b>
30E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70548507	70548607	70548805	<b>15BHLE-30E</b>
40E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-40E</b>
50E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-50E</b>
65E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-65E</b>
80E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-80E</b>
100E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-100E</b>
125E	1	63	3.00 (76.2)	18.90 (480.1)	10 (4.54)	70546601	70546701	70547401	<b>15BHLE-125E</b>
150E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-150E</b>
175E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-175E</b>
200E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-200E</b>
250E	2	63	3.00 (76.2)	18.90 (480.1)	21 (9.53)	70546601	70546701	70547401	<b>15BHLE-250E</b>

3

**Fuse Dimensional Details**

**Type BHLE Fuse**



# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type HCL

#### Type HCL Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal), Indoor

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Approximate Shipping Weight Lbs (kg)	Mounting Type	Live Parts (Includes End Fittings) Catalog Number	Performance Curves			Catalog Number
								Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-10E
15E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-15E
20E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-20E
25E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-25E
30E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70548505	70548605	70548702	5HCL-30E
40E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-40E
50E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-50E
65E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-65E
80E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-80E
100E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-100E
125E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-125E
150E	1	63	3.00 (76.2)	Clip-lock	9 (4.09)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-150E
200E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-200E
250E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70545803	70545903	70547602	5HCL-250E
300E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	70546003	70516103	70547602	5HCL-300E
400E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	70546003	70516103	70547602	5HCL-400E
450E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	70546003	70516103	70547602	5HCL-450E
500E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	66703401	66703501	66703701	5HCL-500E
600E	2	63	3.00 (76.2)	Clip-lock	20 (9.08)	Non-disconnect	HCL-NL-1	66703401	66703501	66703701	5HCL-600E
750E	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5HCL-750E
	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5BHCL-750E
900E	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5HCL-900E
	3	63	3.00 (76.2)	Bolt-in	30 (13.62)	—	—	66703401	66703501	66703701	5BHCL-900E

#### Type HCL Current Limiting Fuses (15.5 kV Maximum, 14.4 kV Nominal), Indoor

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Approximate Shipping Weight Lbs (kg)	Mounting Type	Live Parts (Includes End Fittings) Catalog Number	Performance Curves			Catalog Number
								Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
10E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-10E
15E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-15E
20E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-20E
25E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-25E
30E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	70548503	70548603	70548803	15HCL-30E
40E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-40E
50E	1	63	3.00 (76.2)	Clip-lock	10 (4.54)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-50E
65E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-65E
80E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-80E
100E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-100E
125E	1	50	3.00 (76.2)	Clip-lock	12 (5.45)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-125E
150E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-150E
200E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-200E
250E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-250E
300E	2	50	3.00 (76.2)	Clip-lock	24 (10.90)	Non-disconnect	HCL-NL-1	66703201	66703301	70547402	15HCL-300E

**Note**

Approximate Dimensions in Inches (mm).

**Fuse Dimensional Details**

Approximate Dimensions in Inches (mm)

**5.5 and 15.5 kV Clip Lock Mounted**

Ampere Rating	Number of Barrels	Figure Number	A	B	C	Interrupting Rating rms (kA Sym.)
<b>5.5 kV Maximum—Clip Lock Style—15.25-Inch (387.4 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
10E–150E	1	A	16.81 (427.0)	16.12 (409.4)	①	63
<b>5.5 kV Maximum—Clip Lock Style—21.25-Inch (539.8 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
200E–600E	1	A	22.81 (579.4)	22.12 (561.8)	①	63

**15.5 kV Clip Lock Mounted**

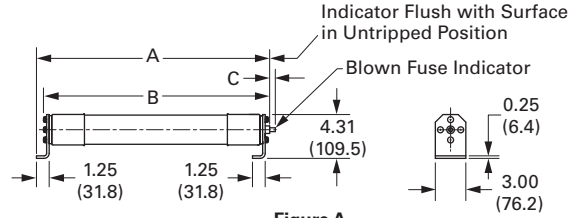
Ampere Rating	Number of Barrels	Figure Number	A	B	C	Interrupting Rating rms (kA Sym.)
<b>15.5 kV Maximum—Clip Lock Style—21.25-Inch (539.8 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
65E–125E	1	A	22.81 (579.4)	22.12 (561.8)	①	63
150E–300E	2	B	22.81 (579.4)	22.12 (561.8)	①	50
<b>15.5 kV Maximum—Clip Lock Style—18.25-Inch (463.6 mm) Clip Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>						
10E–50E	1	A	19.81 (503.2)	19.12 (485.6)	①	63

**Bolt-In Series—5.5 kV**

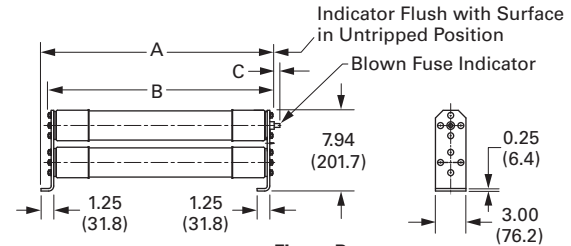
Ampere Rating	Number of Barrels	Figure Number	A	B	C	D	Interrupting Rating rms (kA Sym.)
<b>5.5 kV Maximum—Bolt-in Style—23.73-Inch (602.7 mm) Hole Centers—3.00-Inch (76.2 mm) Barrel Diameter</b>							
750E, 900E	3	C	25.11 (637.8)	22.37 (568.2)	23.73 (602.7)	①	63

**Type HCL Fuse Dimensional Details**

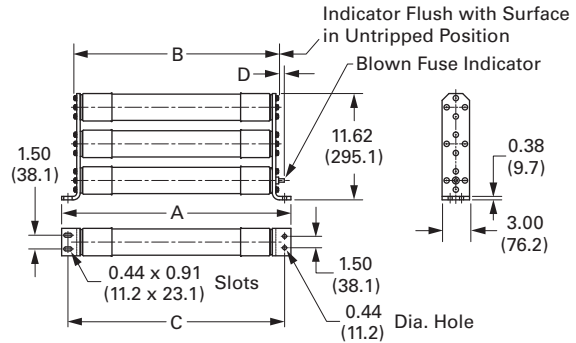
**Type HCL-14 Fuses**



**Figure A**

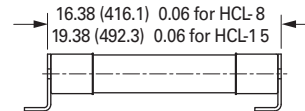


**Figure B**



**Figure C**

**Type HCL Fuses**



**Note**

① 0.5 (12.7) tripped force 2 lb (0.9 kg).

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type CLS

#### Type CLS Current Limiting Fuses

3

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
									Minimum Melting Time	Total Clearing Time		
2.54	25	—	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-25</b>
	70	2R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-2R</b>
	100	3R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-3R</b>
	130	4R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-4R</b>
	150	5R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-5R</b>
	170	6R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-6R</b>
	200	9R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-9R</b>
	230	12R	1	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2CLS-12R</b>
	390	18R	2	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2CLS-18R</b>
	450	24R	2	50	3.00 (76.2)	7.00 (177.8)	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2CLS-24R</b>
	25	—	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-25</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2ACLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2ACLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2ACLS-24R</b>
	25	—	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-25</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	8 (3.63)	66664702	66664704	66700202	<b>2BCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	17 (7.72)	66664702	66664704	66700202	<b>2BCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	17 (7.72)	66664702	66664704	66700202	<b>2BCLS-24R</b>
	25	—	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-25</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	10.80 (274.3)	7 (3.18)	66664702	66664704	66700202	<b>2HCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2HCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	10.80 (274.3)	16 (7.26)	66664702	66664704	66700202	<b>2HCLS-24R</b>

**Note**

Approximate Dimensions in Inches (mm).

