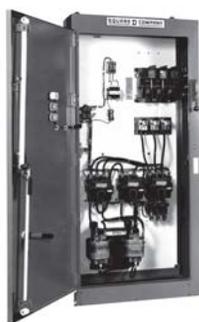


Section 15

Operating Mechanisms and Disconnect Switches



Electromechanical
Reduced Voltage Starter

| | |
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| IEC Style Disconnect Switches | 15-2 |
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200 A Switch

30 A Side Handle
GS1EERU30

Compact 30 A Switch

**Table 15.3: Fusible Switches with Direct Mount
Side Handle**

| Catalog No. | Description |
|-------------|---|
| GS1EERU20 | 30 A, 2-pole, Class CC |
| GS1EERU30 | 30 A, 3-pole, Class CC |
| GS1AH01 | Right-side handle for GS1EERU20 and GS1EERU30 |

For example:

LK3SU3 (600 A nonfusible switch, use 15x15 shaft)
 + GS1AE6 (15x15 200 mm Type H shaft)
 + LK3AH150 (black/black, lockable)

To add auxiliary contacts:

For front-mounted contacts order
 GS1AD30 (front-mounted auxiliary contact holder)
 + GS1AM110 (NO contact for GS1AD10, 20, 30)

Catalog Number Identification System

The GS1 part numbers can be identified as shown in Table 15.1.
 See Catalog 9421CT0301 for specific applications.

Table 15.1: Identification System

| GS1 | | D | U | 3 |
|--|--|-----|--------------------------|---|
| Model GS1 Fusible (Class J fuse unless noted), LK3 Nonfusible | | | | |
| Current Range, Operator Type (front operator unless noted), Accessory Type | | | | |
| D | 30 A front and side operation | T | 800 A (Class L if fused) | |
| DD | 30 A Class CC front and side operation | U | 1000 A | |
| E | 30 A | W | 1200 A | |
| EE | 30 A Class CC | AH | handle | |
| G | 60 A | AHT | handle with test | |
| J | 100 A | AE | extension shaft | |
| M | 200 A | AD | auxiliary contact holder | |
| Q | 400 A | AM | auxiliary contact | |
| S | 600 A | | | |
| UL Certification | | | | |
| Poles—Number of Poles, 2 or 3 | | | | |

NOTE: All fusible switches through 400 A, and nonfused switches through 200 A, are equipped with a feature to test the optional auxiliary contacts without energizing the load, when the appropriate GS1AHT*** handle is used.

Table 15.2: Fusible Switches, 3-pole

| Catalog No. | Rating | Fuses | Shaft to Use |
|---|--------|----------|--------------|
| Compact GS1 Fusible IEC Style Disconnect Switches | | | |
| GS1DDU3 | 30 A | Class CC | 5x5 shaft |
| GS1DU3 | 30 A | Class J | 5x5 shaft |
| GS1 Fusible IEC Style Disconnect Switches | | | |
| GS1EEU3 | 30 A | Class CC | 10x10 shaft |
| GS1EU3 | 30 A | Class J | 10x10 shaft |
| GS1GU3 | 60 A | Class J | 10x10 shaft |
| GS1JU3 [1] [2] | 100 A | Class J | 10x10 shaft |
| GS1MU3 [1] [2] | 200 A | Class J | 10x10 shaft |
| GS1QU3 [1] | 400 A | Class J | 10x10 shaft |
| GS1SU3 [1] [2] | 600 A | Class J | 15x15 shaft |
| GS1TU3 [1] | 800 A | Class L | 15x15 shaft |

Table 15.4: Nonfusible Switches, 3-pole

| Catalog No. | Rating | Shaft to Use |
|--|--------|--------------|
| Compact LK3 Nonfusible IEC Style Disconnect Switches | | |
| LK3DU3 [2] | 30 A | 5x5 shaft |
| LK3 Nonfusible IEC Style Disconnect Switches | | |
| LK3GU3 | 60 A | 10x10 shaft |
| LK3JU3 [2] | 100 A | 10x10 shaft |
| LK3MU3 [1] | 200 A | 10x10 shaft |
| LK3QU3 [1] | 400 A | 15x15 shaft |
| LK3SU3 [1] | 600 A | 15x15 shaft |
| LK3TU3 [1] | 800 A | 15x15 shaft |
| LK3UU3 [1] | 1000 A | 15x15 shaft |
| LK3WU3 [1] | 1200 A | 15x15 shaft |

Example of the parts to order to build a complete GS or LK switch:

| Choose a Switch | + | Shaft | + | Handle Assembly | + | Lugs, if needed |
|-----------------|---|----------------------|---|------------------------|---|--------------------|
| 600 A, LK3SU3 | | Shaft 200 mm, GS1AE6 | | Black Handle, LK3AH150 | | Lugs Kit, GS1AW503 |



[1] Shipped with line side terminal shrouds—for additional shrouds, see Table 15.12. Terminal lug must be ordered separately—see Table 15.11.

[2] Obsolete.



GS1AH101 GS1AH102
Type D—alternate handles for compact switches only



GS1AE7/AE71 Shafts
5 mm x 5 mm
Compact Shaft Kits



GS1AH110 GS1AH120
Type G—Standard Handle Design

Use these shaft kits when using compact switches:



GS1AE8/AE81 Shafts
5 mm x 5 mm



LK3AH160 GS1AE6



GS1AE2/AE21 Shafts

Handles

Table 15.5: Operating Handles for Compact GS1 and LK3 for Use with Shaft Type D

| Type | | Defeatable | Padlockable | Color | Operation | Catalog Number |
|---------|------|------------|-------------|------------|--------------|----------------|
| NEMA/UL | IEC | | | | | |
| 1, 12 | IP54 | Yes | Yes | Black | Off/On (O/I) | GS1AH101 |
| | | | | Red/Yellow | | GS1AH102 |

Table 15.6: Operating Handles for Compact GS1 and LK3 for Use with Shaft Type G

| Type | | Defeatable | Padlockable | Color | Operation | Catalog Number |
|------------------|------|------------|-------------|------------|---------------------|----------------|
| NEMA/UL | IEC | | | | | |
| 1, 3R, 12 | IP54 | Yes | Yes | Black | Off/On (O/I) | GS1AH110 |
| | | | | Red/Yellow | Off/On (O/I) | GS1AH120 |
| | | | | Black | Test/Off/On (T/O/I) | GS1AHT110 |
| | | | | Red/Yellow | Test/Off/On (T/O/I) | GS1AHT120 |
| 1, 3R, 4, 4X, 12 | IP65 | Yes | Yes | Black | Off/On (O/I) | GS1AH410 [3] |
| | | | | Red/Yellow | Off/On (O/I) | GS1AH420 |
| | | | | Black | Test/Off/On (T/O/I) | GS1AHT410 |
| | | | | Red/Yellow | Test/Off/On (T/O/I) | GS1AHT420 |

Table 15.7: Operating Handles for Standard GS1 and LK3

| Type | | Defeatable | Padlockable | Color | Operation | Catalog Number |
|---|------|------------|-------------|------------|---------------------|----------------|
| NEMA/UL | IEC | | | | | |
| GS1 30–100 A and LK3 60–100 A (3 in. handles) | | | | | | |
| 1, 3R, 12 | IP54 | Yes | Yes | Black | Off/On (O/I) | GS1AH110 |
| | | | | Red/Yellow | Off/On (O/I) | GS1AH120 |
| | | | | Black | Test/Off/On (T/O/I) | GS1AHT110 |
| | | | | Red/Yellow | Test/Off/On (T/O/I) | GS1AHT120 |
| 1, 3R, 4, 4X, 12 | IP65 | Yes | Yes | Black | Off/On (O/I) | GS1AH410 |
| | | | | Red/Yellow | Off/On (O/I) | GS1AH420 |
| | | | | Black | Test/Off/On (T/O/I) | GS1AHT410 |
| | | | | Red/Yellow | Test/Off/On (T/O/I) | GS1AHT420 |
| GS1 200–400 A and LK3 200 A (5 in. handles) | | | | | | |
| 1, 3R, 12 | IP54 | Yes | Yes | Black | Off/On (O/I) | GS1AH130 |
| | | | | Red/Yellow | Off/On (O/I) | GS1AH140 |
| | | | | Black | Test/Off/On (T/O/I) | GS1AHT130 |
| | | | | Red/Yellow | Test/Off/On (T/O/I) | GS1AHT140 |
| 1, 3R, 4, 4X, 12 | IP65 | Yes | Yes | Black | Off/On (O/I) | GS1AH430 |
| | | | | Red/Yellow | Off/On (O/I) | GS1AH440 |

Table 15.8: Operating Handles for Use with Shaft Type H

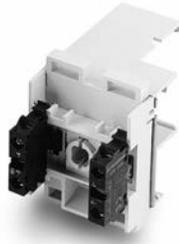
| Type | | Defeatable | Padlockable | Color | Operation | Catalog Number |
|--------------------|------|------------|-------------|------------|--------------|----------------|
| NEMA/UL | IEC | | | | | |
| For LK3 400–1200 A | | | | | | |
| 1, 3R, 4, 4X, 12 | IP65 | No | Yes | Black | Off/On (O/I) | LK3AH150 [3] |
| | | No | | Red/Yellow | | LK3AH160 [3] |
| | | Yes | | Black | | LK3AH170 |
| | | Yes | | Red/Yellow | | LK3AH180 |
| For GS1 600–800 A | | | | | | |
| 1, 3R, 4, 4X, 12 | IP65 | No | Yes | Black | Off/On (O/I) | LK3AH150 [3] |
| | | No | | Red/Yellow | | LK3AH160 [3] |
| | | Yes | | Black | | GS1AH170 |
| | | Yes | | Red/Yellow | | GS1AH180 [3] |

NOTE: UL approved for indoor or outdoor applications.

Table 15.9: Shafts

| Length | Length | | Catalog No. |
|--|--------|-----|-------------|
| | in. | mm | |
| Shaft 5 mm x 5 mm—For use with Operating Handles, Type D | | | |
| 12.6 | | 320 | GS1AE7 |
| 15.7 | | 400 | GS1AE71 [3] |
| Shaft 5 mm x 5 mm—For use with Operating Handles, Type G | | | |
| 12.6 | | 320 | GS1AE8 [3] |
| 15.7 | | 400 | GS1AE81 |
| Shaft 10 mm x 10 mm—For Standard GS1 and LK3 | | | |
| 12.6 | | 320 | GS1AE2 |
| 15.7 | | 400 | GS1AE21 |
| Shaft 15 mm x 15 mm—For use with Operating Handles, Type H | | | |
| 7.9 | | 200 | GS1AE6 [3] |
| 15.7 | | 400 | GS1AE61 [3] |

[3] Obsolete.

