Data sheet

Thermistor motor protection relays
CM-MSS.22 and CM-MSS.23

The thermistor motor protection relays CM-MSS.22 and CM-MSS.23 monitor the winding temperature of motors and protect them from overheating, overload and insufficient cooling.

The devices are available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).



Characteristics

- 1 measuring circuit
- Reset button
- Auto, manual or remote reset configurable
- Overvoltage protected supply and measuring inputs
- Increased interference immunity acc. to EN 62061 with evaluation criterion "Fail-Safe"
- According to the latest version of the product standard IEC 60947-8
- Screw connection technology or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- 22.5 mm (0.89 in) width

Approvals

UL 508, CAN/CSA C22.2 No.14
GL
EAC
CB scheme
CCC

Marks

CE
RCM

Order data

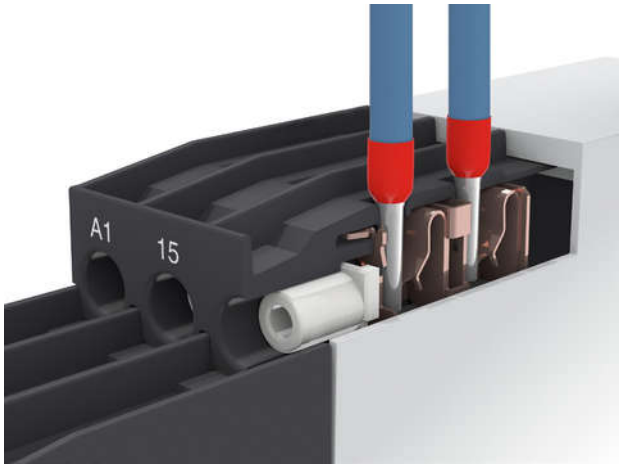
Type	Rated control supply voltage	Output contacts	Connection technology	Order code
CM-MSS.22P	24 V AC/DC *	2 c/o (SPDT) contacts	Push-in terminals	1SVR740700R0200
CM-MSS.22S			Screw terminals	1SVR730700R0200
CM-MSS.23P	110-130 V AC, 220-240 V AC		Push-in terminals	1SVR740700R2200
CM-MSS.23S			Screw terminals	1SVR730700R2200

* Supply and measuring circuits not electrically isolated

Connection technology

Maintenance free Easy Connect Technology with push-in terminals

Type designation CM-xxS.yyP



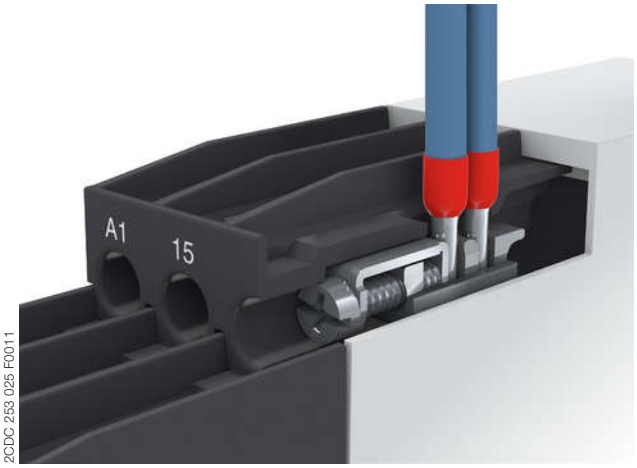
2CDC 253 026 F0011

Push-in terminals

- Tool-free connection of rigid and flexible wires with wire end ferrule according to DIN 46228-1-A, DIN 46228-4-E
  Wire size: 2 x 0.5-1.5 mm², (2 x 20 - 16 AWG)
- Easy connection of flexible wires without wire end ferrule by opening the terminals
- No retightening necessary
- One operation lever for opening both connection terminals
- For triggering the lever and disconnecting of wires you can use the same tool (Screwdriver according to DIN ISO 2380-1 Form A 0.8 x 4 mm (0.0315 x 0.157 in), DIN ISO 8764-1 PZ1 ø 4.5 mm (0.177 in))
- Constant spring force on terminal point independent of the applied wire type, wire size or ambient conditions (e. g. vibrations or temperature changes)
- Opening for testing the electrical contacting
- Gas-tight