Type CLS Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
									Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
5.08	30	—	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-30</b>
	70	2R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-2R</b>
	100	3R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-3R</b>
	130	4R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-4R</b>
	150	5R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-5R</b>
	170	6R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-6R</b>
	200	9R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-9R</b>
	230	12R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5CLS-12R</b>
	390	18R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5CLS-18R</b>
	450	24R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5CLS-24R</b>
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-30</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5ACLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5ACLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5ACLS-24R</b>
4.3	480	26R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>4ACLS-26R</b>
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-30</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5BCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5BCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5BCLS-24R</b>
4.3	480	26R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>4BCLS-26R</b>
5.08	30	—	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-30</b>
	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-6R</b>
	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66690602	66690702	66700203	<b>5HCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5HCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66690602	66690702	66700203	<b>5HCLS-24R</b>

**Note**  
Approximate Dimensions in Inches (mm).



# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type CLS Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
									Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
5.08	70	2R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-2R</b>
	100	3R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-3R</b>
	130	4R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-4R</b>
	150	5R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-5R</b>
	170	6R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-6R</b>
	200	9R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66690602	66690702	66700203	<b>5CLS70-9R</b>
	230	12R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-12R</b>
	390	18R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-18R</b>
	450	24R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-24R</b>
	600	32R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-32R</b>
	650	36R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-36R</b>
	700	44R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66690602	66690702	66700203	<b>5CLS70-44R</b>
	5.5	70	2R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204
100		3R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-3R</b>
130		4R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-4R</b>
150		5R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-5R</b>
170		6R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-6R</b>
200		9R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-9R</b>
230		12R	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	51285302	51285402	66700204	<b>5LCLS-12R</b>
390		18R	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	51285302	51285402	66700204	<b>5LCLS-18R</b>
450		24R	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	51285302	51285402	66700204	<b>5LCLS-24R</b>
8.3	70	2R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-2R</b>
	100	3R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-3R</b>
	130	4R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-4R</b>
	150	5R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-5R</b>
	170	6R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>8CLS-6R</b>
7.2	200	9R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>7CLS-9R</b>
	230	12R	1	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	7 (3.18)	66700602	66700702	66700205	<b>7CLS-12R</b>
	390	18R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	16 (7.26)	66700602	66700702	66700205	<b>7CLS-18R</b>
	450	24R	2	50	3.00 (76.2)	12.00 (304.8)	15.90 (403.9)	16 (7.26)	66700602	66700702	66700205	<b>7CLS-24R</b>
8.3	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-6R</b>
7.2	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	7 (3.18)	66700602	66700702	66740205	<b>7BCLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	16 (7.26)	66700602	66700702	66740205	<b>7BCLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	16 (7.26)	66700602	66700702	66740205	<b>7BCLS-24R</b>
8.3	70	2R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-2R</b>
	100	3R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-3R</b>
	130	4R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-4R</b>
	150	5R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-5R</b>
	170	6R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>8ACLS-6R</b>

**Note**

Approximate Dimensions in Inches (mm).

Type CLS Current Limiting Fuses, continued

Maximum Design Voltage (kV)	Current Rating (Amperes)	"R" Designation	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves		Peak Let-Through Current	Catalog Number
									Minimum Melting Time	Total Clearing Time		
7.2	200	9R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>7ACLS-9R</b>
	230	12R	1	50	3.00 (76.2)	Not applicable	15.90 (403.9)	8 (3.63)	66700602	66700702	66740205	<b>7ACLS-12R</b>
	390	18R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66700602	66700702	66740205	<b>7ACLS-18R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	17 (7.72)	66700602	66700702	66740205	<b>7ACLS-24R</b>
	450	24R	2	50	3.00 (76.2)	Not applicable	15.90 (403.9)	20 (9.08)	66700602	66700702	66740205	<b>7CLS70-24R</b>
	650	36R	3	50	3.00 (76.2)	Not applicable	15.90 (403.9)	30 (13.62)	66700602	66700702	66740205	<b>7CLS70-36R</b>
	700	44R	2	50	4.00 (101.6)	Not applicable	15.90 (403.9)	40 (18.16)	66700602	66700702	66740205	<b>7CLS70-44R</b>
8.3	15	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-15</b>
	30	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-30</b>
	60	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-60</b>
	70	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-70</b>
	90	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-90</b>
	110	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-110</b>
	125	Not applicable	1	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	11 (4.99)	66664202	66664302	66679802	<b>8CLS-125</b>
	150	Not applicable	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	66664202	66664302	66679802	<b>8CLS-150</b>
	200	Not applicable	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	66664202	66664302	66679802	<b>8CLS-200</b>
	225	Not applicable	2	50	3.00 (76.2)	14.00 (355.6)	17.90 (454.7)	22 (9.99)	66664202	66664302	66679802	<b>8CLS-225</b>

**Note**  
Approximate Dimensions in Inches (mm).

# 3.5

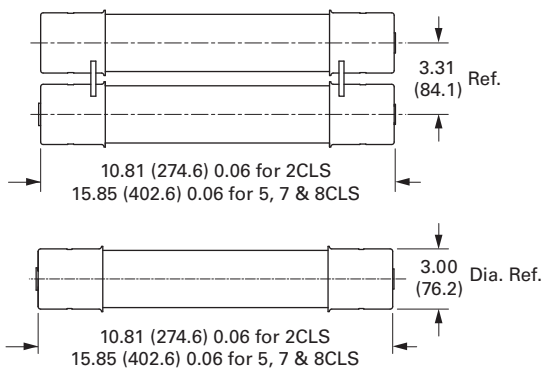
## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

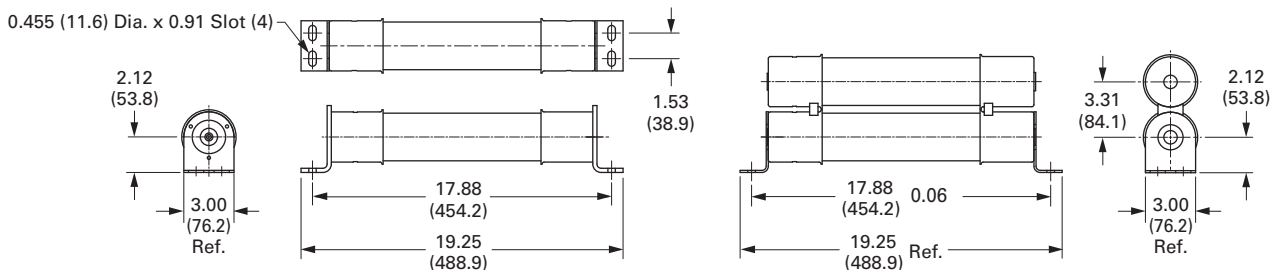
#### Fuse Dimensional Details

Approximate Dimensions in Inches (mm)

