

Bulletin 100-K

MCS Miniature Contactors

Specifications

IEC Specifications

	100/104-K screw type		
	05	09	12
AC-1 Active Power Load (50 Hz); Ambient temperature 40°C			
≤ 690V [A]	20	20	20
230V [kW]	8	8	8
240V [kW]	8.3	8.3	8.3
400V [kW]	14	14	14
415V [kW]	14	14	14
500V [kW]	17	17	17
690V [kW]	24	24	24
Ambient temperature 60°C			
≤ 690V [A]	16	16	16
230V [kW]	6.4	6.4	6.4
240V [kW]	6.7	6.7	6.7
400V [kW]	11	11	11
415V [kW]	12	12	12
500V [kW]	14	14	14
690V [kW]	19	19	19
Switching of 3-phase Motors; (50 Hz) Ambient temperature 60°C, AC-2, AC-3, AC-4			
230V [A]	6.3	11.3	11.5
240V [A]	6.3	11.3	11.5
400V [A]	4.9	8.5	11.5*
415V [A]	4.9	8.5	11.5*
500V [A]	3.9	6.8	9.2
575V [A]	3.9	6.8	9
690V [A]	3.2	6.9	6.7
230V‡ [kW]	1.5	3	3
240V‡ [kW]	1.5	3	3
400V‡ [kW]	2.2	4	5.5*
415V‡ [kW]	2.2	4	5.5*
500V‡ [kW]	2.2	4	5.5
690V‡ [kW]	2.2	4	5.5
AC-4 at approximately 200,000 operations			
230V [A]	2.3	3.9	3.9
240V [A]	2.3	3.9	3.9
400V [A]	2	3.3	3.3
415V [A]	2	3.3	3.3
500V [A]	1.9	3.2	3.2
230V‡ [kW]	0.37	0.75	0.75
240V‡ [kW]	0.37	0.75	0.75
400V‡ [kW]	0.75	1.1	1.1
415V‡ [kW]	0.75	1.1	1.1
500V‡ [kW]	0.75	1.5	1.5
690V‡ [kW]	—	—	—
Max. switching frequency	Ops/h	250	250

		100/104-K screw type		
		05	09	12
Star-Delta Starting (50 Hz)				
≤ 230V	[A]	11	19	19
≤ 240V	[A]	11	19	19
400V	[A]	9.2	16	19
415V	[A]	9.2	16	19
500V	[A]	6.9	12	12
690V	[A]	6	10.5	10.5
230V‡	[kW]	3	5.5	5.5
240V‡	[kW]	3	5.5	5.5
400V‡	[kW]	4	7.5	10
415V‡	[kW]	4	7.5	11
500V‡	[kW]	4	7.5	7.5
690V‡	[kW]	4	7.5	7.5

UL/CSA Specifications

		100/104-K screw type		
		05	09	12
Load Carrying Capacity per UL/CSA				
General Purpose Current (enclosed)				
	[A]	12	15	18
Rated power (enclosed)				
1-phase	115V [A]	9.8	9.8	13.8
	230V [A]	8	10	12
	115V [Hp]	0.5	0.5	0.75
3-phase	230V [Hp]	1	1.5	2
	200V [A]	6.9	7.8	11
	230V [A]	6	6.8	9.6
	460V [A]	6.8	7.6	9.1
	575V [A]	3.9	6.1	9
	200V [Hp]	1.5	2	3
	230V [Hp]	1.5	2	3
	460V [Hp]	3	5	7.5
	575V [Hp]	3	5	7.5
Wye-Delta (60 Hz)				
	200V [Hp]	2.5	3.3	5
	230V [Hp]	2.5	3.3	5
	460V [Hp]	5	8.5	12
	575V [Hp]	5	8.5	12
Additional, optional supplementary Definite Purpose Ratings:				
Air conditioning applications (30'000 ops.) Includes: suitable for operation by automatic-reset overload device	230V, 3P [FLA]	5	9	12
	[LRA]	30	54	72
	460V, 3P [FLA]	5	9	12
	[LRA]	25	45	60
	575V, 3P [FLA]	5	9	12
	[LRA]	20	36	48
Electric Heating Ratings (UL: 100'000 ops. / CSA: 250'000 ops.)				
	600V AC [A]	max. 5	max. 9	max. 12