Approved screw connection technology with double-chamber cage connection terminals

Type designation CM-xxS.yyS



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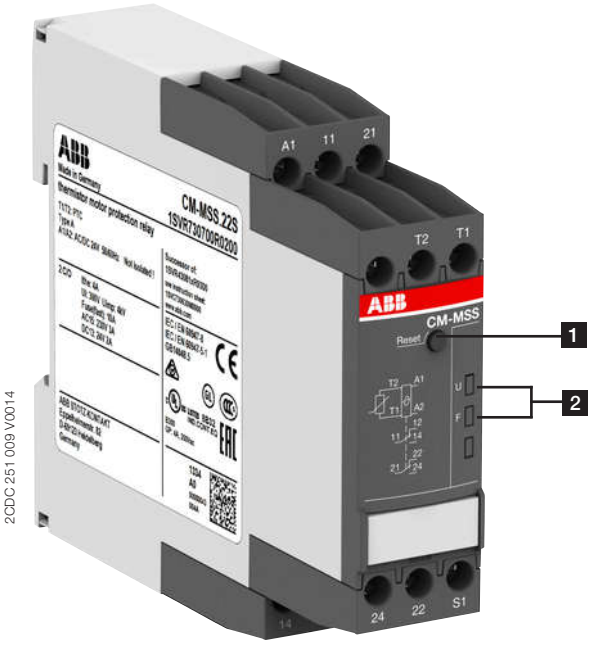
Double-chamber cage connection terminals

- Terminal spaces for different wire sizes:
  fine-strand with/without wire end ferrule:
  1 x 0.5-2.5 mm² (2 x 20 - 14 AWG),
  2 x 0.5-1.5 mm² (2 x 20 - 16 AWG)
  rigid:
  1 x 0.5-4 mm² (1 x 20 - 12 AWG),
  2 x 0.5-2.5 mm² (2 x 20 - 14 AWG)
- One screw for opening and closing of both cages
- Pozidrive screws for pan- or crosshead screwdrivers according to DIN ISO 2380-1 Form A 0.8 x 4 mm (0.0315 x 0.157 in), DIN ISO 8764-1 PZ1 ø 4.5 mm (0.177 in)

Both the Easy Connect Technology with push-in terminals and screw connection technology with double-chamber cage connection terminals have the same connection geometry as well as terminal position.

Functions

Operating controls



1 Test / Reset button

Reset - only possible if measured value < switch-on resistance

2 Indication of operational states with LEDs

U: green LED - Status indication of control supply voltage

Control supply voltage applied

F: red LED - Fault message

Application / Monitoring function

The thermistor motor protection relay CM-MSS monitors the winding temperature and thus protects the motor from overheating, overload and insufficient cooling in accordance to the product standard IEC 60947-8, control units for built-in thermal protection (PTC) for rotating electrical machines.

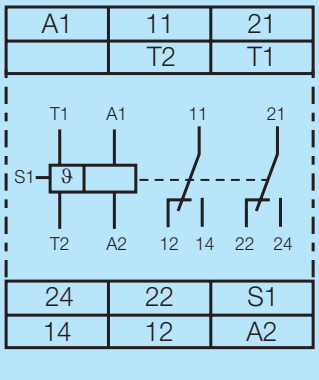
Operating mode

The thermistor motor protection relays CM-MSS.22 and CM-MSS.23 are used to monitor the temperature of motors or generators equipped with PTC resistor sensors type A. The sensors are built-in into the motor windings, measuring the motor heating. In case of an increase of the temperature in the motor, the resistance of the PTC sensors will increase as well. If the motor heats-up excessively (>2.7 kΩ) the output relays de-energize and the corresponding LED displays the overtemperature. A reset is only possible after cooling down of the motor (<1.2 kΩ).