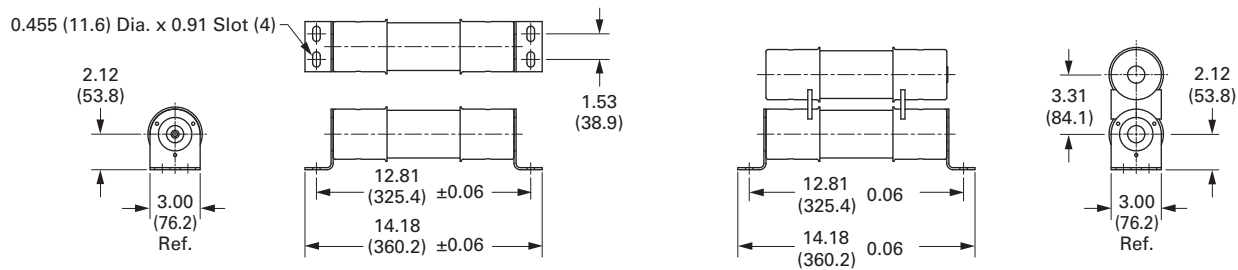
#### Type CLS Fuse



#### Type BCLS Fuse



Type 5BCLS and 7BCLS Fuses



Type 2BCLS Fuse

Type CLS Mountings and Hardware

Maximum Design Voltage (kV)	Ampere Rating	Fuse Mounting Type	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ①		Live Parts (Including End Fittings)	End Fittings (Disconnect Only) ①
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
2.54	25–230	Non-disconnect	60	2CLE-PNM-D	2CLE-GNM-D	CLE-NL-D	—
		Disconnect	60	2CLE-PDM-D	2CLE-GDM-E	CLE-DL-D	CLE-DF-D
	390–450	Non-disconnect	60	2CLE-PNM-E	2CLE-GNM-E	CLE-NL-E	—
		Disconnect	60	2CLE-PDM-E	2CLE-GDM-E	CLE-DL-E	CLE-DF-E
5.5 (CLS)	30–230	Non-disconnect	60	5HLE-PNM-D	5HLE-GNM-D	CLE-NL-D	—
		Disconnect	60	5HLE-PDM-D	5HLE-GDM-E	CLE-DL-D	CLE-DF-D
	390–480	Non-disconnect	60	5HLE-PNM-E	5HLE-GNM-E	CLE-NL-E	—
		Disconnect	60	5HLE-PDM-E	5HLE-GDM-E	CLE-DL-E	CLE-DF-E
5.5 (LCLS)	70–230	Non-disconnect	60	5CLE-PNM-D	5CLE-GNM-D	CLE-NL-D	—
		Disconnect	60	5CLE-PDM-D	5CLE-GDM-D	CLE-DL-D	CLE-DF-D
			75	8CLE-PDM-D	8CLE-GDM-D	CLE-DL-D	CLE-DF-D
	390–450	Non-disconnect	60	5CLE-PNM-E	5CLE-GNM-E	CLE-NL-E	—
		Disconnect	60	5CLE-PDM-E	5CLE-GDM-E	CLE-DL-E	CLE-DF-E
			75	8CLE-PDM-E	8CLE-PDM-E	CLE-DL-E	CLE-DF-E
8.3	70–100	Non-disconnect	75	8HLE-PNM-D	8HLE-GNM-D	CLE-NL-D	—
	130–230	Disconnect	75	8HLE-PDM-D	8HLE-GDM-D	CLE-DL-D	CLE-DF-D
7.2	390–450	Non-disconnect	75	8HLE-PDM-E	8HLE-GNM-E	CLE-NL-E	—
		Disconnect	75	8HLE-PDM-E	8HLE-GDM-E	CLE-DL-E	CLE-DF-E
8.3	15–30	Non-disconnect	75	8CLE-PNM-D	8CLE-GNM-D	CLE-NL-D	—
	60–125	Disconnect	75	8CLE-PDM-D	8CLE-GDM-D	CLE-DL-D	CLS-DF-D
			75	8CLE-PDM-E	8CLE-GDM-E	CLE-DL-E	CLE-DF-E
	150–225	Non-disconnect	75	8CLE-PNM-E	8CLE-GNM-E	CLE-NL-E	—
Disconnect	75	8CLE-PDM-E	8CLE-GDM-E	CLE-DL-E	CLE-DF-E		

Type CLPT

Indicating

Type CLPT Current Limiting Fuses 2.475 kV Maximum (2.4 kV Nominal)

Approximate Dimensions in Inches (mm)



Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Approximate Dimensions in Inches (mm)			Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
		Diameter	Clip Center	Length		Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
0.25E	63	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	2NCLPT-.25E
0.5E	63	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	2NCLPT-.5E
1E	40	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	2NCLPT-1E
2E	40	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	2NCLPT-2E
5E	25	0.81 (20.6)	—	4.50 (114.3)	0.25 (0.11)	56357202	59883702	63933702	2NCLPT-5E

Notes

① Disconnect only.

Approximate Dimensions in Inches (mm).

**Non-Indicating**



**Type CLPT Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal)**

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
<b>Non-Indicating</b>									
0.5E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-.5E
1E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-1E
2E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-2E
3E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-3E
4E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-4E
5E	63	0.81 (20.6)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	5NCLPT-5E
0.5E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H02
1E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H06
2E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H03
3E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H04
5E	50	1.00 (25.4)	—	5.63 (143.0)	0.25 (0.11)	66702402	66702502	66704101	317B487H05
0.5E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-.5E-A
1E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-1E-A
2E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-2E-A
3E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-3E-A
5E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-5E-A
10E	63	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	70548302	70548402	63934002	5NCLPT-10E-A
<b>Indicating</b>									
0.5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-.5E
1E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-1E
1.5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-1.5E
3E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-3E
5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-5E
10E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.2 (0.54)	56353206	56353306	63934001	5CLPT-10E

**Indicating**



**Type CLPT Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal) ③**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
0.5–2	Non-disconnect	60	5CLPT-PNM-A	5CLPT-GNM-A	CLPT-NL	—
	Disconnect	60	5CLPT-PDM-A	5CLPT-GDM-A	CLPT-DL	CLPT-DF
3–10	Non-disconnect	60	5CLPT-PNM-B	5CLPT-GNM-B	CLPT-NL	—
	Disconnect	60	5CLPT-PDM-B	5CLPT-GDM-B	CLPT-DL	CLPT-DF

**Notes**



① See Page V4-T3-145 for diagram of typical mounting.

② End fittings supplied only when required.

③ Refers only to 5CLPT and 5NCLPT-A fuses only.

Approximate Dimensions in Inches (mm).

Type CLPT Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

	Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number	
							Minimum Melting Time	Total Clearing Time	Peak Let-Through Current		
<b>Non-Indicating</b>											
	2E	25	0.81 (20.6)	—	8.00 (203.2)	0.25 (0.11)	56357206	59883706	63933704	8NCLPT-2E	
	4E	25	0.81 (20.6)	—	8.00 (203.2)	0.25 (0.11)	56357206	59883706	63933704	8NCLPT-4E	
	10E	50	1.10 (27.9)	—	5.00 (127.0)	0.5 (0.23)	56357206	59883706	63933704	8NCLPT-0E	
	1E	50	1.10 (27.9)	—	5.00 (127.0)	0.5 (0.23)	56357206	59883706	63933704	8NCLPT-1E	
	5E	50	1.10 (27.9)	—	5.00 (127.0)	0.5 (0.23)	56357206	59883706	63933704	8NCLPT-5E	
	0.5E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	8NCLPT-.5E-A	
	1E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	8NCLPT-1E-A	
	2E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	8NCLPT-2E-A	
	3E	50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	70548303	70548403	63934002	8NCLPT-3E-B	
	5E	50	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	8NCLPT-5E-B	
	10E	50	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	8NCLPT-10E-B	
	<b>Indicating</b>										
		.5E	80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.5 (0.70)	56353206	56353306	63934001	8CLPT-.5E
3E		80	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.6 (0.73)	56353206	56353306	63934001	8CLPT-3E	
5E		50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.6 (0.73)	56353206	56353306	63934001	8CLPT-5E	
10E		50	1.60 (40.6)	8.10 (205.7)	9.50 (241.3)	1.6 (0.73)	56353206	56353306	63934001	8CLPT-10E	

Type CLPT Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal) ③

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
0.5–2	Non-disconnect	75	8CLPT-PNM-A	8CLPT-GNM-A	CLPT-NL	—
	Disconnect	75	8CLPT-PDM-A	8CLPT-GDM-A	CLPT-DL	CLPT-DF
3–10	Non-disconnect	75	8CLPT-PNM-B	8CLPT-GNM-B	CLPT-NL	—
	Disconnect	75	8CLPT-PDM-B	8CLPT-GDM-B	CLPT-DL	CLPT-DF

Notes

- ① See Page V4-T3-145 for diagram of typical mounting.
  - ② End fittings supplied only when required.
  - ③ Refers only to 8CLPT and 8NCLPT-A or -B fuses only.
- Approximate Dimensions in Inches (mm).

#### Type CLPT Current Limiting Fuses 15.5 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
<b>Non-Indicating</b>									
0.5E	63	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>15NCLPT-5E</b>
1E	63	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>15NCLPT-1E</b>
2E	63	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	70548303	70548403	63934002	<b>15NCLPT-1.5E</b>
3E	63	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	70548303	70548403	63934002	<b>15NCLPT-3E</b>
5E	63	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	70548303	70548403	63934002	<b>15NCLPT-5E</b>
10E	63	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	70548303	70548403	63934002	<b>15NCLPT-10E</b>
<b>Indicating</b>									
0.5E	80	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	56353206	56353306	63934001	<b>15CLPT-5E</b>
1E	80	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	56353206	56353306	63934001	<b>15CLPT-1E</b>
2E	80	1.60 (40.6)	11.50 (292.1)	12.90 (327.7)	1.6 (0.73)	56353206	56353306	63934001	<b>15CLPT-1.5E</b>
3E	80	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353206	56353306	63934001	<b>15CLPT-3E</b>
5E	80	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353206	56353306	63934001	<b>15CLPT-5E</b>
10E	50	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353206	56353306	63934001	<b>15CLPT-10E</b>