GS1AD10 +
GS1AM110GS1AD20 +
GS1AM110GS1AD30 +
GS1AM110

Terminal Lugs



Terminal Shrouds



Shorting Links

Accessories

Table 15.10: Auxiliary Contacts

| Type | Description | Catalog No. |
|--------------------------------|--|--------------|
| For Compact LK3 / GS1 | | |
| U = Upper or Top mounted | Standard products allow up to 4 auxiliary contacts without any extra contact holders. Contact holder (for 5 to 8 auxiliary contacts) | GS1AD10 |
| 10 A | 1 N.O. Contact Block | GS1AM110 |
| 600 Vac | 1 N.C. Contact Block | GS1AM101 |
| For LK3 60–200 A, GS1 30–400 A | | |
| U = Upper or Top mounted | Contact holder required (for 1 to 8 upper auxiliary contacts) | GS1AD20 |
| 10 A | 1 N.O. Contact Block | GS1AM110 |
| 600 Vac | 1 N.C. Contact Block | GS1AM101 |
| S = Side mounted [4] | 1 N.O. & N.C. Contact Block (max of two blocks—any mix) | GS1AN11 |
| | 2 N.O. & N.C. Contact Block (max of two blocks—any mix) | GS1AN22 |
| S = Side mounted [4] | 1 N.O. & N.C. Contact Block w/ Test (max of two blocks—any mix) | GS1ANT11 [5] |
| | 2 N.O. & N.C. Contact Block w/ Test (max of two blocks—any mix) | GS1ANT22 [5] |
| For LK3 400–1200 A | | |
| U = Upper or Top mounted | Contact holder (for 1 to 4 auxiliary contacts) | LK3AD30 |
| 10 A | 1 N.O. Contact Block | GS1AM110 |
| 600 Vac | 1 N.C. Contact Block | GS1AM101 |
| For GS1 600–800 A | | |
| Micro-switch (top mounted) | 1 N.O./N.C. Contact | GS1AMU3 [5] |
| | 2 N.O./N.C. Contact | GS1AMU4 [5] |

Table 15.11: Terminal Lugs

| For Use On | Wire Size (AWG) | No. of Wires per Lug | Wire Type | Lugs per Kit | Catalog No. |
|--------------------------------|-----------------|----------------------|-----------|--------------|--------------|
| Compact GS1/LK3 | 14–10 | 1 | Cu | — | Standard |
| GS1 30 A CC | 14–10 | 1 | Cu | — | Standard |
| GS1 30 A J | 14–10 | 1 | Cu | — | Standard |
| GS1/LK3 60 A J | 10–3 | 1 | Cu | — | Standard |
| LK3 100 A | 14–2/0 | 1 | Cu | — | Standard |
| GS1 100 A | 14–2/0 | 1 | Cu/Al | 6 | GS1AW303 |
| GS1/LK3 200 A | 6–3/0 | 1 | Cu/Al | 6 | GS1AW403 |
| GS1/LK3 400–600 A [6] | 2 x 2–2 x 600 | 2 | Cu/Al | 6 | GS1AW503 |
| GS1/LK3 800 A / LK3 1000 A [6] | 3 x 2–3 x 600 | 3 | Cu/Al | 6 | GS1AW803 [5] |
| LK3 1250 A [6] | 4 x 2–4 x 600 | 2 | Cu/Al | 12 | GS1AW903 |

Table 15.12: Terminal Shrouds

| For Use On | Catalog No. |
|---------------------------|-------------|
| For Line or Load Side [7] | |
| Compact GS1/LK3 | Standard |
| All GS1/LK3 30 A | Standard |
| All GS1/LK3 60 A | Standard |
| LK3 100 A | Standard |
| GS1 100 A [8] | GS1AP33 |
| GS1/LK3 200 A [8] | GS1AP43 |
| GS1 400 A | GS1AP63 |
| LK3 400–600 A | LK3AP63 |
| GS1 600–800 A | GS1AP83 |
| LK3 800–1250 A | LK3AP83 |

Table 15.13: Shorting Links

| For Use On | Shorting Links per Kit | Catalog No. |
|---------------|------------------------|-------------|
| GS1 60 A | 3 | GS1AU203 |
| GS1 100 A | | GS1AU303 |
| GS1 200 A | | GS1AU403 |
| GS1 400 A | | GS1AU503 |
| GS1 600–800 A | | GS1AU803 |

Table 15.14: Shaft Padlocking Kit

| For Use On | Catalog No. |
|-----------------|-------------|
| Compact GS1/LK3 | Standard |
| LK3 60–200 A | |
| GS1 30–400 A | |
| LK3 400–1250 A | |

[4] A GS1AN** contact block may not be used on the same switch as a GS1ANT**. A single switch must use all GS1AN11/GS1AN22 contact blocks or all GS1ANT11/GS1ANT22 contact blocks.

[5] Obsolete.

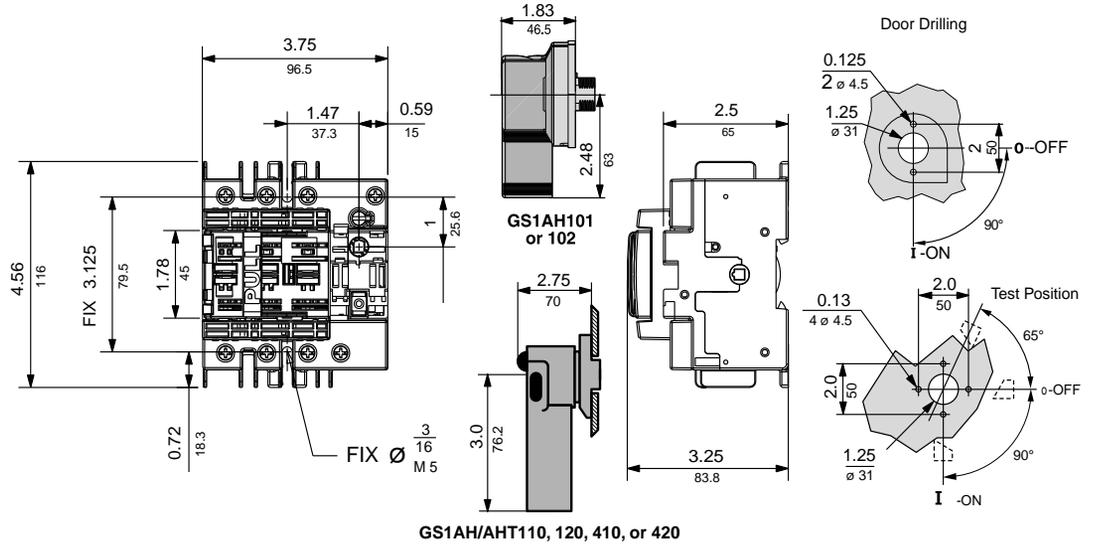
[6] GS1 600–800 A and LK3 800–1250 A can receive 1 lug for 3 cables per terminal or 2 lugs for 2 cables per terminal.

[7] All GS1 and LK3 switches are provided with line side shrouding.

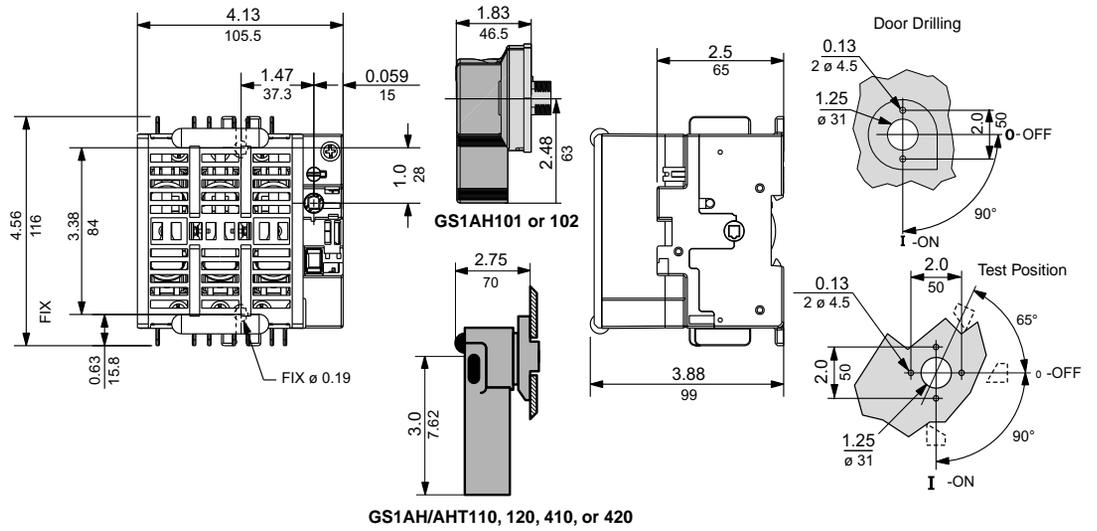
[8] Three-piece kit for either the line or load side.

GS1DDU3
Compact
30 A rating
Class CC fuses

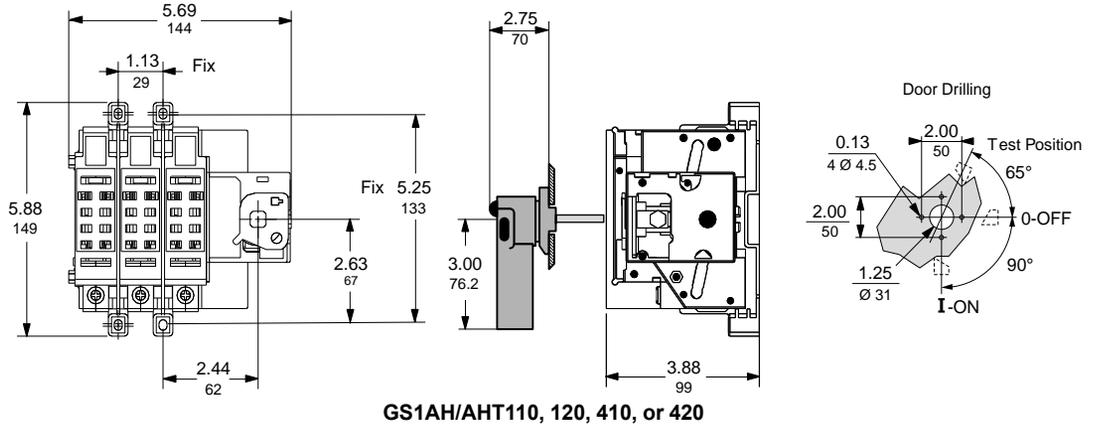
Dimensions



GS1DU3
Compact
30 A rating
Class J fuses

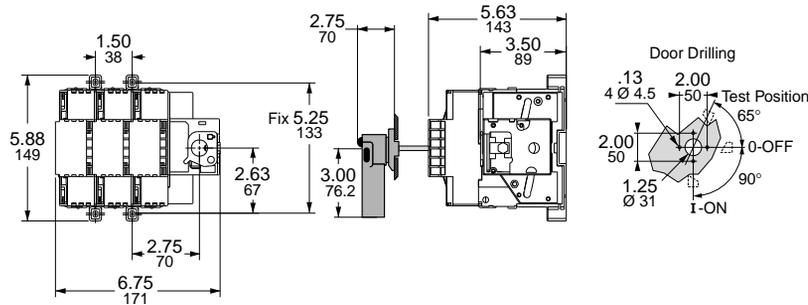


GS1EEU3
30 A rating
Class CC fuses



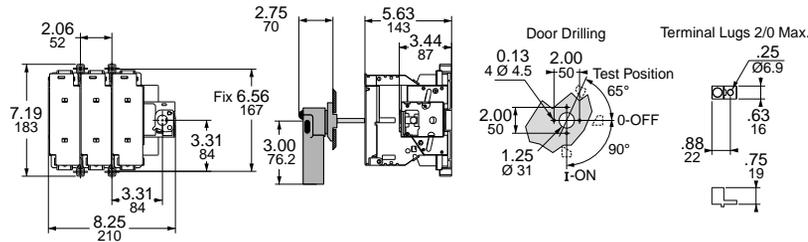
GS1 Dimensions

**GS1EU3/GS1GU3,
30 and 60 A (Class J)**



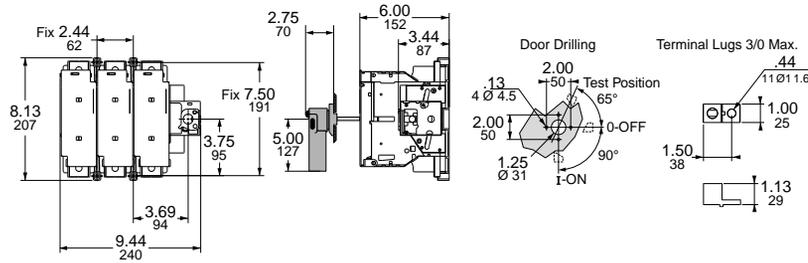
Mounting Hole Dimension:
0.19 in. (4.8 mm)