Reset

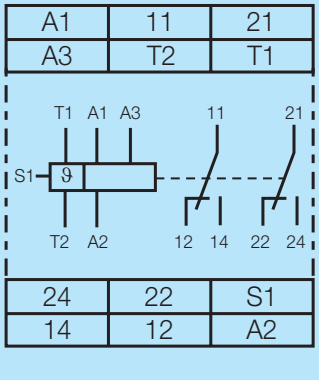
After rectification of a fault, the device has to be reset. This reset can be made manually by the Reset button, automatically by jumpering S1-T2 or externally by a remote reset between S1-T2.

Electrical connection



A1 – A2	Control supply voltage 24 V AC/DC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – T2 (jumpered)	Automatic reset
T1 – T2	Measuring circuit

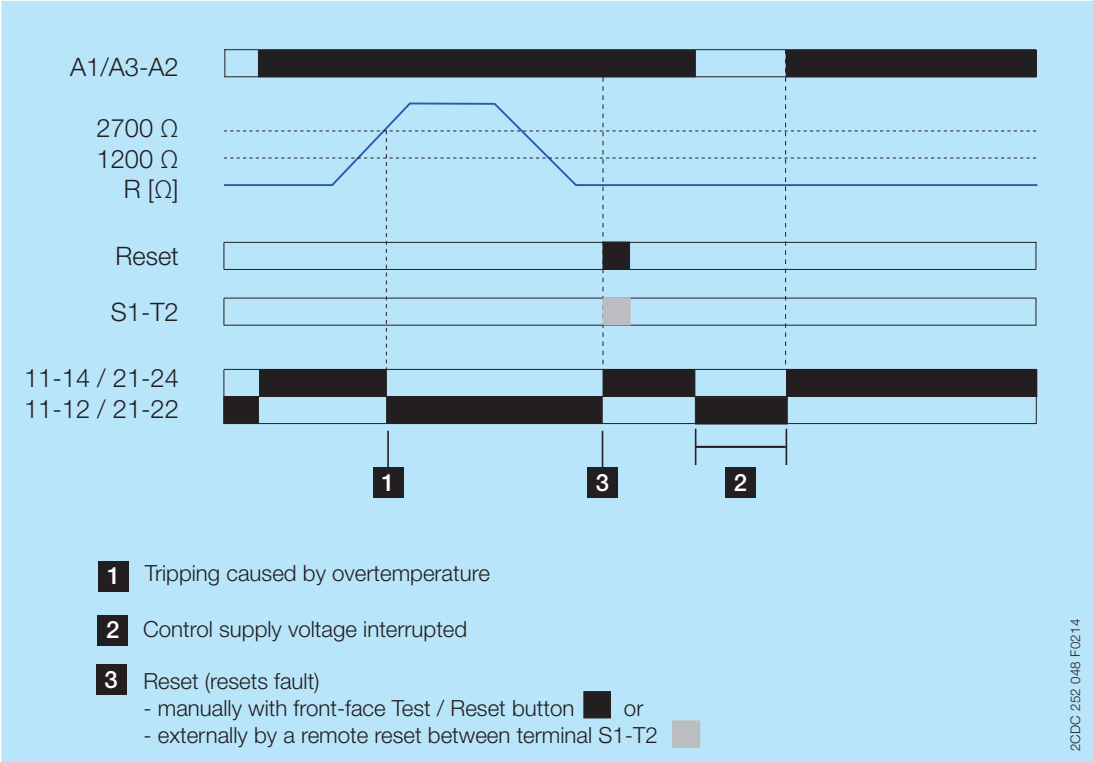
Connection diagram CM-MSS.22



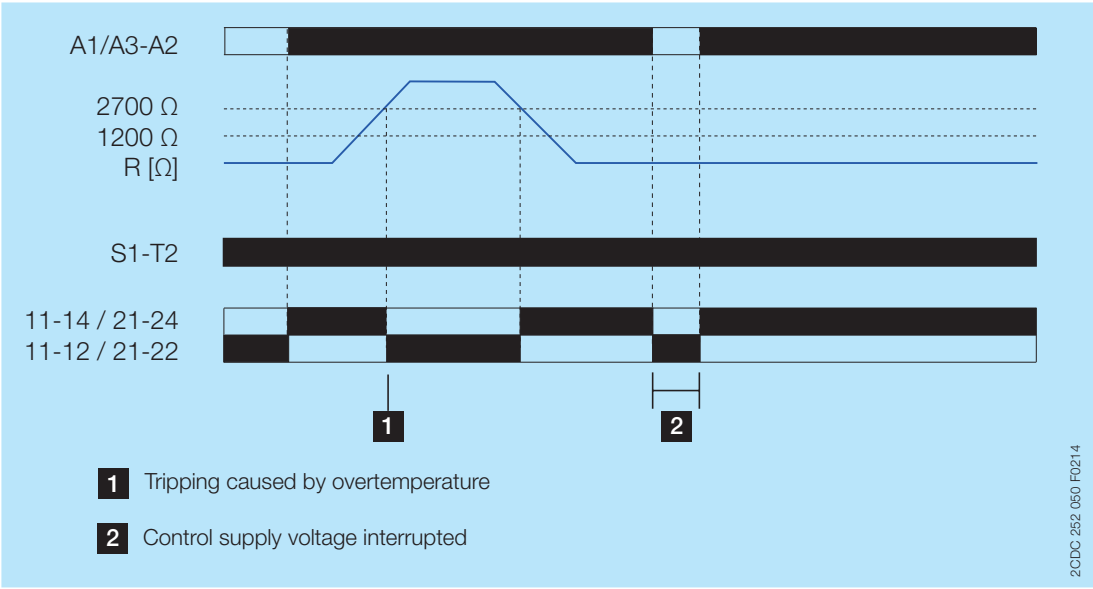
A1 – A2	Control supply voltage 220-240 V AC
A2 – A3	Control supply voltage 110-130 V AC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – T2 (jumpered)	Automatic reset
T1 – T2	Measuring circuit