#### Type CLPT Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
0.5–2	Non-disconnect	95	<b>15CLPT-PNM-A</b>	<b>15CLPT-GNM-A</b>	<b>CLPT-NL</b>	—
	Disconnect	95	<b>15CLPT-PDM-A</b>	<b>15CLPT-GDM-A</b>	<b>CLPT-DL</b>	<b>CLPT-DF</b>
3–10	Non-disconnect	95	<b>15CLPT-PNM-B</b>	<b>15CLPT-GNM-B</b>	<b>CLPT-NL</b>	<b>CLPT-DF</b>
	Disconnect	95	<b>15CLPT-PDM-B</b>	<b>15CLPT-GDM-B</b>	<b>CLPT-DL</b>	—

**Notes**

① See **Page V4-T3-145** for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

**Type CLPT Current Limiting Fuses 25.5 kV Maximum (23.0 kV Nominal)**

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
0.5E	44	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353208	56353308	63933901	25CLPT-.5E
1E	44	1.60 (40.6)	16.10 (408.9)	17.60 (447.0)	2 (0.91)	56353208	56353308	63933901	25CLPT-1E

**Type CLPT Mountings and Hardware 25.5 kV Maximum (23.0 kV Nominal)**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
0.5E-1E	Non-disconnect	150	25CLPT-PNM-A	—	25CLPT-NL	—
	Disconnect	150	25CLPT-PDM-A	—	25CLPT-DL	CLPT-DF

**Type CLPT Current Limiting Fuses 38.0 kV Maximum (34.5 kV Nominal)**

Current Rating (Amperes)	Interrupting Rating rms (kA Sym.)	Diameter	Clip Center	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
0.5E	44	1.60 (40.6)	17.10 (434.3)	18.60 (472.4)	2 (0.91)	56353208	56353308	63933901	38CLPT-.5E

**Type CLPT Mountings and Hardware 38.0 kV Maximum (34.5 kV Nominal)**

Ampere Rating	Fuse Mounting Type ①	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
			Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
0.5E	Disconnect	—	Not applicable	Not applicable	25CLPT-NL	CLPT-DF
	Non-disconnect	—	Not applicable	Not applicable	25CLPT-DL	—

**Notes**

① See Page V4-T3-145 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).



#### Type CX

3

Type CX



#### Type CX Current Limiting Fuses 4.3 kV Maximum (2.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves				Catalog Number
							Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	$I^2t$	
<b>Non-Indicating</b>											
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-18C</b>
25C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-25C</b>
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-35C</b>
45C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-45C</b>
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CX-50C</b>
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CX-60C</b>
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CX-65C</b>
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CX-75C</b>
80C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CX-80C</b>
100C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CX-100C</b>
<b>Indicating</b>											
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-18C</b>
25C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-25C</b>
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	1 (0.45)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-35C</b>
45C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-45C</b>
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544101	TC70544501	TC70544901	TC70545101	<b>4CXI-50C</b>
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CXI-60C</b>
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CXI-65C</b>
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CXI-75C</b>
80C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544502	TC70544901	TC70545101	<b>4CXI-80C</b>
100C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544102	TC70544501	TC70544901	TC70545101	<b>4CXI-100C</b>

#### Type CX Mountings and Hardware 4.3 kV Maximum (2.4 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
18C-100C	Non-disconnect	A	60	—	<b>5CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	A	60	—	<b>5CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

**Notes**

① See Page V4-T3-145 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CX



Type CX Current Limiting Fuses 5.5 kV Maximum (4.8 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Peak Let-Through Current	I <sup>2</sup> t	Catalog Number
							Minimum Melting Time	Total Clearing Time				
<b>Non-Indicating</b>												
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-10C</b>	
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-12C</b>	
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-18C</b>	
20C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-20C</b>	
21C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CX-21C</b>	
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-25C</b>	
30C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-30C</b>	
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CX-35C</b>	
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-40C</b>	
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-50C</b>	
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CX-60C</b>	
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-65C</b>	
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CX-75C</b>	
<b>Indicating</b>												
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-10C</b>	
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-12C</b>	
18C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-18C</b>	
20C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-20C</b>	
21C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CXI-21C</b>	
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-25C</b>	
30C	1	50	G	1.13 (28.7)	10.00 (254.0)	1 (0.45)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-30C</b>	
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CXI-35C</b>	
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-40C</b>	
50C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-50C</b>	
60C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544202	TC70544602	TC70544902	TC70545201	<b>5CXI-60C</b>	
65C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-65C</b>	
75C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544201	TC70544601	TC70544902	TC70545201	<b>5CXI-75C</b>	

Type CX Mountings and Hardware 5.5 kV Maximum (4.8 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) <sup>②</sup>		Live Parts (Including End Fittings) <sup>②</sup>	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
10C-75C	Non-disconnect	A	60	—	<b>5CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	A	60	—	<b>5CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

Notes

<sup>①</sup> See Page V4-T3-145 for diagram of typical mounting.

<sup>②</sup> End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CX



3

#### Type CX Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Peak Let-Through Current I <sub>2t</sub>	Catalog Number
							Minimum Melting Time	Total Clearing Time			
<b>Non-Indicating</b>											
3.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-3.5C</b>
4C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-4C</b>
4.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-4.5C</b>
6C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-6C</b>
7C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-7C</b>
8C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-8C</b>
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-10C</b>
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-12C</b>
15C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-15C</b>
18C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-18C</b>
20C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-20C</b>
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-25C</b>
30C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-30C</b>
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CX-35C</b>
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CX-40C</b>
<b>Indicating</b>											
3.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-3.5C</b>
4C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-4C</b>
4.5C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-4.5C</b>
6C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-6C</b>
7C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-7C</b>
8C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-8C</b>
10C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-10C</b>
12C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-12C</b>
15C	1	50	G	1.13 (28.7)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-15C</b>
18C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-18C</b>
20C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-20C</b>
25C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-25C</b>
30C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-30C</b>
35C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544302	TC70544702	TC70545001	TC70545301	<b>8CXI-35C</b>
40C	1	50	G	2.00 (50.8)	10.00 (254.0)	2 (0.91)	TC70544301	TC70544701	TC70545001	TC70545301	<b>8CXI-40C</b>

#### Type CX Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number	Catalog Number	Catalog Number
3.5C-40C	Non-disconnect	B	75	—	<b>8CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	B	75	—	<b>8CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

**Notes**

① See Page V4-T3-145 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CX



Type CX Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Fuse Mounting Code	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Peak Let-Through Current	I <sup>2</sup> t	Catalog Number
							Minimum Melting Time	Total Clearing Time				
<b>Non-Indicating</b>												
4C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-4C</b>	
6C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-6C</b>	
7C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CX-7C</b>	
8C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-8C</b>	
10C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-10C</b>	
12C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-12C</b>	
15C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CX-15C</b>	
18C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-18C</b>	
20C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-20C</b>	
25C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-25C</b>	
30C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-30C</b>	
40C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CX-40C</b>	
<b>Indicating</b>												
4C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-4C</b>	
6C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-6C</b>	
7C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CXI-7C</b>	
8C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-8C</b>	
10C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-10C</b>	
12C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-12C</b>	
15C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544402	TC70544802	TC70545002	TC70545401	<b>15CXI-15C</b>	
18C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-18C</b>	
20C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-20C</b>	
25C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-25C</b>	
30C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-30C</b>	
40C	1	50	G	2.00 (50.8)	14.30 (363.2)	2 (0.91)	TC70544401	TC70544801	TC70545002	TC70545401	<b>15CXI-40C</b>	

Type CX Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Size	Voltage BIL (kV)	Mounting (Including Live Parts, End Fittings) ②		Live Parts (Including End Fittings) ②	End Fittings (Disconnect Only)
				Porcelain Insulator Catalog Number	Glass-Polyester Insulator Catalog Number		
4C–40C	Non-disconnect	C	95	—	<b>15CX-GNM-G</b>	<b>CX-NL</b>	—
	Disconnect	C	95	—	<b>15CX-GDM-G</b>	<b>CX-DL</b>	<b>CX-DF</b>

Notes

① See Page V4-T3-145 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

## Type CXN

Type CXN

3



## Type CXN Current Limiting Fuses 8.3 kV Maximum (7.2 kV Nominal)

Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
60C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66675102	66675202	66664902	<b>8CXN-60C</b>
100C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66675102	66675202	66664902	<b>8CXN-100C</b>
125C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-125C</b>
150C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-150C</b>
200C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-200C</b>
250C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66675102	66675202	66664902	<b>8CXN-250C</b>
120C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66675104	66675204	66664902	2 X 60C <b>8CXN-120C</b>
200C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66675104	66675204	66664902	2 X 100C <b>8CXN-200C</b>
250C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66675104	66675204	66664902	2 X 125C <b>8CXN-250C</b>
300C	2	50	4.00 (101.6)	18.80 (477.5)	28 (12.71)	66675104	66675204	66664902	2 X 150C <b>8CXN-300C</b>