**GS1JU3,
100 A (Class J)**



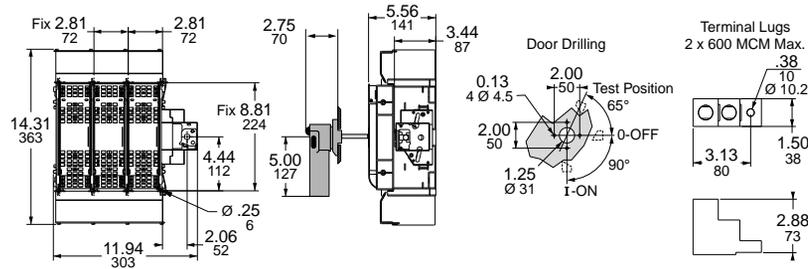
Mounting Hole Dimension:
0.19 in. (4.8 mm)

**GS1MU3,
200 A (Class J)**



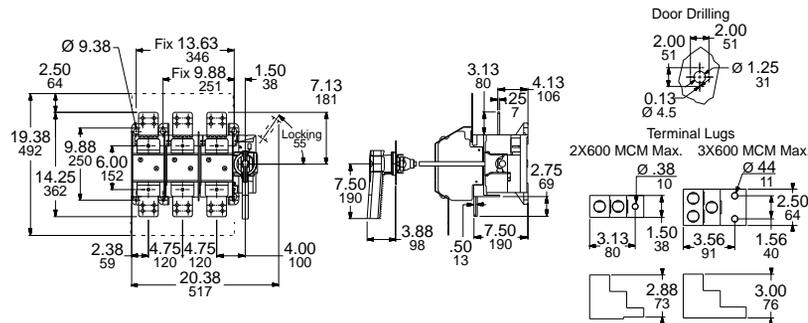
Mounting Hole Dimension:
0.19 in. (4.8 mm)

**GS1QU3,
400 A (Class J)**



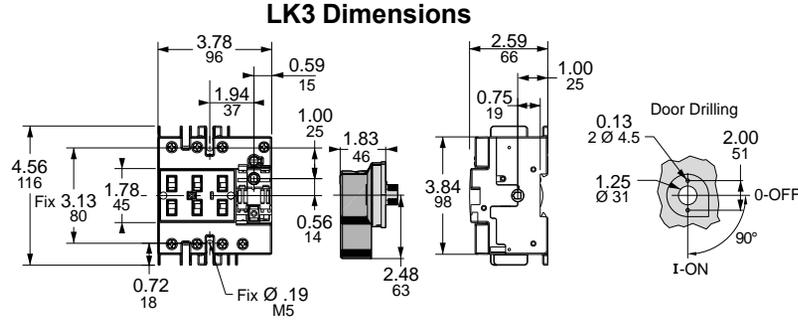
Mounting Hole Dimension:
0.25 in. (6.3 mm)

**GS1SU3/GS1TU3,
600 A (Class J) and
800 A (Class L)**



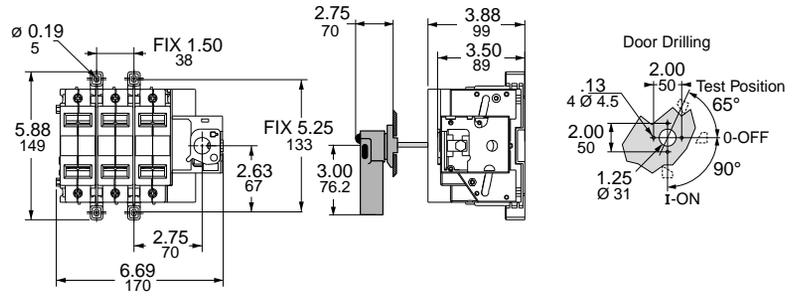
Mounting Hole Dimension:
0.38 in. (9.6 mm)

**LK3DU3,
Compact LK3
30 A**



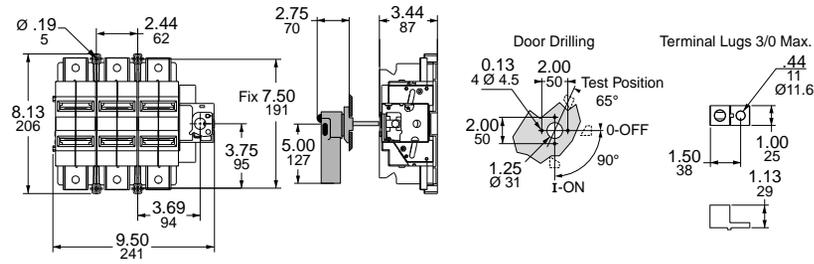
Mounting Hole
Dimension:
0.19 in. (4.8 mm)

**LK3GU3/LK3JU3,
60 and 100 A**



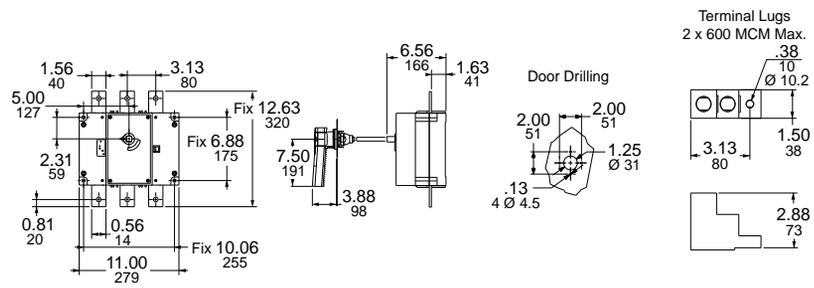
Mounting Hole
Dimension:
0.19 in. (4.8 mm)

**LK3MU3,
200 A**



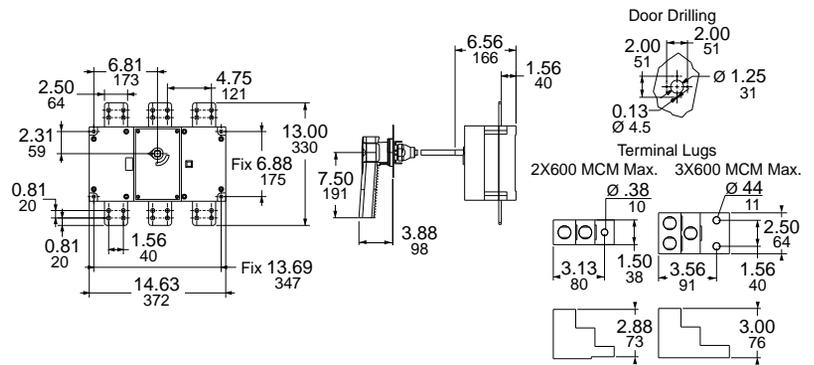
Mounting Hole
Dimension:
0.19 in. (4.8 mm)

**LK3QU3/LK3SU3,
400 and 600 A**



Mounting Hole
Dimension:
0.25 in. (6.3 mm)

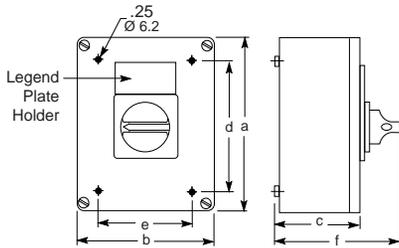
**LK3TU3/LK3UU3/
LK3WU3,
800, 1000, and 1250 A**



Mounting Hole
Dimension:
0.38 in. (9.6 mm)



Non-Metallic Enclosure



VC1GU-VC6GU

Vario

The Vario motor disconnect switch is also offered as an enclosed switch made of corrosion resistant material. The 3-pole version makes the Vario switch ideal for manual motor control applications. The switches are compact, easy to wire and connect, and come undrilled to allow variable cable entry positions.

NOTE: VCGUN enclosures are UL approved.

Table 15.15: Non-Metallic Enclosed Switches [1]

| Ampere Size | | IP55-PVC 3-Pole, NEMA Type 1 & 12 |
|-------------|-----|-----------------------------------|
| UL | IEC | Catalog No. |
| 20 | 32 | VC1GUN |
| 25 | 40 | VC2GUN |
| 45 | 63 | VC3GUN |
| 63 | 80 | VC4GUN |
| 100 | 125 | VC5GUN |
| 115 | 175 | VC6GUN |

Table 15.16: Non-Metallic Enclosed Switch Dimensions

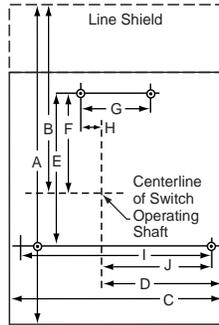
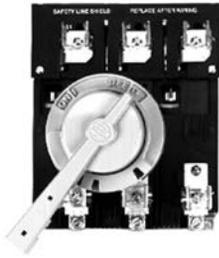
| Catalog No. [2] | No. of Poles | Dimensions | | | | | | | | | | | |
|-----------------|--------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | a | | b | | c | | d | | e | | f | |
| | | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm |
| VC1GU-VC2GU | 3 | 6.7 | 170 | 4.1 | 105 | 3.2 | 82 | 4.8 | 122 | 2.1 | 53 | 5.0 | 128 |
| VC3GU-VC4GU | | 6.7 | 170 | 5.3 | 135 | 3.3 | 85 | 5.1 | 130 | 3.7 | 95 | 5.2 | 131 |
| VC5GU-VC6GU | | 11.0 | 280 | 8.6 | 220 | 5.0 | 126 | 7.9 | 201 | 7.5 | 190 | 8.6 | 203 |

Table 15.17: Vario Manual Motor Control Switches, IEC

| Rating (A) IEC | kW Rating | | | | 3-Pole Switch Body | |
|-------------------|-----------|-------|-------|-------|--------------------|-------|
| | 230 V | 240 V | 400 V | 415 V | 500 V | 690 V |
| 20 | 4 | 4 | 5.5 | 5.5 | 7.5 | 11 |
| 25 | 5.5 | 5.5 | 7.5 | 7.5 | 11 | 15 |
| 32 | 5.5 | 5.5 | 11 | 11 | 11 | 15 |
| 40 | 7.5 | 7.5 | 15 | 15 | 18.5 | 15 |
| 63 | 15 | 15 | 22 | 22 | 30 | 22 |
| 80 | 18.5 | 18.5 | 30 | 30 | 37 | 30 |
| 125 | 22 | 22 | 37 | 37 | 45 | 37 |
| 175 | 30 | 30 | 45 | 45 | 55 | 45 |

[1] Assembled, includes switches mounted in an enclosure with a handle.