Connection diagram CM-MSS.23

Function diagrams



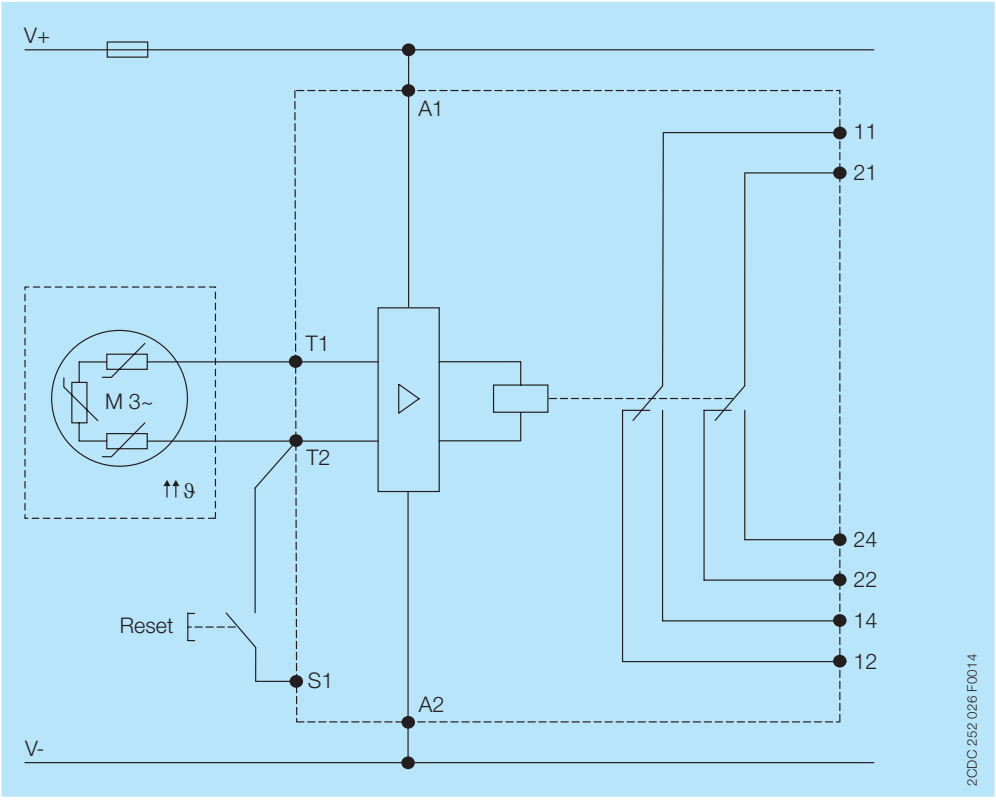
CM-MSS.22, CM-MSS.23 Manual reset



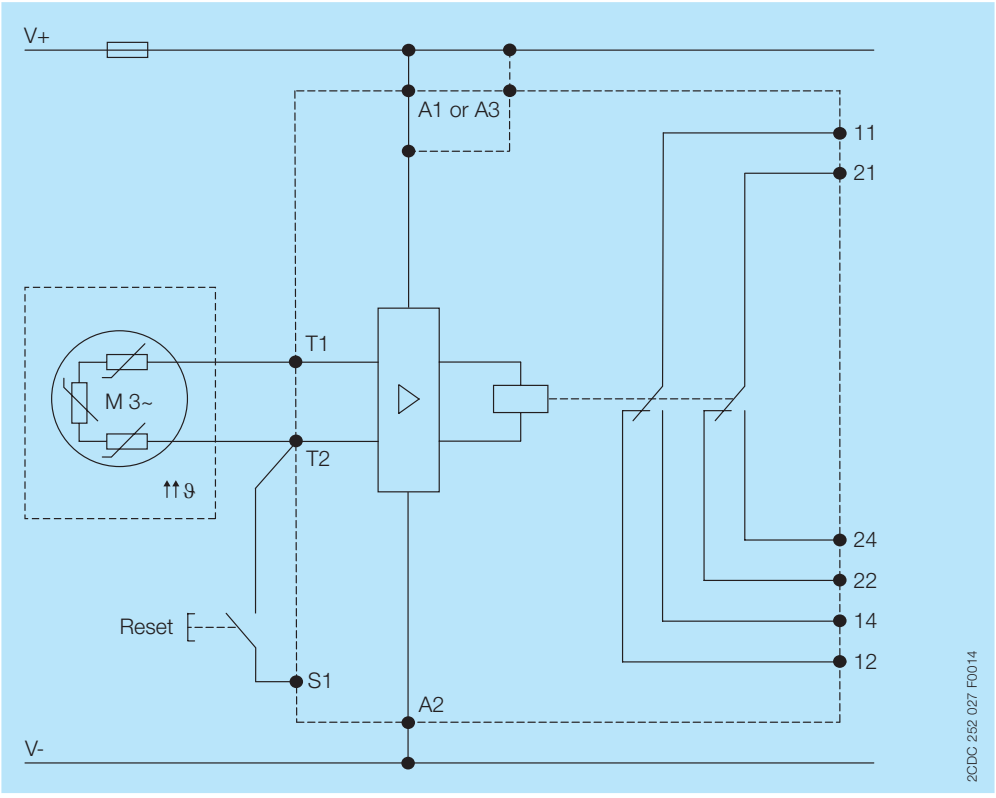
CM-MSS.22. CM-MSS.23 Auto reset

Example of application

Circuit diagrams



CM-MSS.22



CM-MSS.23

Technical data

Data at T_a = 25 °C and rated values, unless otherwise indicated

Input circuit

Supply circuit		CM-MSS.22	CM-MSS.23
Rated control supply voltage U_s	A1-A2	24V AC/DC	220-240 V AC
	A2-A3	-	110-130 V AC
Rated control supply voltage U_s tolerance		-15...+10 %	
Rated frequency		50-60 Hz	
Typical current / power consumption	24 V AC/DC	38 mA / 0.65 VA	-
	110-130 V AC	-	24 mA / 3 VA
	220-240 V AC	-	10 mA / 2.2 VA
Electrical insulation between supply circuit and measuring circuit		no	yes
Power failure buffering time		20 ms	