## Type CXN Mountings and Hardware 8.3 kV Maximum (7.2 kV Nominal)

Ampere Rating	Fuse Mounting Type <sup>①</sup>	Voltage LIWL (BIL)	Glass Polyester Insulator Mounting (Including Live Parts, End Fittings) <sup>②</sup> Catalog Number	Live Parts <sup>②</sup> Catalog Number	End Fittings (Disconnect Only) Catalog Number
60C–100C Single barrel	Non-disconnect	95	<b>15CXN-GNM-D</b>	<b>15CXN-NL-D</b>	—
	Non-disconnect	95	<b>15CXN-GNM-G</b>	<b>15CXN-NL-G</b>	—
	Disconnect	95	<b>15CXN-GDM-G</b>	<b>15CXN-DL-G</b>	<b>15CXN-DF-G</b>
125C–250C Single barrel	Non-disconnect	95	<b>15CXN-GNM-F</b>	<b>15CXN-NL-F</b>	—
	Non-disconnect	95	<b>15CXN-GNM-G</b>	<b>15CXN-NL-G</b>	—
	Disconnect	95	<b>25CXN-GDM-G</b>	<b>15CXN-DL-G</b>	<b>15CXN-DF-G</b>
120C, 200C Double barrel	Non-disconnect	95	<b>15CXN-GNM-D</b>	<b>15CXN-NL-D</b>	—
250C, 300C Double barrel	Non-disconnect	95	<b>15CXN-GNM-F</b>	<b>15CXN-NL-F</b>	—

**Notes**

<sup>①</sup> See **Page V4-T3-145** for diagram of typical mounting.

<sup>②</sup> End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

Type CXN

Type CXN Current Limiting Fuses 15.5 kV Maximum (14.4 kV Nominal)



Current Rating (Amperes)	Barrel Number	Interrupting Rating rms (kA Sym.)	Diameter	Length	Approximate Shipping Weight Lbs (kg)	Performance Curves			Catalog Number
						Minimum Melting Time	Total Clearing Time	Peak Let-Through Current	
45C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66674802	66675002	66665002	15CXN-45C
60C	1	50	3.00 (76.2)	18.80 (477.5)	8 (3.63)	66674802	66675002	66665002	15CXN-60C
75C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66674802	66675002	66665002	15CXN-75C
85C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66674802	66675002	66665002	15CXN-85C
100C	1	50	4.00 (101.6)	18.80 (477.5)	14 (6.36)	66674802	66675002	66665002	15CXN-100C
90C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66674804	66675004	66665002	2 X 45C 15CXN-90C
120C	2	50	3.00 (76.2)	18.80 (477.5)	16 (7.26)	66674804	66675004	66665002	2 X 60C 15CXN-120C
150C	2	50	4.00 (101.6)	18.80 (477.5)	28 (12.71)	66674804	66675004	66665002	2 X 75C 15CXN-150C
175C	2	50	4.00 (101.6)	18.80 (477.5)	28 (12.71)	66674804	66675004	66665002	2 X 85C 15CXN-175C

Type CXN Mountings and Hardware 15.5 kV Maximum (14.4 kV Nominal)

Ampere Rating	Fuse Mounting Type ①	Voltage LIWL (BIL)	Glass Polyester Insulator Mounting (Including Live Parts, End Fittings) ② Catalog Number	Live Parts ② Catalog Number	End Fittings (Disconnect Only) Catalog Number
45C–60C Single barrel	Non-disconnect	95	15CXN-GNM-D	15CXN-NL-D	—
	Non-disconnect	95	15CXN-GNM-G	15CXN-NL-G	—
	Disconnect	95	15CXN-GDM-G	15CXN-DL-G	15CXN-DF-G
75C–100C Single barrel	Non-disconnect	95	15CXN-GNM-F	15CXN-NL-F	—
	Non-disconnect	95	15CXN-GNM-G	15CXN-NL-G	—
	Disconnect	95	25CXN-GDM-G	15CXN-DL-G	15CXN-DF-G
90C, 120C Double barrel	Non-disconnect	95	15CXN-GNM-D	15CXN-NL-D	—
150C, 175C Double barrel	Non-disconnect	95	15CXN-GNM-F	15CXN-NL-F	—

Type CXF

Type CXF Indicated Full-Range Current-Limiting Fuses Mountings and Hardware

Maximum Design Voltage (kV)	Ampere Rating	Mounting Fuse Mounting Type	Voltage BIL (kV)	Catalog Number	Live Parts Catalog Number	End Fittings Catalog Number
5.5	80–100	Non-disconnect	—	—	CXN-NL-G	—
	125–200	Disconnect	—	—	CXN-GL-G	CXN-DF-G
10	6–18	Non-disconnect	75	8CX-GNM-G	CX-NL	—
	20–50	Disconnect	75	8CX-GDM-G	CX-DL	CX-DF
8.3	65–80	Non-disconnect	—	—	CXN-NL-G	—
	100–125	Disconnect	—	—	CXN-DL-G	CXN-DF-G
17.2	6–18	Non-disconnect	95	15CX-GNM-G	CX-NL	—
	20–50	Disconnect	95	15CX-GDM-G	CX-DL	CX-DF
15.5	65–80	Non-disconnect	—	—	CXN-NL-G	—
	100	Disconnect	—	—	CXN-DL-G	CXN-DF-G
23	6–18	Non-disconnect	—	—	CX-NL	—
	20–50	Disconnect	—	—	CX-DL	CX-DF

Notes

① See Page V4-T3-145 for diagram of typical mounting.

② End fittings supplied only when required.

Approximate Dimensions in Inches (mm).

# 3.5

## Power Breakers, Contactors and Fuses

### Current Limiting Fuses

#### Type DSL

6DSL-B1600

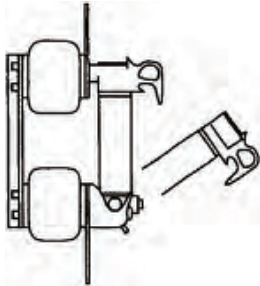


#### Type DSL Low Voltage Current Limiting Fuse

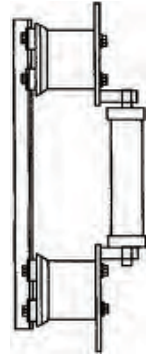
Fuse Type/Voltage	Interrupting Rating rms (kA Sym.)	Application Data (Time Current Curves)	Approximate Ship Wt. Lbs (kg)	Catalog Number
Type DSL fuse units 600V nominal	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A150</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A200</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A250</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A300</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A400</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A600</b>
	200	33-792 (2)	3.00 (1.4)	<b>6DSL-A800</b>
	200	33-792 (2)	4.00 (1.8)	<b>6DSL-B1200</b>
	200	33-792 (2)	4.00 (1.8)	<b>6DSL-B1600</b>
	200	33-792 (2)	4.00 (1.8)	<b>6DSL-B2000</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C800</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C1000</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C1200</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C1600</b>
	200	33-792 (3)	5.50 (2.5)	<b>6DSL-C2000</b>
	200	33-792 (3)	8.50 (3.9)	<b>6DSL-D2500</b>
	200	33-792 (3)	8.50 (3.9)	<b>6DSL-D3000</b>
	200	33-792	20.00 (9.1)	<b>6DSL-E2500</b>
	200	33-792	20.00 (9.1)	<b>6DSL-E3000</b>
	200	33-792	20.00 (9.1)	<b>6DSL-E4000</b>
200	33-792	24.00 (10.9)	<b>6DSL-F5000</b>	

**Typical Fuse Mounting for Current Limiting Fuses**

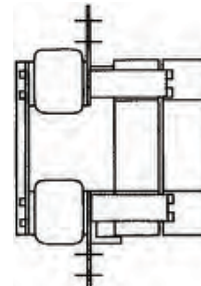
**Single Barrel Disconnect with 2.00-Inch (50.8 mm) Diameter CLE Fuses**