[2] UL Rated, NEMA Type 1, 12, IP55.



File D10

The D10 disconnect switch features high I²T rating, longer contact life, visible contact indication, fuse-mounting flexibility, dead-front construction, and auxiliary interlocks.

A complete installation includes a D10 disconnect switch, D11 handle operator, and D12 fuse clip kit. The D10 accepts Class H, K, J, or R fuses, or can be used for nonfusible applications. The D10 disconnect switch is operated by a cast metal handle operator that is lockable in the Off position and defeatable in the On position.

Table 15.18: Lug Data

| Rating (A) | Number Per Pole | Wire Range [1] | Wire Type |
|------------|-----------------|-------------------|-----------|
| 30 | 1 | 14-8 AWG | Cu |
| 60 | | 14-4 AWG | Cu |
| 100 | | 14-1/0 AWG | Al-Cu |
| 200 | | 6 AWG - 250 kcmil | Al-Cu |

Table 15.19: Fuse Clip Kits

| D10 Switch Size | Fuse Clip Rating [2] | | | Catalog Number |
|-----------------|----------------------|----------|------|----------------|
| | Amperes | AC Volts | Type | |
| 30 A | No Fuse | | | D12C01 |
| | 0-30 | 250 | H, K | D12C21 [3] |
| | 0-30 | 250 | R | D12CR21 |
| | 0-30 | 600 | H, K | D12C61 |
| | 0-30 | 600 | R | D12CR61 |
| | 0-30 | 600 | J | D12CJ1 |
| | 31-60 | 250 | H, K | D12C22 [3] |
| | 31-60 | 600 | H, K | D12C62 |
| | 31-60 | 600 | R | D12CR62 |
| | 31-60 | 600 | J | D12CJ2 [3] |
| | 61-100 | 250 | H, K | D12C23 |
| | 60 A | No Fuse | | |
| 0-30 | | 250 | R | D12DR21 [3] |
| 0-30 | | 600 | H, K | D12D61 |
| 0-30 | | 600 | R | D12DR61 |
| 31-60 | | 250 | H, K | D12D22 |
| 31-60 | | 250 | R | D12DR22 |
| 31-60 | | 600 | H, K | D12D62 |
| 31-60 | | 600 | R | D12DR62 |
| 31-60 | | 600 | J | D12DJ2 |
| 61-100 | | 250 | H, K | D12D23 [3] |
| 61-100 | | 600 | H, K | D12D63 [3] |
| 61-100 | | 600 | J | D12DJ3 [3] |
| 100 A | No Fuse | | | D12DR63 [3] |
| | 31-60 | 250 | H, K | D12E03 |
| | 31-60 | 600 | H, K | D12E22 [3] |
| | 31-60 | 600 | H, K | D12E62 |
| | 61-100 | 250 | H, K | D12E23 |
| | 61-100 | 250 | R | D12ER23 |
| | 61-100 | 600 | H, K | D12F63 |
| | 61-100 | 600 | R | D12FR63 |
| | 61-100 | 600 | J | D12EJ3 |
| | 101-200 | 250 | H, K | D12F24 |
| | 101-200 | 600 | H, K | D12F64 |
| | 101-200 | 600 | J | D12FJ4 |
| 200 A | No Fuse | | | D12F04 |
| | 61-100 | 600 | H, K | D12F63 |
| | 101-200 | 250 | H, K | D12F24 |
| | 101-200 | 250 | R | D12FR24 |
| | 101-200 | 600 | H, K | D12F64 |
| | 101-200 | 600 | R | D12FR64 |

Table 15.20: Disconnect Switches (without fuse clips or shorting straps)

| 600 V—Without Service Entrance Rating | | | | | | |
|---------------------------------------|------------|----------------------------|-----------|-------|-------|----------------|
| Starter NEMA Size | Rating (A) | Max. Horsepower Rating [4] | | | | Catalog Number |
| | | 120 V | 200-240 V | 480 V | 600 V | |
| 0-1 | 30 | 5 | 10 | 20 | 25 | D10S1 |
| 2 | 60 | 10 | 20 | 40 | 50 | D10S2 |
| 3 | 100 | 15 | 30 | 60 | 75 | D10S3 |
| 4 | 200 | 25 | 50 | 100 | 100 | D10S4 |

| 600 V—With Service Entrance Rating | | | | | | |
|------------------------------------|------------|----------------------------|-----------|-------|-------|----------------|
| Starter NEMA Size | Rating (A) | Max. Horsepower Rating [4] | | | | Catalog Number |
| | | 120 V | 200-240 V | 480 V | 600 V | |
| 0-1 | 30 | 5 | 10 | 20 | 25 | D10S1H |
| 2 | 60 | 10 | 20 | 40 | 50 | D10S2H |
| 3 | 100 | 15 | 30 | 60 | 75 | D10S3H |
| 4 | 200 | 25 | 50 | 100 | 100 | D10S4H |

Table 15.21: Rotary Handle Operator Kits and Shafts

| Kits include: Handle, Shaft, and Actuator NEMA Type 1, 3, 3R, 4, and 12 | | | |
|--|------------------|--------------------------------|----------------|
| Description | Rating (A) | Enclosure Interior Depth (in.) | Catalog Number |
| Complete Kit with Handle, Shaft, and Actuator | 30, 60, 100, 200 | 5-6 | D11SF4 |
| | | 6-10 | D11SF10 |
| | | 10-16 | D11SF16 |
| Shaft only | | 6 | D11SH10 [3] |
| | | 12 | D11SH16 |

Table 15.22: Auxiliary Electrical Interlock (for mounting on a 30-200 A disconnect switch) [5]

| Block Description (with switch contacts open) | Catalog Number |
|---|----------------|
| 1 N.O. | D11N0 [3] |
| 1 N.C. | D11NC |
| 1 N.O. and 1 N.C. | D11N0C |
| 2 N.O. | D11N00 [3] |
| 2 N.O. and 2 N.C. | D11N0C2 |

Table 15.23: Interrupting and Withstandability Ratings

| Rating (A) | Interrupting Rating Amperes Symmetrical 600 Vac, 3Ø | Withstandability I ² T (Amperes ² seconds) |
|------------|---|--|
| 30 | 1,200 | 0.38 x 10 ⁶ |
| 60 | 1,800 | 1.28 x 10 ⁶ |
| 100 | 2,000 | 2.62 x 10 ⁶ |
| 200 | 3,600 | 5.25 x 10 ⁶ |

NOTE: These switches are for motor circuit applications.

Table 15.24: Switch Dimensions (in.)

| Rating (A) | Length | | Width | | Mounting Hole Dimensions | | | | | | Depth | |
|------------|---------|---------|--------|---------|--------------------------|---------|---------|-------|--------|--------|---------|---------|
| | A | B | C | D | E | F | G | H | I | J | K [6] | L [7] |
| 30 | 7-5/16 | 4-15/32 | 5-7/8 | 3-15/32 | 6 | 3-15/32 | 1-7/8 | 13/32 | 5-7/16 | 3-1/4 | 4-3/32 | 4-11/32 |
| 60 | 7-5/16 | 4-15/32 | 5-7/8 | 3-15/32 | 6 | 3-15/32 | 1-7/8 | 13/32 | 5-7/16 | 3-1/4 | 4-11/32 | 4-11/32 |
| 100 | 9-27/32 | 5-11/32 | 8-3/16 | 4-5/8 | 5-13/16 | 3-13/16 | 2-11/16 | 51/64 | 7-5/16 | 4-3/16 | 5-23/32 | 4-27/32 |
| 200 | 12-3/16 | 7-7/32 | 8-3/16 | 4-5/8 | 5-13/16 | 3-13/16 | 2-11/16 | 51/64 | 7-5/16 | 4-3/16 | 5-23/32 | 4-27/32 |

[1] One conductor per lug.
 [2] Continuous current should not exceed switch rating (size). Fuse clip kits should be sized to accommodate inrush.
 [3] Obsolete.
 [4] Nonfused ratings.
 [5] One block per switch.
 [6] Maximum depth with largest fuse.
 [7] Depth including insulating barrier on service entrance switches.

Type L Circuit Breaker Mechanisms

Type L door-mounted, variable-depth operating mechanisms feature heavy duty, all metal construction with trip indication. All can be padlocked in the Off position when the enclosure door is open. Further, the handle assemblies can be locked Off with up to three padlocks, which also locks the enclosure when the door is closed. (The 3" handle accepts one padlock.) Complete kits are rated for NEMA Type 1, 3R, and 12 enclosures. They include a handle assembly, operating mechanism, and shaft assembly.

Table 15.25: Electrical Interlock Kits—Class 9999

| Description | Class | Type |
|---------------------------|-------|------|
| Single-Pole, Double-Throw | 9999 | R47 |
| Double-Pole, Double-Throw | 9999 | R48 |

Table 15.26: Complete Kits

| For Use With Circuit Breakers (Not Included in the Complete Kit) | | | Operating Mechanism Standard 6 in. Handle | | | | Operating Mechanism Short 3 in. Handle | |
|--|--------------|----------------|---|--------------------------|----------------|--------------------------|--|--------------------------|
| Circuit Breaker or Interrupter Type | No. of Poles | Frame Size (A) | Standard Shaft Kit | | Long Shaft Kit | | Long Shaft Kit | |
| | | | Type | Mounting Depth [2] Range | Type | Mounting Depth [2] Range | Type | Mounting Depth [2] Range |
| GJL | 3 | 75, 100 | LG1 | 5-1/2 to 10-1/4 | LG4 | 5-1/2 to 20-7/8 | LG3 | 5-1/2 to 20-7/8 |
| FAL, FCL, FHL | 2-3 | 100 | LN1 | 5-1/2 to 10-7/16 | LN4 | 5-1/2 to 21 | LN3 | 5-1/2 to 21 |
| KAL, KCL, KHL | 2-3 | 250 | LP1 | 6-1/4 to 11-3/16 | LP4 | 6-1/4 to 21-3/4 | LP3 | 6-1/4 to 21-3/4 |
| LAL [3], LHL [3], Q4L | 2-3 | 400 | LR1 | 6-5/16 to 10-7/8 | LR4 | 6-5/16 to 21-1/2 | LJ3 | 5-1/2 to 21-3/8 |
| MEL, MXL | 2-3 | 800 | LT1 [4] | 7-3/16 to 11-5/8 | LT4 [4] | 7-3/16 to 22-1/4 | Not recommended. | |
| MAL, MHL | 2-3 | 1200 | LT1 [4] | 7-3/16 to 11-5/8 | LT4 [4] | 7-3/16 to 22-1/4 | | |
| NAL, NCL, NEL, NXL | 2-3 | 1200 | LX1 [4] | 8-1/4 to 12-3/4 | LX4 [4] | 8-1/4 to 23-3/8 | | |
| NSF | 2-3 | 250 | 9421LJ1 | 5.50-10.75 | 9421LJ4 | 5.50-21.38 | 9421LJ3 | 5.50-21.38 |
| PowerPact D | 2-3 | 600 | 9421LD1 | 7.25-12.06 | 9421LD4 | 7.25-22.63 | 3 in. handles are not recommended for use with these circuit breakers. | |