* Only for AC-2 and AC-3

‡ Performance datas: Preferred values according to IEC 60072-1

IEC Specifications

		100/104-K screw type		
		05	09	12
Switching of Power Transformers, AC-6a (50 Hz)				
Inrush Current	= n			
Rated transformer current				
n = 30	≤ 230V [A]	2.9	5.4	5.4
	≤ 240V [A]	2.9	5.4	5.4
	≤ 400V/415V [A]	2.4	4.1	5.4
	≤ 500V [A]	1.8	3.2	3.2
	≤ 690V [A]	—	—	—
	230V [kVA]	1.2	2	2
	240V [kVA]	1.2	2	2
	400V [kVA]	1.7	2.8	3.4
	415V [kVA]	1.7	2.8	3.4
	500V [kVA]	1.7	2.8	3.4
	690V [kVA]	2	4	5
n = 20	≤ 690V [A]	—	—	—
n = 15	≤ 690V [A]	—	—	—
60 Hz Peak Inrush/peak rated transformer current				
n = 30	[A]	—	—	—
	200V [kVA]	—	—	—
	208V [kVA]	—	—	—
	240V [kVA]	—	—	—
	480V [kVA]	—	—	—
	600V [kVA]	—	—	—
	660V [kVA]	—	—	—
60 Hz Peak Inrush/peak rated transformer current				
n = 20	[A]	—	—	—
	200V [kVA]	—	—	—
	208V [kVA]	—	—	—
	240V [kVA]	—	—	—
	480V [kVA]	—	—	—
	600V [kVA]	—	—	—
	660V [kVA]	—	—	—
60 Hz Peak Inrush/peak rated transformer current				
n=15	[A]	—	—	—
	200V [kVA]	—	—	—
	208V [kVA]	—	—	—
	240V [kVA]	—	—	—
	480V [kVA]	—	—	—
	600V [kVA]	—	—	—
	660V [kVA]	—	—	—

		100/104-K screw type		
		05	09	12
Switching of Lamps				
Gas discharge lamps AC-5a	[A]	18	18	18
220...240V AC (40 °C)				
Individually compensated:				
Max. capacitance at expected				
Short-circuit current of	10 kA [μF]	750	750	750
	20 kA [μF]	400	400	400
	50 kA [μF]	—	—	—
Filament AC-5b	230/240V [A]	5	9	9
Switching of Low Inductive Loads in Home Appliances and Similar Applications per IEC 61095 (50 Hz)				
AC-7a	230V [A]	20	20	20
	400V [A]	20	20	20
Switching of Motor Load for Home Appliances (50 Hz)				
AC-7b	230V [A]	6	11	11
	400V [A]	6	11	11
Switching of hermetically encapsulated cooling compressor motors with manual reset of the overload release				
AC-8a	400V [A]	11	18	18
	500V [A]	10	15	15

Bulletin 100-K

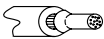
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			100/104-K screw type		
			05	09	12
Switching of DC Loads					
Non-inductive/slightly inductive loads or resistance furnaces DC-1 at 60 °C					
1 pole	24V	[A]	6	9	9
	48/60V	[A]	4/1	6/1.5	6/1.5
	110V	[A]	0.6	1	1
	220V	[A]	0.2	0.3	0.3
2 poles in series	440V	[A]	0.08	0.1	0.1
	24V	[A]	6	9	9
	48/60V	[A]	6	8	8
	110V	[A]	4	6	6
220V	[A]		0.8	1.2	1.2
	440V	[A]	0.2	0.3	0.3
3 poles in series	24V	[A]	6	9	9
	48/60V	[A]	6	9	9
	110V	[A]	6	9	9
	220V	[A]	3	4	4
440V	[A]		0.4	0.6	0.6
Shunt-wound Motors					
Starting, reverse current braking, reversing, stepping DC-3, 60 °C					
3 poles in series	24V	[A]	5	9	9
	48/60V	[A]	4	6	6
	110V	[A]	2	3	3
	220V	[A]	0.8	1.2	1.2
440V	[A]		0.15	0.2	0.2
Series-wound Motors					
Starting, reverse current braking, reversing, stepping DC-5, 60 °C					
3 poles in series	24V	[A]	5	9	9
	48/60V	[A]	2	3	3
	110V	[A]	0.6	1	1
	220V	[A]	0.1	0.1	0.1
440V	[A]		—	—	—
Short Time Withstand I_{CW}, 60 °C					
10 s			[A]	60	96
Resistance and Power Dissipation					
Main current circuit resistance	230V	[mΩ]	5.5	5.5	5.5
Power dissipation by all circuits at I_e AC-3/400V	400V	[W]	0.46	1.3	2.4
Total power dissipation					
AC control			[W]	2.1	2.6
DC control			[W]	3.0	3.4
Lifespan					
Mechanical AC control		[Mio. op.]	15	15	15
DC control		[Mio. op.]	20	20	20
Electrical AC-3 (400 V)		[Mio. op.]	0.7	0.7	0.7
Reversing combination mechanical, electrical		[Mio. op.]	0.7	0.7	0.7
Weight					
AC	DOL	kg (lbs.)	0.16	0.16	0.16
	Reversing	kg (lbs.)	—	—	—
DC	DOL	kg (lbs.)	0.2	0.2	0.2
	Reversing	kg (lbs.)	—	—	—

