

Bulletin 100-K  
**MCS Miniature Contactors**  
 Specifications

**IEC Specifications**

	100/104-K screw type			
	05	09	12	
<b>AC-1 Active Power Load (50 Hz); Ambient temperature 40°C</b>				
≤ 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	
<b>Ambient temperature 60°C</b>				
≤ 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	
<b>Switching of 3-phase Motors; (50 Hz) Ambient temperature 60°C, AC-2, AC-3, AC-4</b>				
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	
<b>AC-4 at approximately 200,000 operations</b>				
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	250

		100/104-K screw type		
		05	09	12
<b>Star-Delta Starting (50 Hz)</b>				
≤ 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
<b>Load Carrying Capacity per UL/CSA</b>				
<b>General Purpose Current (enclosed)</b>				
	[A]	12	15	18
<b>Rated power (enclosed)</b>				
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
<b>Wye-Delta (60 Hz)</b>				
	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
<b>Additional, optional supplementary Definite Purpose Ratings:</b>				
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
<b>Switching of Power Transformers, AC-6a (50 Hz)</b>				
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]	—	—	—



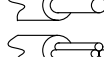
		100/104-K screw type		
		05	09	12
<b>Switching of Lamps</b>				
Gas discharge lamps AC-5a 220...240V AC (40 °C)	[A]	18	18	18
Individually compensated:				
Max. capacitance at expected				
Short-circuit current of	10 kA [μF]	750	750	750
	20 kA [μF]	400	400	400
	50 kA [μF]	—	—	—
Filament AC-5b	230/240V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

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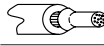

			100/104-K screw type			
			05	09	12	
<b>Switching of DC Loads</b>						
Non-inductive/slightly inductive loads or resistance furnaces DC-1 at 60 °C						
1 pole	24V	[A]	6	9	9	
	48/60V	[A]	4/1	6/1.5	6/1.5	
	110V	[A]	0.6	1	1	
	220V	[A]	0.2	0.3	0.3	
2 poles in series	440V	[A]	0.08	0.1	0.1	
	24V	[A]	6	9	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	
<b>Shunt-wound Motors</b>						
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		
<b>Series-wound Motors</b>						
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]	—	—	—		
<b>Short Time Withstand <math>I_{CW}</math>, 60 °C</b>						
10 s	[A]	60	96	96		
<b>Resistance and Power Dissipation</b>						
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	2.6		
DC control	[W]	3.0	3.4	3.4		
<b>Lifespan</b>						
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		
<b>Weight</b>						
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	
<b>Conductor Cross Sections - Main Contacts</b>							
<b>Terminal type</b>							
	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	
<b>Conductor Cross Sections - Main Contacts</b>				Push-In Terminal			
<b>Terminal type</b>							
	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
<b>Operating Limits</b>					
AC control 50 Hz, 60 Hz, 50/60 Hz	pick-up	[x U <sub>s</sub> ]	0.85...1.1		
	dropout	[x U <sub>s</sub> ]	0.1...0.75		
DC control	pick-up	[x U <sub>s</sub> ]	0.85...1.1 9, 12, 24, 110V DC: 0.75...1.25		
	dropout	[x U <sub>s</sub> ]	0.1...0.25		
<b>Coil Consumption</b>					
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		
<b>Operating Times</b>					
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
<b>Short Circuit Coordination (Max. Fuse or Circuit Breaker Rating)</b>					
<b>Per IEC 60947-4-1 (contactor and fuses only)</b>					
<b>DIN Fuses - gG, gL</b>		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
<b>Switching of AC Loads</b>				
AC-12 I <sub>th</sub>	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	—
<b>Switching of DC Loads</b>				
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
<b>Fuse gG</b>				
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
<b>Load Carrying Capacity per UL/CSA</b>				
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	

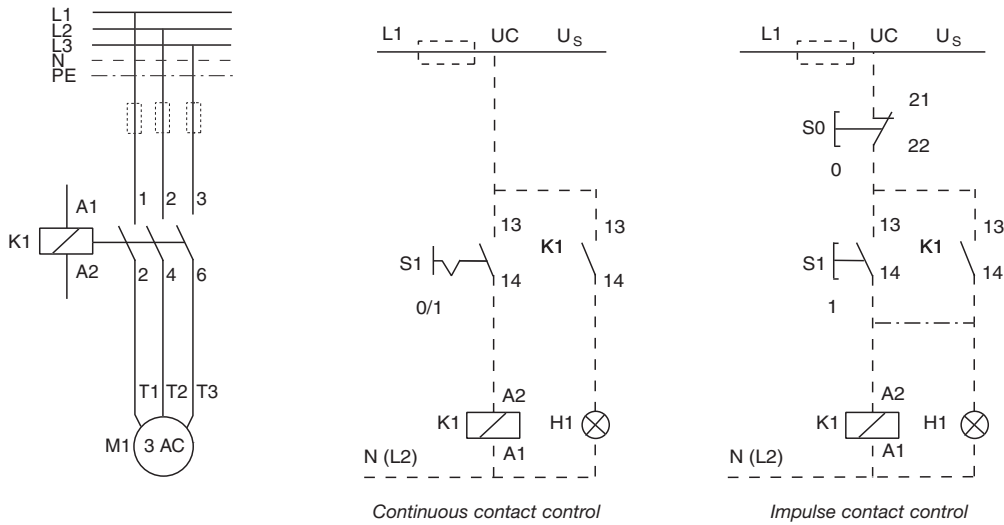
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**General Data**