Table 15.27: Component Parts

| Use With | | | Handle Assemblies NEMA 1, 3R, 12 | | Operating Mechanism (Lockout Included) | Standard Shaft (Support Bracket Not Required) | | Long Shaft (Support Bracket Included) | |
|-------------------------------------|--------------|----------------|----------------------------------|-------------|--|---|--------------------------|---------------------------------------|--------------------------|
| Circuit Breaker or Interrupter Type | No. of Poles | Frame Size (A) | 3 in. | | | Type | Mounting Depth [2] Range | Type | Mounting Depth [2] Range |
| | | | Type | Type | | | | | |
| GJL | 3 | 75, 100 | LH3 | LH6 | LG7 | 5-1/2 to 10-7/16 | LS8 | 5-1/2 to 21 | LS13 |
| FAL, FCL, FHL | 2-3 | 100 | LH3 | LH6 | LF1 | 5-1/2 to 10-7/16 | LS8 | 5-1/2 to 21 | LS12 |
| KAL, KCL, KHL | 2-3 | 250 | LH3 | LH6 | LK1 | 6-1/4 to 11-3/16 | LS8 | 6-1/4 to 21-3/4 | LS12 |
| LAL [3], LHL [3], Q4L | 2-3 | 400 | Not recommended | LH6 | LL1 | 6-5/16 to 10-7/8 | LS8 | 6-5/16 to 21-1/2 | LS10 |
| MEL, MXL | 2-3 | 800 | | LH8 | LM1 | 7-3/16 to 11-5/8 | LS8 | 7-3/16 to 22-1/4 | LS10 |
| MAL, MHL | 2-3 | 1200 | | LH8 | LM1 | 7-3/16 to 11-5/8 | LS8 | 7-3/16 to 22-1/4 | LS10 |
| NAL, NCL, NEL, NXL | 2-3 | 1200 | | LH8 | LX7 | 8-1/4 to 12-3/4 | LS8 | 8-1/4 to 23-3/8 | LS10 |
| NSF | 2-3 | 250 | 9421LH3 [5] | 9421LH6 [5] | 9421LJ7 | 5.50-10.25 | 9421LS8 | 5.50-21.38 | 9421LS13 |

Table 15.28: NEMA Type 4 and 4X Handle Assemblies [6]

| Use With | | | Standard Handle Assemblies | | 3 in. Handle Version | |
|-------------------------------------|--------------|----------------|-----------------------------|---------------------------------------|-----------------------------|---------------------------------------|
| Circuit Breaker or Interrupter Type | No. of Poles | Frame Size (A) | NEMA 1, 3R, 4, 12 (Painted) | NEMA 1, 3R, 4, 4X, 12 (Chrome Plated) | NEMA 1, 3R, 4, 12 (Painted) | NEMA 1, 3R, 4, 4X, 12 (Chrome Plated) |
| | | | Type | Type | Type | Type |
| GJL | 3 | 75 | LH46 | LC46 | LH43 | LC43 |
| FAL, FCL, FHL | 2-3 | 100 | LH46 | LC46 | LH43 | LC43 |
| KAL, KCL, KHL | 2-3 | 250 | LH46 | LC46 | LH43 | LC43 |
| LAL, LHL, Q4L | 2-3 | 400 | LH46 | LC46 | Not recommended | |
| MEL, MXL | 2-3 | 800 | LH48 | LC48 | | |
| MAL, MHL | 2-3 | 1000 | LH48 | LC48 | | |
| NAL, NCL, NEL, NXL | 2-3 | 1200 | LH48 | LC48 | | |

Table 15.29: IEC Style Operating Mechanisms

| Circuit Breaker or Interrupter Type | Handle Type 1, 4, 4X, 12 | | Operating Mechanism (Lockout Included) | Extension Shafts | | Type |
|-------------------------------------|--------------------------|---------|--|------------------|--------|-----------|
| | Color | Type | | Mounting Depth | | |
| | | | Min. | Max. | | |
| GJL | Red/Yellow | NW3 [7] | LG8 | 6-1/8 | 10-3/4 | NS16 |
| | Black | NW3B | | 6-1/8 | 17-7/8 | NS336 [8] |



Operating Mechanism



Operating Mechanism (includes lockout)



3 in. Handle Assembly



Standard Handle Assembly

[1] Optional accessory for use with 9421L operating mechanisms. Not used with GJL, NAL, NCL, NEL, NXL, NSF, NSJ, PowerPact™ C, D, H, and J circuit breakers; use field-installed circuit breaker interlocks instead.

[2] Mounting depth in inches, measured from the circuit breaker mounting surface (control panel) to the outside of the enclosure door.

[3] These operating mechanisms cannot be used with any LA/LH circuit breakers with an MB or MT suffix.

[4] Types LT1, LT4, LX1, and LX4 include an 8 in. handle rather than a 6 in. handle.

[5] For a red handle and yellow bezel, add suffix RY to catalog number, e.g., 9421LH6RY.

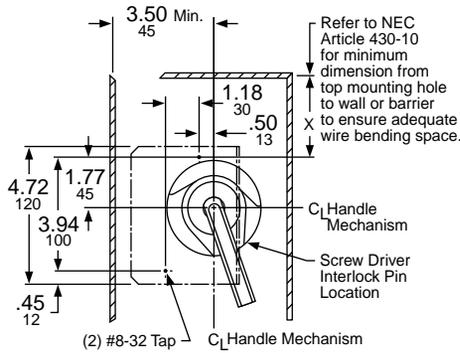
[6] Due to gasketing, NEMA Type 3 and 4 handle assemblies are **not** trip indicating.

[7] Obsolete.

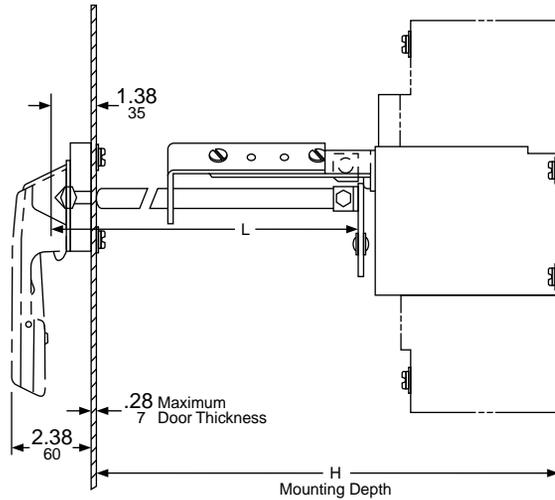
[8] Contains support bracket.

Panel Drilling, Types G, F, and K

Refer to Table 15.30 for the shaft cutting dimensions.

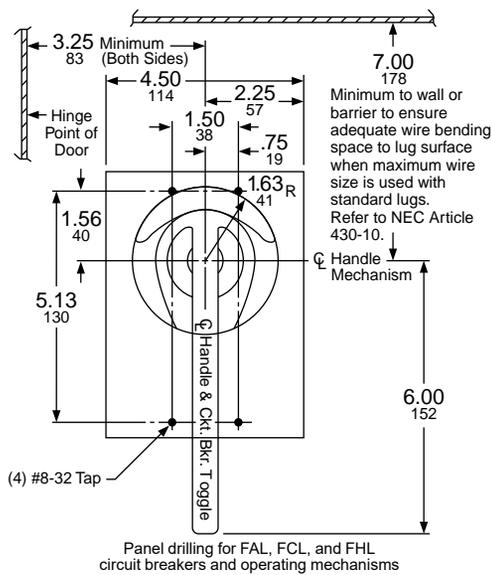


Panel drilling for GJL circuit breaker and operating mechanism

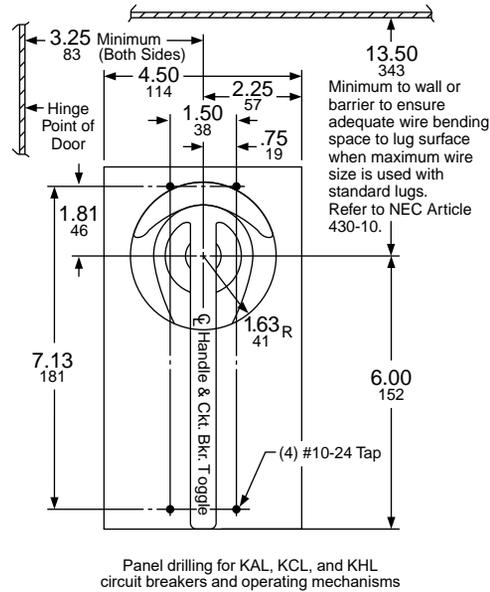


L = Overall shaft length
H = Distance from inside of enclosure door to circuit breaker mounting surface

NOTE: The mounting depth is measured from the circuit breaker mounting surface (control panel) to the outside of the enclosure door.



Panel drilling for FAL, FCL, and FHL circuit breakers and operating mechanisms



Panel drilling for KAL, KCL, and KHL circuit breakers and operating mechanisms

Dimensions: $\frac{\text{in.}}{\text{mm}}$

Table 15.30: Shaft Cutting Dimensions, in. (mm)

| Class | Type | Shaft Length Formula | H = Standard Shaft | | H = Long Shaft | |
|-------|--------------------|----------------------|--------------------|-------------|----------------|-------------|
| | | | Min. | Max. | Min. | Max. |
| 9421 | LG7, LG1, LG4, LG3 | L = H - 2.50 (64) | 5.50 (140) | 10.25 (260) | 5.50 (140) | 20.85 (530) |
| 9421 | LF1, LN1, LN3, LN4 | L = H - 2.88 (73) | 5.50 (140) | 10.44 (265) | 5.50 (140) | 21.00 (533) |
| 9421 | LK1, LP1, LP3, LP4 | L = H - 3.63 (92) | 6.25 (159) | 11.19 (284) | 6.25 (159) | 21.75 (552) |
| 9421 | LL1, LR1, LR4 | L = H - 3.13 (79) | 6.31 (160) | 10.88 (276) | 6.31 (160) | 21.50 (546) |
| 9421 | LM1, LT1, LT4 | L = H - 4.00 (102) | 7.18 (182) | 11.63 (295) | 7.18 (182) | 22.25 (565) |
| 9421 | LX7, LX1, LX4 | L = H - 5.17 (131) | 8.25 (210) | 12.75 (324) | 8.25 (210) | 23.38 (594) |

Door Closing Mechanisms

Class 9423 door closing mechanisms cover a range of enclosures with door openings up to a maximum of 91 in. high. The door closing mechanisms are designed to be used on control enclosures and interlocked with a Class 9422 disconnect device, although they all can be used independently. Three different systems are available, and their use is as recommended below. A complete system is available for interlocking all the doors of a multi-door enclosure with the master door when using the 6 in. or 8 in. vault handle mechanism.