Cross Sections, Screw Type Terminals

				100/104-K screw type		
				05	09	12
Conductor Cross Sections - Main Contacts Terminal type				* 		
	Fine stranded with ferrule	(1) Conductor (2) Conductors	[mm²] [mm²]	0.75...2.5 0.75...2.5		
	Solid or coarse stranded	(1) Conductor (2) Conductors	[mm²] [mm²]	1...4 0.75...2.5 + 1...4		
Recommended torque				[Nm]	1.2	
Cross section per UL/CSA				[AWG]	18...12 ❄	
Recommended torque				[lb-in]	9	

* Pozidriv No. 2 / Blade No. 3 screw

* Use same cross sections

Cross Sections, Push-In Terminals

				100/104-K push-In type		
				05	09	12
Conductor Cross Sections - Main Contacts				Push-In Terminal		
Terminal type						
	Fine stranded with ferrule	(1) Conductor (2) Conductors	[mm²] [mm²]	0.75...2.5 0.75...2.5		
	Solid or coarse stranded	(1) Conductor (2) Conductors	[mm²] [mm²]	0.75...2.5 0.75...2.5		
Recommended torque				[Nm]	—	
Cross section per UL/CSA				[AWG]	18...14	
Recommended torque				[lb-in]	—	

Coil Data

			100/104-K screw type		
			05	09	12
Operating Limits					
AC control 50 Hz, 60 Hz, 50/60 Hz	pick-up	[x U _s]	0.85...1.1		
	dropout	[x U _s]	0.1...0.75		
DC control	pick-up	[x U _s]	0.85...1.1		
	dropout	[x U _s]	9, 12, 24, 110V DC: 0.75...1.25		
Coil Consumption					
AC control 50 Hz, 60 Hz, 50/60 Hz	pick-up	[VA/W]	35/32		
	hold-in	[VA/W]	5/1.8		
DC control	pick-up	[W]	3.0		
	hold-in	[W]	3.0		
Operating Times					
AC	closing delay	[ms]	15...40		
	opening delay	[ms]	15...33		
With RC module	opening delay	[ms]	15...28		
DC	closing delay	[ms]	18...40		
	opening delay	[ms]	6...12		
With integrated diode	opening delay	[ms]	8...12		
With external diode	opening delay	[ms]	35...50		
Minimal change over-time for reversing		[ms]	<50		

Short Circuit Coordination

				100/104-K screw type		
				05	09	12
Short Circuit Coordination (Max. Fuse or Circuit Breaker Rating)						
Per IEC 60947-4-1 (contactor and fuses only)						
DIN Fuses - gG, gL				50 kA Available Fault Current		
Type "1" (690V)	[A]	35	35	35		
Type "2" (400V)	[A]	20	20	20		
Type "2" (690V)	[A]	20	20	16		