	100-K screw type	
	05...09	12
<b>Rated Isolation Voltage <math>U_i</math></b>		
IEC [V]	690	
UL, CSA [V]	600	
<b>Rated Impulse Voltage Withstand <math>U_{imp}</math></b> [kV]	6	
<b>Rated Operating Voltage <math>U_e</math></b>		
AC 50/60 Hz [V]	115, 200, 230, 240, 400, 415, 460, 500, 575, 690	
DC [V]	24, 48, 60, 110, 220, 440, 600	
<b>Insulation Class of the Coil</b>	Class F according to IEC 60085, Class 105 insulation system according to UL 508	
<b>Rated coil frequency</b>	AC 50/60 Hz, DC	
<b>Ambient Temperature</b>		
Storage [°C]	-55...+80	
Operation at rated voltage [°C]	-25...+60	
at 70°C	15% current reduction against 60°C values	
<b>Climatic Withstand</b>	IEC 68-2/EN 60068	
<b>Max. Altitude of Installation Site</b> [m]	2000 NN	
<b>Protection Class</b>	IP2X	
Single contactor cover	—	
Contactors with frame terminal block	—	
Auxiliary contact	IP2X	
<b>Resistance to Shock</b>	IEC 68-2/EN 60068	
<b>Resistance to Vibration</b>	IEC 68-2/EN 60068	
<b>Mechanically Linked Contacts IEC 60947-5-1, Annex L</b>	100-K/700-K internally aux. contact, internally and between 100-K/700-K and aux. contacts	
<b>Mirror Contacts IEC 60947-4 Annex F</b>	100-K, 700-K, auxiliary contact block	
<b>Standards</b>	IEC/EN 60947-1, -4-1, -5-1, -5-4, IEC/EN 60999-1, UL 508, UL 1059, CSA 22.2.Teil 14	
<b>Approvals</b>	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	<b>Resistance Furnaces:</b> Non inductive or slightly inductive loads	1	1	0.95	1	1	0.95	
AC-2	<b>Slip-ring motors:</b> Starting and reversing	2.5	1	0.65	2.5	1	0.65	
AC-3	<b>Squirrel - cage motors:</b> Starting and stopping of running motors	$I_e < 17 \text{ A}$	6	1	0.65	1	0.17	0.65
		$I_e > 17 \text{ A}$	6	1	0.35	1	0.17	0.35
AC-4	<b>Squirrel - cage motors:</b> Starting, plugging *, inching *	$I_e < 17 \text{ A}$	6	1	0.65	6	1	0.65
		$I_e > 17 \text{ A}$	6	1	0.35	6	1	0.35
AC-15	<b>Solenoids:</b> 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.

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Life-Load Curves

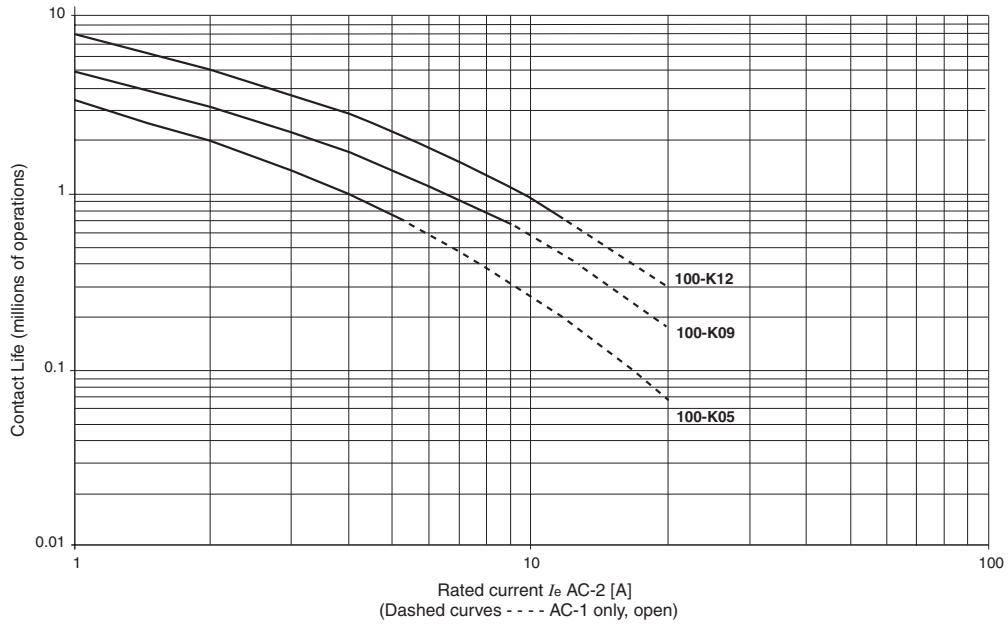
Electrical life;  $U_e = 400...460V$  AC

**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