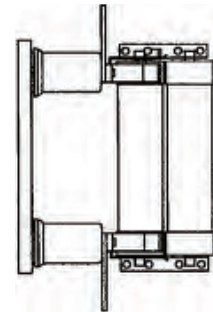
**Non-Disconnect (CX)**



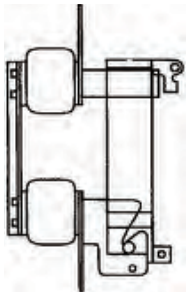
**Double-Barrel Non-Disconnect All 2.00-Inch (50.8 mm) and 3.00-Inch (76.2 mm) Diameter CL Fuses**



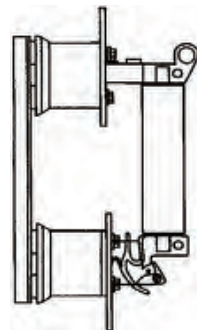
**Non-Disconnect (15CXN-GNM-F and 15CXN-GNM-D)**



**Single Barrel Disconnect All 3.00-Inch (76.2 mm) Diameter CLE Fuses**



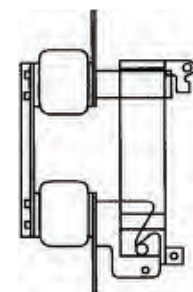
**Disconnect (CX)**



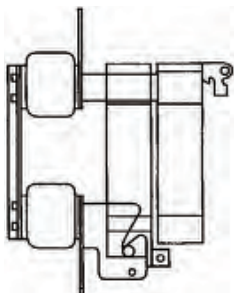
**Non-Disconnect (15CXN-GNM-G)**



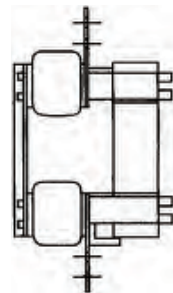
**Disconnect (15CXN-GNM-F)**



**Double Barrel Disconnect All 3.00-Inch (76.2 mm) Diameter CLE Fuses**



**Single-Barrel Non-Disconnect All 2.00-Inch (50.8 mm) and 3.00-Inch (76.2 mm) Diameter CL Fuses**

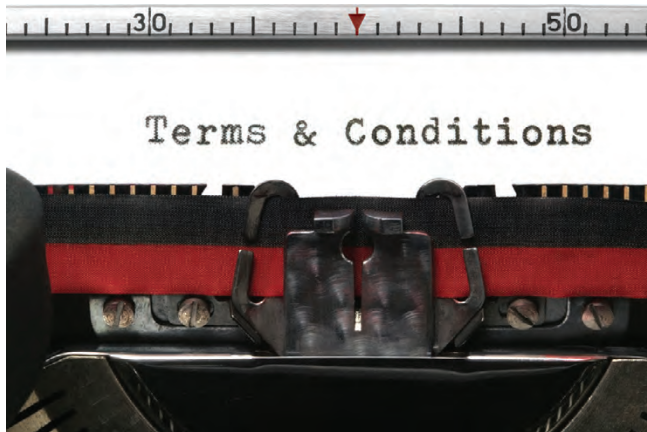


**Disconnect (15CXN-GNM-G)**





Eaton Terms & Conditions



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## Selling Policy (Supersedes Selling Policy 25-000, dated November 1, 2008)

### Terms and Conditions of Sale

The Terms and Conditions of Sale set forth herein, and any supplements which may be attached hereto, constitute the full and final expression of the contract for the sale of products or services (hereinafter referred to as Product(s) or Services by Eaton Corporation (hereinafter referred to as Seller) to the Buyer, and supersedes all prior quotations, purchase orders, correspondence or communications whether written or oral between the Seller and the Buyer. Notwithstanding any contrary language in the Buyer's purchase order, correspondence or other form of acknowledgment, Buyer shall be bound by these Terms and Conditions of Sale when it sends a purchase order or otherwise indicates acceptance of this contract, or when it accepts delivery from Seller of the Products or Services.

THE CONTRACT FOR SALE OF THE PRODUCTS OR SERVICES IS EXPRESSLY LIMITED TO THE TERMS AND CONDITIONS OF SALE STATED HEREIN. ANY ADDITIONAL OR DIFFERENT TERMS PROPOSED BY BUYER ARE REJECTED UNLESS EXPRESSLY AGREED TO IN WRITING BY SELLER. No contract shall exist except as herein provided.

#### **Complete Agreement**

No amendment or modification hereto nor any statement, representation or warranty not contained herein shall be binding on the Seller unless made in writing by an authorized representative of the Seller. Prior dealings, usage of the trade or a course of performance shall not be relevant to determine the meaning of this contract even though the accepting or acquiescing party had knowledge of the nature of the performance and opportunity for objection.

#### **Quotations**

Written quotations are valid for 30 days from its date unless otherwise stated in the quotation or terminated sooner by notice.

Verbal quotations, unless accepted, expire the same day they are made.

A complete signed order must be received by Seller within 20 calendar days of notification of award, otherwise the price and shipment will be subject to re-negotiation.

#### **Termination and Cancellation**

##### **Products**

Any order may be terminated by the Buyer only by written notice and upon payment of reasonable termination charges, including all progress billings and all incurred direct manufacturing costs.

##### **Services**

Any order may be terminated by the Buyer only by written notice and upon payment of reasonable termination charges including all costs plus profit.

Seller shall have the right to cancel any order at any time by written notice if Buyer breaches any of the terms hereof, becomes the subject of any proceeding under state or federal law for the relief of debtors, or otherwise becomes insolvent or bankrupt, generally does not pay its debts as they become due or makes an assignment for the benefit of creditors.

# Appendix 1—General Terms and Conditions of Sale

Effective Date: November 1, 2017

## **Prices**

All prices are subject to change without notice. In the event of a price change, the effective date of the change will be the date of the new price or discount sheet, letter or telegram. All quotations made or orders accepted after the effective date will be on the new basis. For existing orders, the price of the unshipped portion of an order will be the price in effect at time of shipment.

## **Price Policy—Products and Services**

When prices are quoted as firm for quoted shipment, they are firm provided the following conditions are met:

1. The order is released with complete engineering details.
2. Shipment of Products are made, and Services purchased are provided within the quoted lead time.
3. When drawings for approval are required for any Products, the drawings applicable to those Products must be returned within 30\* calendar days from the date of the original mailing of the drawings by Seller. The return drawings must be released for manufacture and shipment and must be marked "APPROVED" or "APPROVED AS NOTED." Drawing re-submittals which are required for any other reason than to correct Seller errors will not extend the 30-day period.

\* 60 days for orders through contractors to allow time for their review and approval before and after transmitting them to their customers.

If the Buyer initiates or in any way causes delays in shipment, provision of Services or return of approval drawings beyond the periods stated above, the price of the Products or Services will be increased 1% per month or fraction thereof up to a maximum of 18 months from the date of the Buyer's order. For delays resulting in shipment or provision of Services beyond 18 months from the date of the Buyer's order, the price must be renegotiated.

## **Price Policy—BLS**

Refer to Price Policy 25-050.

## **Minimum Billing**

Orders less than \$1,000 will be assessed a shipping and handling charge of 5% of the price of the order, with a minimum charge of \$25.00 unless noted differently on Product discount sheets.

## **Taxes**

The price does not include any taxes. Buyer shall be responsible for the payment of all taxes applicable to, or arising from the transaction, the Products, its sale, value, or use, or any Services performed in connection therewith regardless of the person or entity actually taxed.

## **Terms of Payment**

### **Products**

Acceptance of all orders is subject to the Buyer meeting Seller's credit requirements. Terms of payment are subject to change for failure to meet such requirements. Seller reserves the right at any time to demand full or partial payment before proceeding with a contract of sale as a result of changes in the financial condition of the Buyer. Terms of Payment are either Net 30 days from the date of invoice of each shipment or carry a cash discount based on Product type. Specific payment terms for Products are outlined in the applicable Product discount schedules.

### **Services**

Terms of payment are net within 30 days from date of invoice for orders amounting to less than \$50,000.00.

Terms of payment for orders exceeding \$50,000.00 shall be made according to the following:

1. Twenty percent (20%) of order value with the purchase order payable 30 days from date of invoice.
2. Eighty percent (80%) of order value in equal monthly payments over the performance period payable 30 days from date of invoice.