Auxiliary Contacts and Auxiliary Contact Blocks

				Auxiliary contact for 100-K screw type	
				Srew Type Terminals	Push-In Terminals
Switching of AC Loads					
AC-12 I _{th}	at 40°C	[A]		10	6
	at 60°C	[A]		6	6
AC-15 at rated voltage of					
	24V	[A]		—	—
	120V	[A]		6	—
	240V	[A]		3	—
	380V	[A]		1.9	2
	480V	[A]		1.5	1
	500V	[A]		1.4	0.6
	600V	[A]		1.2	—
Switching of DC Loads					
DC-12 L/R< 1 ms resistive loads at					
	24V DC	[A]		6	6
	48V DC	[A]		2	2
	110V DC	[A]		0.6	0.6
	220V DC	[A]		0.2	0.2
	440V DC	[A]		0.08	0.08
DC-14 L/R< 15 ms inductive loads with economy resistor in series at					
	24V DC	[A]		4	4
	48V DC	[A]		1.2	1.2
	110V DC	[A]		0.6	0.4
	220V DC	[A]		0.12	0.12
	440V DC	[A]		0.05	0.05
DC-13 switching electromagnets at					
	120V DC	[A]		0.55	2
	240V DC	[A]		0.27	0.6
	480V DC	[A]		0.25	0.45
	500V DC	[A]		0.13	0.1
	600V DC	[A]		0.1	0.04
Fuse gG					
Short-circuit protection with no Welding of contacts per IEC 60947-5-1					
		[A]		10	10
		[A]		10	10
Protective Separation per IEC 60947-1, Annex N					
Min. switching capacity 17V IEC 60947-5-4				[mA]	
				5	5
Load Carrying Capacity per UL/CSA					
Rated voltage	AC	[V]		max. 600	
Continuous rating	40 °C	[A]		10	
Switching capacity	AC	[A]		A 600	
Rated voltage	DC	[V]		max. 600	
Switching capacity	DC	[A]		Q 600	

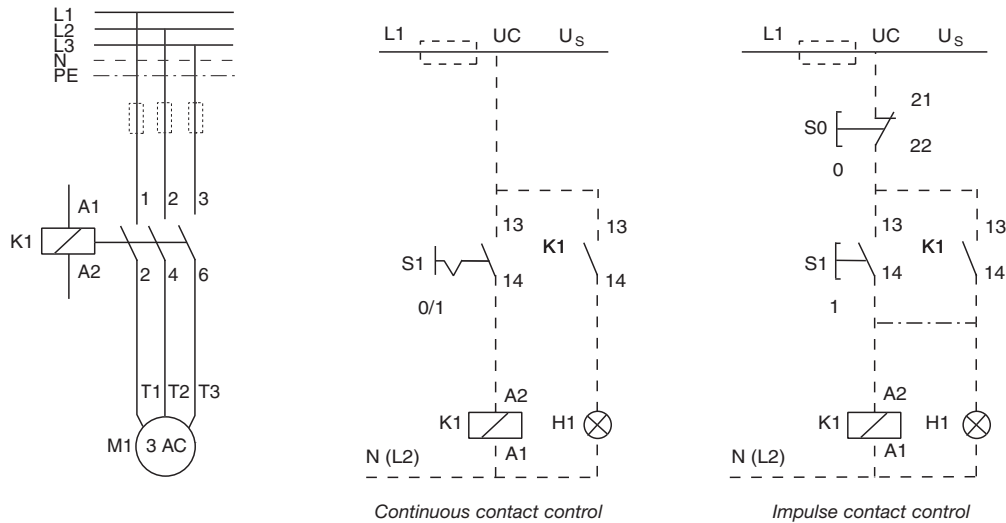
Bulletin 100-K
MCS Miniature Contactors
 Specifications

General Data

		100-K screw type	
		05...09	12
Rated Isolation Voltage U_i			
IEC	[V]	690	
UL, CSA	[V]	600	
Rated Impulse Voltage Withstand U_{imp}		6	
Rated Operating Voltage U_e			
AC 50/60 Hz	[V]	115, 200, 230, 240, 400, 415, 460, 500, 575, 690	
DC	[V]	24, 48, 60, 110, 220, 440, 600	
Insulation Class of the Coil		Class F according to IEC 60085, Class 105 insulation system according to UL 508	
Rated coil frequency		AC 50/60 Hz, DC	
Ambient Temperature			
Storage	[°C]	-55...+80	
Operation at rated voltage	[°C]	-25...+60	
at 70°C		15% current reduction against 60°C values	
Climatic Withstand		IEC 68-2/EN 60068	
Max. Altitude of Installation Site	[m]	2000 NN	
Protection Class		IP2X	
Single contactor cover		—	
Contactor with frame terminal block		—	
Auxiliary contact		IP2X	
Resistance to Shock		IEC 68-2/EN 60068	
Resistance to Vibration		IEC 68-2/EN 60068	
Mechanically Linked Contacts IEC 60947-5-1, Annex L		100-K/700-K internally aux. contact, internally and between 100-K/700-K and aux. contacts	
Mirror Contacts IEC 60947-4 Annex F		100-K, 700-K, auxiliary contact block	
Standards		IEC/EN 60947-1, -4-1, -5-1, -5-4, IEC/EN 60999-1, UL 508, UL 1059, CSA 22.2.Teil 14	
Approvals		CE, cULus (CSA incl.)	