Note that the “Master Door” is defined to be the door of a single or multi-door enclosure which is interlocked directly with the disconnect device. The master door can be hinged on either the right or left hand side. It can be located in any position on a multi-door enclosure. An “Auxiliary Door” is defined to be any remaining doors of a multi-door enclosure which are interlocked with the master door by means of the overhead interlocking system as illustrated on page 15-13 and page 15-14.

Selection Procedure

1. Determine enclosure construction (no. of doors, door height, hinge location, etc.).
2. Determine Class 9422 disconnect device to be used—either a disconnect switch or a circuit breaker mechanism.
3. Determine the location of the disconnect device and handle mechanism (right- or left-hand flange or center channel).
4. Select the door closing mechanism required.
5. Select the auxiliary door closing mechanisms and multi-door interlocking hardware, if required. (A complete system for interlocking all auxiliary doors of a multi-door enclosure with center channel is available for the medium and large enclosures.)

Table 15.31: Door Closing Mechanism

| 60 in. Maximum Door Opening (Recommended) | 46–60 in. Door Opening (Recommended) | 61–91 in. Door Opening (Recommended) |
|--|---|--|
|  <ul style="list-style-type: none"> • 2 Point Locking is Standard • A Third Roller Latch Kit is Available for 3 Point Locking • For 3/4 in. Door Depths |  <ul style="list-style-type: none"> • For use on Single or Multi-Door Enclosures • For use with Doors Hinged on Right or Left Side • Referred to as the 6 in. Vault Handle Mechanism • For 3/4 in. Door Depths |  <ul style="list-style-type: none"> • For use on Single or Multi-Door Enclosures • For use with Doors Hinged on Right or Left Side • Referred to as the 8 in. Vault Handle Mechanism • For 1-1/8 in. Door Depths |



The door closing mechanisms listed below are for use on small to medium size single door control enclosures. They are designed to be used in conjunction with Class 9422 flange-mounted disconnect switches and circuit breaker operating mechanisms; however, they can be used independently as well. When used on properly designed and gasketed NEMA Type 12 enclosures, they meet NFPA 79 standards.

Table 15.32: Single Door Enclosures—NEMA Type 4 or 12 with 60 in. High Maximum Opening

| Description | For Use On: (Enclosure Type) | Use in Conjunction With: | Door Latch Handle Length | Suggested Maximum Door Opening | Door Depth | Cat. No. |
|---|------------------------------------|-----------------------------------|------------------------------------|--------------------------------|------------|----------|
| Two point, roller latch, door closing mechanism for use on enclosures with doors hinged on the left side. | NEMA Type 4 and 12 Sheet Steel | Class 9422 Types A1, A3, A9 | 4 in. | Less than 39 in. | 3/4 in. | 9423M4 |
| | | | 4 in. | Less than 39 in. | [1] | 9423M10 |
| | | | 6 in. | 60 in. | 3/4 in. | 9423M9 |
| Two point, roller latch, door closing mechanism for use on enclosures with doors hinged on the right side. | NEMA Type 4 and 12 Stainless Steel | Class 9422 Types A2, A4, A10 | 4 in. | Less than 39 in. | 3/4 in. | 9423M24 |
| | | | 4 in. | Less than 39 in. | [1] | 9423M4L |
| | | | 6 in. | 60 in. | 3/4 in. | 9423M9L |
| Third roller latch kit for 3 point locking; for use where 3 point locking is desired or where the door opening is ≥39 in. | NEMA Type 4 and 12 Sheet Steel | Class 9423 Types M4, M9, M4L, M9L | — | — | 3/4 in. | 9423M3 |
| | | | NEMA Type 4 and 12 Stainless Steel | Class 9423 Types M24, M24L | — | — |



[1] Suitable for door depths of 1-1/8 in., 1-1/4 in., 1-3/8 in. and 1-1/2 in.

Vault Type for Single and Multi-Door Enclosures

Table 15.33 shows the requirements for the door closing mechanism, the locking bar kit, and the mechanical interlock kit, if used.

Table 15.33: Single or Multi-Door Enclosures—NEMA Type 12 with 40 in. to 60 in. Door Opening

| Single-Door Enclosure | | Multi-Door Enclosure | | |
|--|--|---|---|--|
| Without Interlocking | With Interlocking | Without Interlocking | With Interlocking | |
| 1—M6 door closing mechanism 1—Type M660 locking bar kit | 1—M6 door closing mechanism 1—Type M660 locking bar kit 1—Type M5 (use with 9422A handles) | For <i>each</i> door: 1—M6 door closing mechanism 1—Type M660 locking bar kit | For <i>Master</i> door: 1—M6 door closing mechanism 1—Type M660 locking bar kit 1—Type M5 (for use with 9422A handles) | For <i>each Auxiliary</i> door: 1—M6 door closing mechanism 1—Type M660 locking bar kit Necessary quantities of Types M2 and M7 for each door (see below) |

NOTE: All mechanisms listed on this page are suitable for either left or right hand mounting.

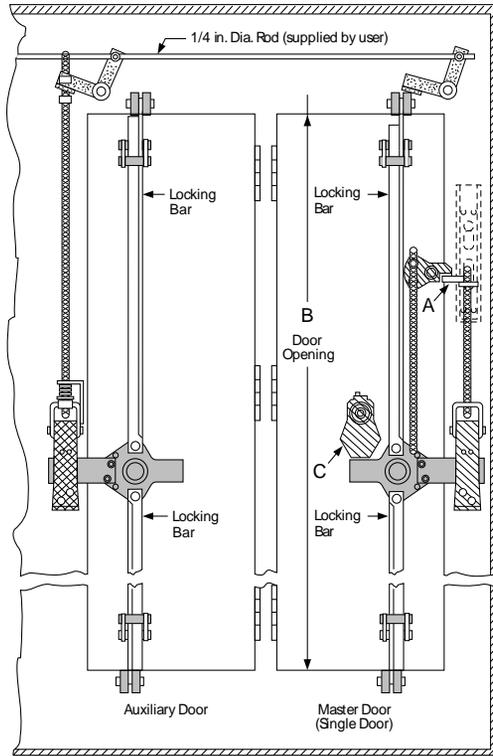


Table 15.34: Door Interlocks

| Type | Description |
|---------------------------------------|---|
| Type M6 Door Closing Mechanism | The Class 9423 Type M6 door closing mechanism is designed to close and seal 0.75 in. deep doors of single or multi-door NEMA Type 12 enclosures. The Type M6 can be used on doors hinged on either the left or right hand side. Recommended door openings are from 40–60 in. Vault type handle length is 6 in. |
| Type M660 Locking Bar Kits | The lock bar kit for the Type M6 door closing mechanism contains two lock bars and is available from stock. The bars can be cut to fit door openings through 60 in. One lock bar kit is required for each Type M6 ordered. |
| Type M5 | The Class 9423 Type M5 mechanical interlock kit is designed to interlock a Class 9422 handle mechanism with the Type M6 door closing mechanism. This kit prevents the opening of the master door (or single door) with the disconnect handle in the "ON" position, making it mandatory to use a screwdriver to gain entry to the enclosure at any time, regardless of the disconnect handle position. |

Table 15.35: Required Accessories for Auxiliary Doors

| Type | Description |
|----------------|--|
| Type M2 | One Type M2 kit is required for each auxiliary door. This kit is required to interlock any auxiliary door(s) with the master door. |
| Type M7 | The first auxiliary door requires 2 Type M7 kits. Additional auxiliary doors require only 1 Type M7 kit. The 0.25 in. diameter rod used to interconnect the M7 kits is furnished by the user. If the distance between any two Type M7 kits exceeds 36 in., an additional Type M7 kit should be installed to prevent the rod from buckling. |

NOTE: A - Interlocking lever extension of the flange-mounted handle mechanism.

NOTE: B - Actual enclosure opening—not door height.

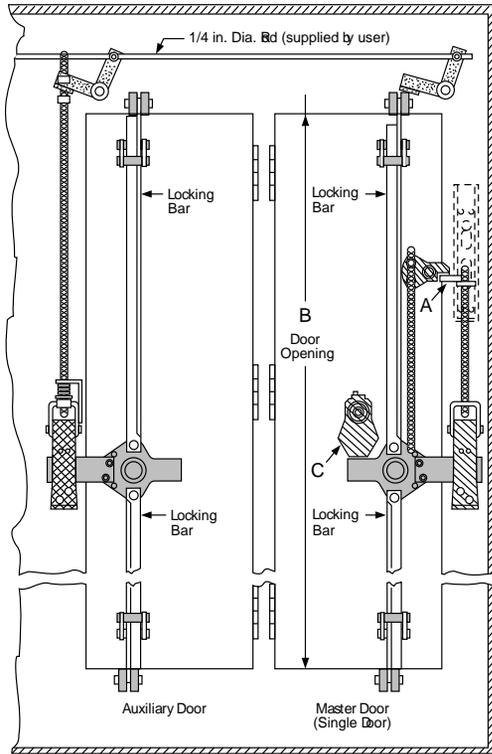
NOTE: C - Screwdriver interlock assembly can be ordered separately. Class 9423 Type CEQ2493.

Vault Type for Single and Multi-Door Enclosures

Table 15.36 shows the requirements for the door closing mechanism, the locking bar kit, and the mechanical interlock kit, if used.

Table 15.36: Single Or Multi-Door Enclosures—NEMA Type 12 with 61 in. to 91 in. Door Openings

| Single-Door Enclosure | | Multi-Door Enclosure | |
|--|--|--|---|
| Without Interlocking | With Interlocking | Without Interlocking | With Interlocking |
| 1—M8 door closing mechanism 1—Type M891 locking bar kit | 1—M8 door closing mechanism 1—Type M891 locking bar kit 1—Type M1 (for use with 9422A handles) | For each door: 1—M8 door closing mechanism 1—Type M891 locking bar kit | For <i>Master</i> door: 1—M8 door closing mechanism 1—Type M891 locking bar kit 1—Type M1 (for use with 9422A handles) For each <i>Auxiliary</i> door: 1—M8 door closing mechanism 1—Type M891 locking bar kit Necessary quantities of Types M2 and M7 for each door (see below) |



NOTE: A - Interlocking lever extension of the flange-mounted handle mechanism.

NOTE: B - Actual enclosure opening—not door height.

NOTE: C - Screwdriver interlock assembly can be ordered separately. Class 9423 Type CEQ2493.

NOTE: All mechanisms listed on this page are suitable for either left or right hand mounting.