Except for work performed (i) under a firm fixed price basis or (ii) pursuant to terms of a previously priced existing contract between Seller and Buyer, invoices for work performed by Seller shall have added and noted on each invoice a charge of 3% (over and above the price of the work) which is related to Seller compliance with present and proposed environmental, health, and safety regulations associated with prescribed requirements covering hazardous materials management and employee training, communications, personal protective equipment, documentation and record keeping associated therewith.

### **Adequate Assurances**

If, in the judgment of Seller, the financial condition of the Buyer, at any time during the period of the contract, does not justify the terms of payment specified, Seller may require full or partial payment in advance.

### **Delayed Payment**

If payments are not made in accordance with these terms, a service charge will, without prejudice to the right of Seller to immediate payment, be added in an amount equal to the lower of 1.5% per month or fraction thereof or the highest legal rate on the unpaid balance.

**Freight**

Freight policy will be listed on the Product discount sheets, or at option of Seller one of the following freight terms will be quoted.

**F.O.B.—P/S—Frt./Ppd. and Invoiced**

Products are sold F.O.B. point of shipment freight prepaid and invoiced to the Buyer.

**F.O.B.—P/S—Frt./Ppd. and Allowed**

Products sold are delivered F.O.B. point of shipment, freight prepaid and included in the price.

**F.O.B. Destination—Frt./Ppd. and Allowed**

At Buyer's option, Seller will deliver the Products F.O.B. destination freight prepaid and 2% will be added to the net price.

The term "freight prepaid" means that freight charges will be prepaid to the accessible common carrier delivery point nearest the destination for shipments within the United States and Puerto Rico unless noted differently on the Product discount sheets. For any other destination, contact Seller's representative.

**Shipment and Routing**

Seller shall select the point of origin of shipment, the method of transportation, the type of carrier equipment and the routing of the shipment.

If the Buyer specifies a special method of transportation, type of carrier equipment, routing, or delivery requirement, Buyer shall pay all special freight and handling charges.

When freight is included in the price, no allowance will be made in lieu of transportation if the Buyer accepts shipment at factory, warehouse, or freight station or otherwise supplies its own transportation.

**Risk of Loss**

Risk of loss or damage to the Products shall pass to Buyer at the F.O.B. point.

**Concealed Damage**

Except in the event of F.O.B. destination shipments, Seller will not participate in any settlement of claims for concealed damage.

When shipment has been made on an F.O.B. destination basis, the Buyer must unpack immediately and, if damage is discovered, must:

1. Not move the Products from the point of examination.
2. Retain shipping container and packing material.
3. Notify the carrier in writing of any apparent damage.
4. Notify Seller representative within 72 hours of delivery.
5. Send Seller a copy of the carrier's inspection report.

**Witness Tests/Customer Inspection**

Standard factory tests may be witnessed by the Buyer at Seller's factory for an additional charge calculated at the rate of \$2,500 per day (not to exceed eight (8) hours) per Product type. Buyer may final inspect Products at the Seller's factory for \$500 per day per Product type.

Witness tests will add one (1) week to the scheduled shipping date. Seller will notify Buyer fourteen (14) calendar days prior to scheduled witness testing or inspection. In the event Buyer is unable to attend, the Parties shall mutually agree on a rescheduled date. However, Seller reserves the right to deem the witness tests waived with the right to ship and invoice Products.

**Held Orders**

For any order held, delayed or rescheduled at the request of the Buyer, Seller may, at its sole option (1) require payment to be based on any reasonable basis, including but not limited to the contract price, and any additional expenses, or cost resulting from such a delay; (2) store Products at the sole cost and risk of loss of the Buyer; and/ or (3) charge to the Buyer those prices under the applicable price policy. Payment for such price, expenses and costs, in any such event, shall be due by Buyer within thirty (30) days from date of Seller's invoice. Any order so held delayed or rescheduled beyond six (6) months will be treated as a Buyer termination.

**Drawing Approval**

Seller will design the Products in line with, in Seller's judgment, good commercial practice. If at drawing approval Buyer makes changes outside of the design as covered in their specifications, Seller will then be paid reasonable charges and allowed a commensurate delay in shipping date based on the changes made.

**Drawing Re-Submittal**

When Seller agrees to do so in its quotation, Seller shall provide Buyer with the first set of factory customer approval drawing(s) at Seller's expense. The customer approval drawing(s) will be delivered at the quoted delivery date. If Buyer requests drawing changes or additions after the initial factory customer approval drawing(s) have been submitted by Seller, the Seller, at its option, may assess Buyer drawing charges. Factory customer approval drawing changes required due to misinterpretation by Seller will be at Seller's expense. Approval drawings generated by Bid Manager are excluded from this provision.

**Warranty****Warranty for Products**

Seller warrants that the Products manufactured by it will conform to Seller's applicable specifications and be free from failure due to defects in workmanship and material for one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

In the event any Product fails to comply with the foregoing warranty, Seller will, at its option, either (a) repair or replace the defective Product, or defective part or component thereof, F.O.B. Seller's facility freight prepaid, or (b) credit Buyer for the purchase price of the Product. All warranty claims shall be made in writing.

Seller requires all non-conforming Products be returned at Seller's expense for evaluation unless specifically stated otherwise in writing by Seller.

This warranty does not cover failure or damage due to storage, installation, operation or maintenance not in conformance with Seller's recommendations and industry standard practice or due to accident, misuse, abuse or negligence. This warranty does not cover reimbursement for labor, gaining access, removal, installation, temporary power or any other expenses, which may be incurred in connection with repair or replacement.

This warranty does not apply to equipment not manufactured by Seller. Seller limits itself to extending the same warranty it receives from the supplier.

# Appendix 1—General Terms and Conditions of Sale

Effective Date: November 1, 2017

## **Extended Warranty for Products**

If requested by the Buyer and specifically accepted in writing by Seller, the foregoing standard warranty for Products will be extended from the date of shipment for the period and price indicated below:

- 24 months—2% of Contract Price
- 30 months—3% of Contract Price
- 36 months—4% of Contract Price

## **Special Warranty (In and Out) for Products**

If requested by the Buyer and specifically accepted in writing by Seller, Seller will, during the warranty period for Products, at an additional cost of 2% of the contract price, be responsible for the direct cost of:

1. Removing the Product from the installed location.
2. Transportation to the repair facility and return to the site.
3. Reinstallation on site.

The total liability of Seller for this Special Warranty for Products is limited to 50% of the contract price of the particular Product being repaired and excludes expenses for removing adjacent apparatus, walls, piping, structures, temporary service, etc.

## **Warranty for Services**

Seller warrants that the Services performed by it hereunder will be performed in accordance with generally accepted professional standards.

The Services, which do not so conform, shall be corrected by Seller upon notification in writing by the Buyer within one (1) year after completion of the Services.

Unless otherwise agreed to in writing by Seller, Seller assumes no responsibility with respect to the suitability of the Buyer's, or its customer's, equipment or with respect to any latent defects in equipment not supplied by Seller. This warranty does not cover damage to Buyer's, or its customer's, equipment, components or parts resulting in whole or in part from improper maintenance or operation or from their deteriorated condition. Buyer will, at its cost, provide Seller with unobstructed access to the defective Services, as well as adequate free working space in the immediate vicinity of the defective Services and such facilities and systems, including, without limitation, docks, cranes and utility disconnects and connects, as may be necessary in order that Seller may perform its warranty obligations. The conducting of any tests shall be mutually agreed upon and Seller shall be notified of, and may be present at, all tests that may be made.

## **Warranty for Power Systems Studies**

Seller warrants that any power systems studies performed by it will conform to generally accepted professional standards. Any portion of the study, which does not so conform, shall be corrected by Seller upon notification in writing by the Buyer within six (6) months after completion of the study. All warranty work shall be performed in a single shift straight time basis Monday through Friday. In the event that the study requires correction of warranty items on an overtime schedule, the premium portion of such overtime shall be for the Buyer's account.

## **Limitation on Warranties for Products, Services and Power Systems Studies**

THE FOREGOING WARRANTIES ARE EXCLUSIVE EXCEPT FOR WARRANTY OF TITLE. SELLER DISCLAIMS ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

CORRECTION OF NON-CONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE SELLER'S SOLE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR FAILURE OF SELLER TO MEET ITS WARRANTY OBLIGATIONS, WHETHER CLAIMS OF THE BUYER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE.