Electrical Life in Utilization Category

Bulletin 100-K



Utilization Categories

Switching conditions for verifying electrical life (number of operations under load) per IEC 947-4; -5.

Test Conditions		Making			Breaking		
		I / I_e	U / U_e	$\cos \phi$	I_c / I_e	U_r / U_e	$\cos \phi$
AC-1	Resistance Furnaces: Non inductive or slightly inductive loads	1	1	0.95	1	1	0.95
AC-2	Slip-ring motors: Starting and reversing	2.5	1	0.65	2.5	1	0.65
AC-3	Squirrel - cage motors: Starting and stopping of running motors	$I_e < 17 \text{ A}$	6	1	0.65	1	0.65
		$I_e > 17 \text{ A}$	6	1	0.35	1	0.35
AC-4	Squirrel - cage motors: Starting, plugging *, inching *	$I_e < 17 \text{ A}$	6	1	0.65	1	0.65
		$I_e > 17 \text{ A}$	6	1	0.35	1	0.35
AC-15	Solenoids: Contactors, valves and lifting magnets	10	1	0.7	1	1	0.4

I_e Rated operational current I Making Current
 U_e Rated voltage I_c Breaking Current
 U_r Recovery voltage U Off-load voltage

* Plugging is understood as stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

* Inching (jogging) is understood as energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Life-Load Curves

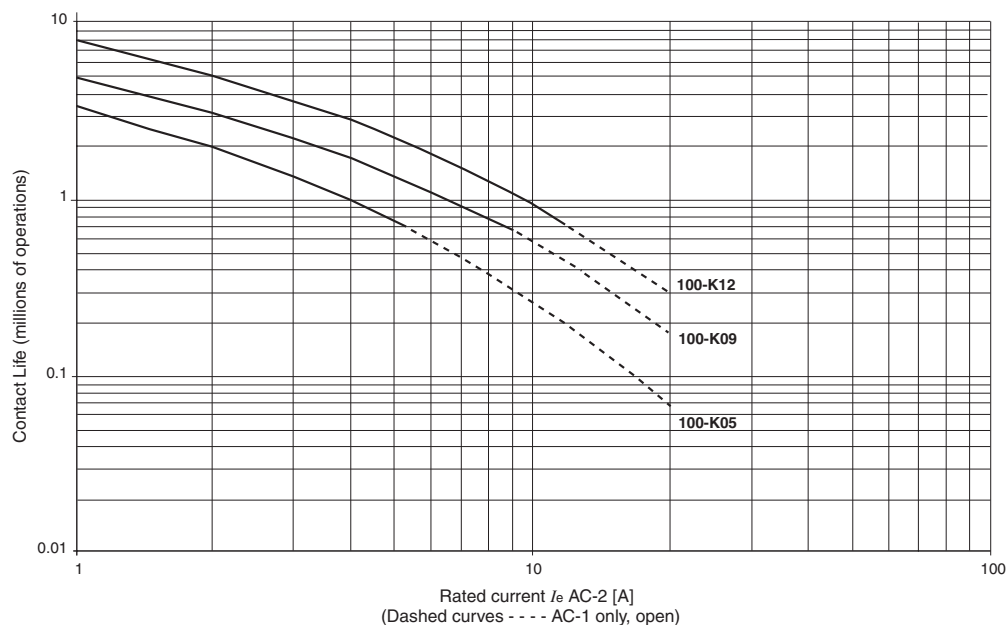
Electrical life; $U_e = 400...460V$ AC

AC-3

Switching of squirrel-cage motors while starting

AC-1

Non- or slightly inductive loads, resistance furnaces



Electrical life; $U_e = 400...460V$ AC

AC-4

Stepping of squirrel-cage motors