Table 15.37: Door Interlocks

| Type | Description |
|---------------------------------------|---|
| Type M8 Door Closing Mechanism | The Class 9423 Type M8 door closing mechanism is designed to close and seal 1.125 in. deep doors of single or multi-door NEMA Type 12 enclosures. The Type M8 can be used on doors hinged on either the left or right hand side. Recommended door openings are from 61–91 in. Vault type handle length is 8 in. |
| Type M891 Locking Bar Kits | The lock bar kit for the Type M8 door closing mechanism contains two lock bars and is available from stock. The bars can be cut to fit door openings through 91 in.. One lock bar kit is required for each Type M8 ordered. |
| Type M1 | The Class 9423 Type M1 mechanical interlock kit is designed to interlock a Class 9422 handle mechanism with the Type M8 door closing mechanism. This kit prevents the opening of the master door (or single door) with the disconnect handle in the "ON" position, making it mandatory to use a screwdriver to gain entry to the enclosure at any time, regardless of the disconnect handle position. |

Table 15.38: Required Accessories for Auxiliary Doors

| Type | Description |
|----------------|--|
| Type M2 | One Type M2 kit is required for each auxiliary door. This kit is required to interlock any auxiliary door(s) with the master door. |
| Type M7 | The first auxiliary door requires 2 Type M7 kits. Additional auxiliary doors require only 1 Type M7 kit. The 0.25 in. diameter rod used to interconnect the M7 kits is furnished by the user. If the distance between any two Type M7 kits exceeds 36 in., an additional Type M7 kit should be installed to prevent the rod from buckling. |

Enclosure Construction and General Location Information For Types M5 and M6

Drilling and location information below is complete for a single door enclosure with door hinged on left side, incorporating a Type M6, M5, and Class 9422 handle mechanism. Transpose all horizontal dimensions for doors hinged on right side.

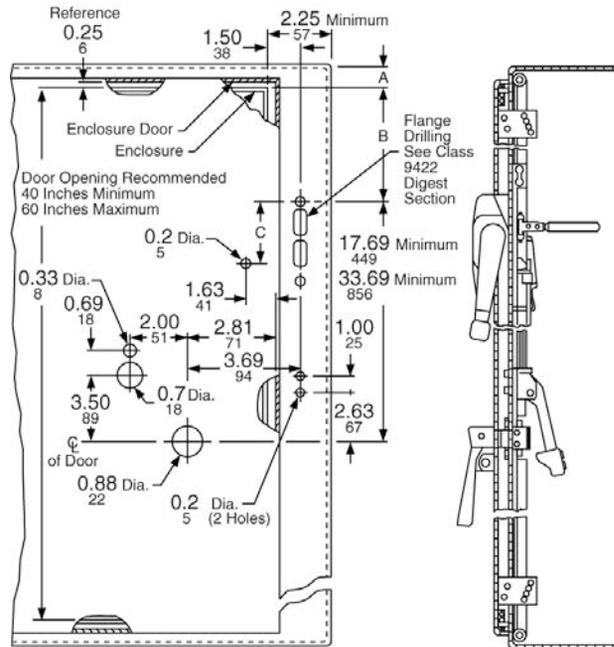
Dimension A

- Single door enclosures: A minimum = 1 in.
- Multi-door enclosures without overhead interlocking system: A minimum = 1 in.
- Multi-door enclosures with overhead interlocking system: A minimum = 4-1/2 in.

NOTE: Overhead interlocking system consists of the required number of Class 9423 Type M2 and M7 kits for interlocking the auxiliary doors with the master door. See page 15-14.

Table 15.39: Dimension B (Minimum)

| Type | Disconnect Device | If A = 1 Minimum B = | If A = 4-1/2 Minimum B = | C |
|------------------------|------------------------------------|-------------------------|-----------------------------|--------|
| TCF, TCN, TDF, TDN, TD | 60 A Disconnect Switch | 3-1/16 | 2-1/2 | 3-3/16 |
| TE, TEF, TEN | 100 A Disconnect Switch | 5-1/4 | 2-1/2 | 3-3/16 |
| TF | 200 A Disconnect Switch | 11-5/8 | 8-1/8 | 3-3/16 |
| TG | 400 A Disconnect Switch | 15-1/16 | 11-9/16 | 6-3/4 |
| RN1 | FAL, FHL, Circuit Breaker | 4-27/32 | 2-1/2 | 3-3/16 |
| RP1 | KAL, KHL Circuit Breaker | 11-5/32 | 7-21/32 | 3-3/16 |
| RR2 | ILL Circuit Breaker | 17-31/32 | 14-15/32 | 3-3/16 |
| RT1 | MAL, MHL, MEL, MXL Circuit Breaker | 18-5/8 | 15-1/8 | 3-3/16 |



Enclosure Construction and General Location Information For Types M1 and M8

Drilling and location information below is complete for a single door enclosure with the door hinged on the left side, incorporating a Type M8, M1, and Class 9422 handle mechanism. Transpose all horizontal dimensions for doors hinged on the right side.

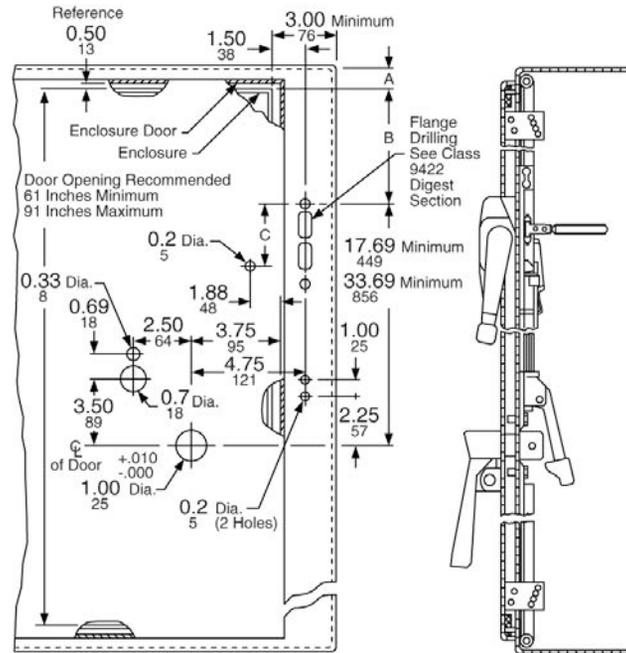
Dimension A

- Single door enclosures: A minimum = 1-1/2 in.
- Multi-door enclosures without overhead interlocking system: A minimum = 1-1/2 in.
- Multi-door enclosures with overhead interlocking system: A minimum = 4-1/2 in.

NOTE: Overhead interlocking system consists of the required number of Class 9423 Type M2 and M7 kits for interlocking the auxiliary doors with the master door. See page 15-14.

Table 15.40: Dimension B (Minimum)

| Type | Disconnect Device | If A = 1-1/2 Minimum B = | If A = 4-1/2 Minimum B = | C |
|------------------------|------------------------------------|--------------------------|--------------------------|--------|
| TCF, TCN, TDF, TDN, TD | 60 A Disconnect Switch | 2-15/16 | 2-1/2 | 3-3/16 |
| TE, TEF, TEN | 100 A Disconnect Switch | 4-3/4 | 2-1/2 | 3-3/16 |
| TF | 200 A Disconnect Switch | 11-1/8 | 8-1/8 | 3-3/16 |
| TG | 400 A Disconnect Switch | 14-9/16 | 11-9/16 | 5-7/8 |
| RN1 | FAL, FHL Circuit Breaker | 4-11/32 | 2-1/2 | 3-3/16 |
| RP1 | KAL, KHL Circuit Breaker | 10-21/32 | 7-21/32 | 3-3/16 |
| RR2 | ILL Circuit Breaker | 17-15/32 | 14-15/32 | 3-3/16 |
| RT1 | MAL, MHL, MEL, MXL Circuit Breaker | 18-1/8 | 15-1/8 | 3-3/16 |

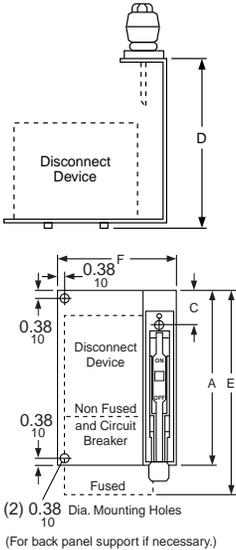


Additional Accessories

Table 15.41: Additional Accessories

| Accessory | Description | Cat. No. |
|--------------------------------------|--|------------------|
| Alternate Mounting Kit | Permits mounting Class 9422 Type A1 or A2 handle mechanisms in enclosures with flange thickness of 16 gauge to 0.5 in. | 9422AM2 |
| Auxiliary Lock Plate | Auxiliary kit recommended for use with the Class 9422 Type A-1 flange handle to facilitate padlocking the handle in the "OFF" position. Primarily used when the handle is mounted on the center channel of a multi-door enclosure. Also in any case where the enclosure doors interfere with the normal padlock slot in the flange handle. Meets both the Automotive and NFPA 79 specifications. | 9422L1 |
| Special Lugs for Disconnect Switches | Copper Lugs only—Specify Form Y157 Tin Plated Aluminum Lugs for 400 A Type TG Switch—Specify Form Y1572 (000–750 kcmil Cu/Al wire) Anderson Type VCEL Compression Lugs—Specify Form Y1574 Exceptions: None of the 30 A or 60 A disconnect switches are available with compression lugs. | — |
| Operating Rods | Standard operating rod for use with Class 9422 variable depth mechanisms. Included as standard in each kit. Extra long operating rod for use with Class 9422 variable depth mechanisms. Can be used as a substitute for the standard rod included in each kit to increase the maximum mounting depth 7 in. (Two are required for Types ARR, RR, ART, RT, ATE, TE, ATF, TF). | 9422R1 9422R2 |





NOTE: No external auxiliary contacts are available for the following circuit breakers: GJL circuit breakers must use internal auxiliary contacts, catalog number AAC. PowerPact D circuit breakers must use internal auxiliary contacts, catalog number AAC.

NOTE: For additional variations, contact the Customer Care Center (CCC) at 1-888-778-2733.

Bracket-Mounted Operating Mechanisms for Use With Square D™ Circuit Breakers

The circuit breaker operating mechanisms listed below are shipped with the external operating handle assembled to a bracket. Circuit breakers are not included and must be ordered separately. A trim plate is provided with each kit to prevent any mounting screws from being accessible from the front and also to provide an attractive installation. The operating handle is Type A1. These switches can be used with Class 9423 door closing mechanisms.

Table 15.42: Bracket-Mounted Operating Mechanisms for Use With Square D™ Circuit Breakers

| Circuit Breaker or Interrupter Type | Use With | | Operating Mechanism | |
|-------------------------------------|--------------|----------------|-----------------------------|----------|
| | No. of Poles | Frame Size (A) | Right Hand, Flange Mounting | Cat. No. |
| FAL, FHL | 2-3 | 100 | | BN1 |
| KAL, KHL | 2-3 | 250 | | BP1 |
| LAL [1], LHL [1], Q4L | 2-3 | 400 | | BR1 |

NOTE: Some enclosures may not accept the listed bracket-mounted operating mechanisms; contact the enclosure manufacturer.

Table 15.43: Electrical Interlock Kits—Class 9999

Optional accessory for use with circuit breaker operating mechanisms listed to the left and the flexible cable mechanisms listed below, except GJL

| Description | Class | Type |
|---------------------------|-------|------|
| Single Pole, Double Throw | 9999 | R26 |
| Double Pole, Double Throw | 9999 | R27 |

NOTE: Not used with GJL; use field installed circuit breaker interlocks.

Table 15.44: Dimensions, in. (mm)

| Type | A | C | D | Min. Enclosure Depth [2] in. (mm) | F |
|----------|------------|-----------|------------|-----------------------------------|------------|
| BG1, BN1 | 8.75 (222) | 1.13 (29) | 6.50 (165) | 8.00 (203) | 7.13 (181) |
| BP1 | 9.13 (232) | | | | 7.38 (187) |

NOTE: Back panel support is recommended for Types TFB1, 2, and 3. Other devices may also require support if the flange is not sufficiently rigid.