## **Asbestos**

Federal Law requires that building or facility owners identify the presence, location and quantity of asbestos containing material (hereinafter "ACM") at work sites. Seller is not licensed to abate ACM. Accordingly, for any contract which includes the provision of Services, prior to (i) commencement of work at any site under a specific Purchase Order, (ii) a change in the work scope of any Purchase Order, the Buyer will certify that the work area associated with the Seller's scope of work includes the handling of Class II ACM, including but not limited to generator wedges and high temperature gaskets which include asbestos materials. The Buyer shall, at its expense, conduct abatement should the removal, handling, modification or reinstallation, or some or all of them, of said Class II ACM be likely to generate airborne asbestos fibers; and should such abatement affect the cost of or time of performance of the work, then Seller shall be entitled to an equitable adjustment in the schedule, price and other pertinent affected provisions of the contract.

## **Compliance with Nuclear Regulation**

Seller's Products are sold as commercial grade Products not intended for application in facilities or activities licensed by the United States Nuclear Regulatory Commission for atomic purposes. Further certification will be required for use of the Products in any safety-related application in any nuclear facility licensed by the U.S. Nuclear Regulatory Commission.

## **Returning Products**

Authorization and shipping instructions for the return of any Products must be obtained from Seller before returning the Products.

When return is occasioned due to Seller error, full credit including all transportation charges will be allowed.

## **Product Notices**

Buyer shall provide the user (including its employees) of the Products with all Seller supplied Product notices, warnings, instructions, recommendations, and similar materials.

## **Force Majeure**

Seller shall not be liable for failure to perform or delay in performance due to fire, flood, strike or other labor difficulty, act of God, act of any governmental authority or of the Buyer, riot, embargo, fuel or energy shortage, car shortage, wrecks or delays in transportation, or due to any other cause beyond Seller's reasonable control. In the event of delay in performance due to any such cause, the date of delivery or time for completion will be extended by a period of time reasonably necessary to overcome the effect of such delay.

## **Liquidated Damages**

Contracts which include liquidated damage clauses for failure to meet shipping or job completion promises are not acceptable or binding on Seller, unless such clauses are specifically accepted in writing by an authorized representative of the Seller at its headquarters office.

## **Patent Infringement**

Seller will defend or, at its option, settle any suit or proceeding brought against Buyer, or Buyer's customers, to the extent it is based upon a claim that any Product or part thereof, manufactured by Seller or its subsidiaries and furnished hereunder, infringes any United States patent, other than a claim of infringement based upon use of a Product or part thereof in a process, provided Seller is notified in reasonable time and given authority, information and assistance (at Seller's expense) for the defense of same. Seller shall pay all legal and court costs and expenses and court-assessed damages awarded therein against Buyer resulting from or incident to such suit or proceeding. In addition to the foregoing, if at any time Seller determines there is a substantial question of infringement of any United States patent, and the use of such Product is or may be enjoined, Seller may, at its option and expense: either (a) procure for Buyer the right to continue using and selling the Product; (b) replace the Product with non-infringing apparatus; (c) modify the Product so it becomes non-infringing; or (d) as a last resort, remove the Product and refund the purchase price, equitably adjusted for use and obsolescence. In no case does Seller agree to pay any recovery based upon its Buyer's savings or profit through use of Seller's Products whether the use be special or ordinary. The foregoing states the entire liability of Seller for patent infringement.

The preceding paragraph does not apply to any claim of infringement based upon: (a) any modification made to a Product other than by Seller; (b) any design and/or specifications of Buyer to which a Product was manufactured; or (c) the use or combination of Product with other products where the Product does not itself infringe. As to the above-identified claim situations where the preceding paragraph does not apply, Buyer shall defend and hold Seller harmless in the same manner and to the extent as Seller's obligations described in the preceding paragraph. Buyer shall be responsible for obtaining (at Buyer's expense) all license rights required for Seller to be able to use software products in the possession of Buyer where such use is required in order to perform any Service for Buyer.

With respect to a Product or part thereof not manufactured by Seller or its subsidiaries, Seller will attempt to obtain for Buyer, from the supplier(s), the patent indemnification protection normally provided by the supplier(s) to customers.

## **Compliance with OSHA**

Seller offers no warranty and makes no representation that its Products comply with the provisions or standards of the Occupational Safety and Health Act of 1970, or any regulation issued thereunder. In no event shall Seller be liable for any loss, damage, fines, penalty or expenses arising under said Act.

## **Limitation of Liability**

THE REMEDIES OF THE BUYER SET FORTH IN THIS CONTRACT ARE EXCLUSIVE AND ARE ITS SOLE REMEDIES FOR ANY FAILURE OF SELLER TO COMPLY WITH ITS OBLIGATIONS HEREUNDER.

NOTWITHSTANDING ANY PROVISION IN THIS CONTRACT TO THE CONTRARY, IN NO EVENT SHALL SELLER BE LIABLE IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE FOR DAMAGE TO PROPERTY OR EQUIPMENT OTHER THAN PRODUCTS SOLD HEREUNDER, LOSS OF PROFITS OR REVENUE, LOSS OF USE OF PRODUCTS, COST OF CAPITAL, CLAIMS OF CUSTOMERS OF THE BUYER OR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, REGARDLESS OF WHETHER SUCH POTENTIAL DAMAGES ARE FORESEEABLE OR IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THE TOTAL CUMULATIVE LIABILITY OF SELLER ARISING FROM OR RELATED TO THIS CONTRACT WHETHER THE CLAIMS ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE, SHALL NOT EXCEED THE PRICE OF THE PRODUCT OR SERVICES ON WHICH SUCH LIABILITY IS BASED.

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Supplementary Protectors . . . . .	V4-T1-100–V4-T1-105
UL 1053 DIN Rail RCCB 480/277 Vac	
Accessories . . . . .	V4-T1-96
Miniature Circuit Breakers and	
Supplementary Protectors . . . . .	V4-T1-94–V4-T1-99
UL 1077 DIN Rail Supplementary Protectors, FAZ	
Accessories . . . . .	V4-T1-82

UL 489 DIN Rail Miniature Circuit Breakers	
Miniature Circuit Breakers and	
Supplementary Protectors	
FAZ . . . . .	V4-T1-74–V4-T1-93
FAZ-NA . . . . .	V4-T1-47–V4-T1-73
UL 489 DIN Rail Miniature Circuit Breakers, FAZ-NA	
Accessories . . . . .	V4-T1-62
UL Lockoff Device	
UL 489 DIN Rail Miniature Circuit Breakers, FAZ-NA	
Accessories . . . . .	V4-T1-62
Undervoltage Release	
Molded Case Circuit Breakers, Speciality Breakers,	
PVGard Solar Circuit Breakers	
Accessories . . . . .	V4-T2-462
Power Circuit Breakers, Magnum	
Accessories . . . . .	V4-T3-30
Undervoltage Release Mechanism	
Molded Case Circuit Breakers, Series C, Internal	
Accessories . . . . .	V4-T2-390
Molded Case Circuit Breakers, Series G, Internal	
Accessories . . . . .	V4-T2-214
Molded Case Circuit Breakers, Speciality Breakers,	
Direct Current	
Accessories . . . . .	V4-T2-453
Molded Case Circuit Breakers, Speciality Breakers,	
E <sup>2</sup> Mining Service	
Accessories . . . . .	V4-T2-488
Universal Rotary	
Handle Mechanisms—Series C	
Molded Case Circuit Breakers . . . . .	V4-T2-516
Handle Mechanisms—Series G	
Molded Case Circuit Breakers . . . . .	V4-T2-502

## V

Voltage Trips	
UL 1077 DIN Rail Supplementary Protectors, FAZ	
Accessories . . . . .	V4-T1-82
UL 489 DIN Rail Miniature Circuit Breakers, FAZ-NA	
Accessories . . . . .	V4-T1-62

## W

Walking Beam Interlock	
Molded Case Circuit Breakers, Series C, External	
Accessories . . . . .	V4-T2-423
Wire Seal	
Molded Case Circuit Breakers, Series G	
Accessories, Digitrip 310+ Electronic Trip Unit . . .	V4-T2-210
Wohner Busbar Adapter	
Molded Case Circuit Breakers, Series G, External	
Accessories . . . . .	V4-T2-211

## Z

Zone Interlock Kits	
Molded Case Circuit Breakers, Series C, Internal	
Accessories . . . . .	V4-T2-397