Table 15.45: Class 9422—Flexible Cable Mechanisms for Use with Square D Circuit Breakers

For use with Square D circuit breakers and Class 9422 A handle operators. Especially designed for tall, deep enclosures where placement flexibility is required. See Digest 177, Section 8 for dimensions.

| Circuit Breaker Type | No. of Poles | Frame Size (A) | Cable Mechanism | | Cable Mechanisms with A1 Handle For Types 1, 3, 3R, 4, 12 |
|-----------------------|--------------|----------------|-----------------|-------------|---|
| | | | Cable Length | Catalog No. | Catalog No. |
| GJL | 3 | 100 | 36 in. | CGJ30 | CGJ31 |
| | | | 48 in. | CGJ40 | CGJ41 |
| | | | 60 in. | CGJ50 | CGJ51 |
| | | | 120 in. | CGJ10 | CGJ11 [3] |
| FAL, FHL | 2, 3 | 100 | 36 in. | CFA30 | CFA31 |
| | | | 60 in. | CFA50 | CFA51 |
| | | | 120 in. | CFA10 | CFA11 |
| KAL, KHL | 2, 3 | 250 | 36 in. | CKA30 | CKA31 |
| | | | 60 in. | CKA50 | CKA51 |
| | | | 120 in. | CKA10 | CKA11 |
| LAL [4], LHL [4], Q4L | 2, 3 | 400 | 36 in. | CLA30 | CLA31 |
| | | | 60 in. | CLA50 | CLA51 |
| | | | 120 in. | CLA10 [3] | CLA11 |

Table 15.46: Class 9999 Auxiliary Contact Kits for Disconnect Switches and Circuit Breakers

| Class | Type | SPDT | DPDT |
|---|--------------------------------|------|------|
| | | Type | Type |
| Disconnect Switches | | | |
| 9422 | TF | R8 | R9 |
| Circuit Breaker Operating Mechanisms | | | |
| 9421 | LF, LK, LL, LM, LN, LP, LR, LT | R47 | R48 |
| 9422 | RM, RN, RP, RR, RT | R26 | R27 |
| 9422 | CFA, CKA, CLA, CSF | R26 | R27 |

[1] These operating mechanisms cannot be used with any LA/LH circuit breakers with an MB or MT suffix.
 [2] The minimum enclosure depth is greater than Dimension D, since additional space is needed when mounting the mechanism.
 [3] Obsolete.
 [4] These operating mechanisms cannot be used with any LA/LH circuit breakers with an MB or MT suffix.

Variable-Depth Mechanisms

Designed for installation in custom built control enclosures where main or branch circuit protective devices are required. All circuit breaker operating mechanisms are suitable for either right- or left-hand flange mounting, convertible on the job.

Table 15.47: Variable-Depth Mechanisms for Use with Square D™ Circuit Breakers and Schneider Electric™ (formerly Merlin Gerin™) Circuit Breakers

| Circuit Breaker Frame Size | Use With | | | Operating Mechanism Only— Does Not Include Handle Mechanism | Operating Mechanism | | |
|----------------------------------|--------------|--------------|--|---|--|-----------------------------------|--|
| | No. of Poles | Frame Size A | Variable-Depth Mounting, Range [1] (in.) | | Operating Mechanism and Handle Mechanism | | |
| | | | | | Includes Type A1 Handle Mechanism | Includes Type A2 Handle Mechanism | |
| Type | Type | Type | | | | | |
| Square D Circuit Breakers | | | | | | | |
| GJL | 3 | 100 | 6.00–17.75 | RG1 | ARG11 | ARG21 | |
| FAL, FHL | 2–3 | 100 | 5.38–17.75 | RN1 | ARN11 | ARN21 | |
| KAL, KHL | 2–3 | 250 | 6.38–17.88 | RP1 | ARP11 | ARP21 | |
| LAL [2], LHL [2], Q4L | 2–3 | 400 | 7.44–18.25 | RR1 | ARR11 | ARR21 | |
| MEL, MXL | 2–3 | 800 | 9.00–18.38 | RT1 | ART11 | ART21 | |
| MAL, MHL | 2–3 | 1200 | 9.00–18.38 | RT1 | ART11 | ART21 | |
| NAL, NCL, NEL, NXL | 2–3 | 1200 | 11.00–18.37 | RX1 | — | — | |

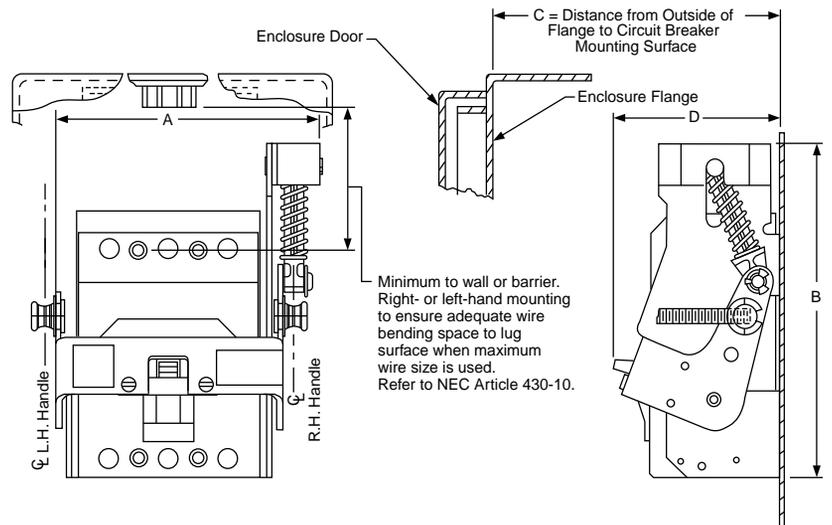


Table 15.48: Electrical Interlocks—Class 9999

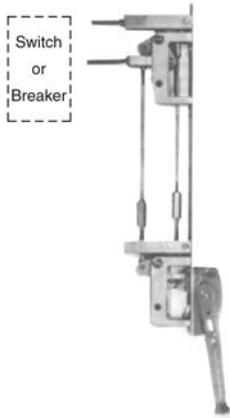
| Description | Class | Type |
|---------------------------|-------|---------|
| Single Pole, Double Throw | 9999 | R26 [3] |
| Double Pole, Double Throw | 9999 | R27 [3] |

Table 15.49: Dimensions

| Circuit Breaker Frame Size | Type | Width (A) | | Height (B) | | Distance to Enclosure Flange [4] (C) | | | | Bracket Depth (D) | |
|----------------------------|------|-----------|-----|------------|-----|--------------------------------------|-----|---------|-----|-------------------|-----|
| | | | | | | Minimum | | Maximum | | | |
| | | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm |
| GJL | RG1 | 5.00 | 127 | 4.75 | 121 | 6.00 | 152 | 17.75 | 451 | 4.00 | 102 |
| FAL, FHL | RN1 | 6.75 | 171 | 8.50 | 216 | 5.51 | 140 | 17.75 | 451 | 4.26 | 108 |
| KAL, KHL | RP1 | 7.13 | 181 | 10.13 | 257 | 6.51 | 165 | 17.88 | 454 | 4.94 | 125 |
| LAL [2], LHL [2], Q4L | RR1 | 10.19 | 259 | 11.00 | 279 | 7.44 | 189 | 18.25 | 464 | 6.00 | 152 |
| MEL, MXL | RT1 | 13.38 | 340 | 14.00 | 356 | 9.00 | 229 | 18.38 | 467 | 9.69 | 246 |
| MAL, MHL [5] | RT1 | 13.38 | 340 | 14.00 | 356 | 9.00 | 229 | 18.38 | 467 | 9.69 | 246 |
| NAL, NCL, NEL, NXL | RX1 | 19.63 | 499 | 13.50 | 343 | 11.00 | 279 | 18.37 | 467 | 9.00 | 229 |



[1] Class 9422 Type R2 extends the mounting depth by 7 in.
 [2] These operating mechanisms cannot be used with any LA/LH circuit breakers with an MB or MT suffix.
 [3] Not for use with the GJL operating mechanism.
 [4] 9422R2 extends the dimension by 7 in. Two are required.
 [5] The minimum mounting depth when using MAL or MHL circuit breakers can be decreased to 7.63 in. by using the Class 9422 Type RT1B conversion kit.



Remote operation shown (the handle mechanism is not included in the kit)



Air valve interlock mounted on the enclosure



Channel/Flange Support Kit



Alternate Mounting Kit



Auxiliary Lock Plate

Remote or Dual Adapter Kit

For the remote or dual operation of GJL, FAL, FHL, KAL, KHL, LAL, LHL, Q4L, MAL, MHL, MEL, and MXL circuit breakers.

Remote Operation—permits mounting the Class 9422 Type A9 or A10 handle mechanism at a lower level than the disconnect device it controls. This arrangement is often required where the disconnect device is mounted too high for personnel to easily reach a conventional operator.

Dual Operation—permits controlling two disconnect devices, one in line with, and one remote from, a single Class 9422 Type A9 or A10 handle mechanism.

NOTE: A Class 9422 Type A9 or A10 handle (see Digest 177, Section 8) and the preferred mounting method **must** be used.

Table 15.50: Disconnect Device

| Disconnect Device | Enclosure Mounting Depth | | Type |
|------------------------|--------------------------|-------|------|
| | Min. | Max. | |
| Circuit Breaker | | | |
| GJL | 10.50 | 19.50 | D2 |
| FAL, FHL | 10.66 | 19.50 | |
| KAL, KHL | 11.13 | 19.50 | |
| LAL, LHL, Q4L | 12.13 | 19.88 | |
| MAL, MHL, MEL, MXL | 13.75 | 20.25 | |

Table 15.51: Air Valve Interlock

NOTE: Air valve interlocks only accept the specific three-way air valves, manufactured by Parker, listed in the table below.

| Air Valve Size | Parker Valve Model Number [6] | Class 9422 Air Valve Interlock Type |
|-------------------|-------------------------------|-------------------------------------|
| | Knob Operated | |
| 0.50 in. NPT (13) | M04841885 | G1 |
| | M08541848 | |
| 0.75 in. NPT (19) | M04861885 | G2 |
| | M08561848 | |
| 1.00 in. NPT (25) | M00080004 | G1 |

Table 15.52: Other Accessories

| Accessory | Description | Class | Type |
|----------------------------|---|-------|------|
| Channel/Flange Support Kit | Auxiliary kit recommended for use with 30 A and 60 A disconnect switches and FAL, FCL, FHL, KAL, KHL, NSF, and NSJ circuit breaker mechanisms when these devices are to be mounted on the center channel of a multi-door enclosure or when extra rigidity for the flange is required. Supplied as standard with 100 A and 200 A disconnect switches and LAL, LHL, Q4L, MAL, MHL, MEL, and MXL circuit breaker mechanisms. | 9422 | C1 |

[6] Prices do not include air valves or the handle mechanism. For more information on the air valves listed, contact Parker at c-parker@parker.com, or call 1-800-272-7537.