Measuring circuit / Sensor circuit		T1-T2
Number of sensor circuits		1
Sensor type		PTC type A (DIN/EN 44081, DIN/EN 44082)
Max. total resistance of sensors connected in series, cold state		< 750 Ω
Overtemperature monitoring	switch-off resistance (relays de-energize)	2.7 kΩ ± 5 %
	switch-on resistance (relays energize)	1.2 kΩ ± 5 %
Maximum voltage in sensor circuit	1.33 kOhm	2.5 V
	4 kOhm	3.7 V
	∞ kOhm	5.5 V
Maximum current in sensor circuit		3.7 mA
Maximum sensor cable length		2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm²
Accuracy within the rated control supply voltage tolerance		5 %
Accuracy within the temperature range		0.5 %/K
Repeat accuracy (constant parameters)		on request
Reaction time of the safety function		<100 ms
Hardware fault tolerance (HFT)		-

Control circuit		S1-T2
Control function	manual reset	yes
	auto reset	adjustable
	remote reset	adjustable
Maximum no-load voltage (S1-T2 open)		5.5 V
Max. current (S1-T2 jumpered)		1.2 mA
Maximum cable length		2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm²

User interface

Indication of operational states		
Control supply voltage	U: green LED	⎍⎍⎍: control supply voltage applied
Fault message	F: red LED	⎍⎍⎍: overtemperature

Operating controls	
Reset	front-face button

Output circuit

Kind of output		11-12/14	relay, 1st c/o (SPDT) contact
		21-22/24	relay, 2nd c/o (SPDT) contact
Operating principle			closed-circuit principle
Contact material			AgNi alloy, Cd free
Rated operational voltage U_e (IEC/EN 60947-1)			250 V AC
Minimum switching voltage / Minimum switching current			24 V / 10 mA
Maximum switching voltage / Maximum switching current			See 'Load limit curves' on page 11
Rated operating current I_e (IEC/EN 60947-5-1)		AC-12 (resistive) at 230 V	4 A
		AC-15 (inductive) at 230 V	3 A
		DC-12 (resistive) at 24 V	4 A
		DC-13 (inductive) at 24 V	2 A
AC Rating (UL 508)	utilization category (Control Circuit Rating Code)		B 300
	maximum rated operational voltage		250 V AC
	maximum continuous thermal current at B 300		4 A
	maximum making/breaking apparent power at B 300		3600/360 VA
Mechanical lifetime			30 x 10^6 switching cycles
Electrical lifetime		at AC12, 230 V AC, 4 A	0.1 x 10^6 switching cycles
Maximum fuse rating to achieve short-circuit protection		n/c contact	10 A fast-acting
		n/o contact	10 A fast-acting

General data

MTBF			on request	
Duty time			100 %	
Dimensions (W x H x D)		product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)	
		packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)	
Weight			**Screw connection technology**	**Easy Connect Technology (push-in)**
	net weight	CM-MSS.22	0.132 kg	0.121 kg
		CM-MSS.23	0.174 kg	0.163 kg
	gross weight	CM-MSS.22	0.155 kg	0.145 kg
		CM-MSS.23	0.197 kg	0.186 kg
Mounting			DIN rail (IEC/EN 60715), snap-on mounting without any tool	
Mounting position			any	
Minimum distance to other units			10 mm (0.394 in) if switching current > 2 A	
			10 mm (0.394 in) if switching current > 2 A	
Material of housing			UL 94 V-0	
Degree of protection		housing	IP50	
		terminals	IP20	

Electrical connection

		Screw connection technology	**Easy Connect Technology (push-in)**
Wire size	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm² (1 x 20-14 AWG) 2 x 0.5-1.5 mm² (2 x 20-16 AWG)	2 x 0.5-1.5 mm² (2 x 20-16 AWG)
	rigid	1 x 0.5-4 mm² (1 x 20-12 AWG) 2 x 0.5-2.5 mm² (2 x 20-14 AWG)	2 x 0.5-1.5 mm² (2 x 20-16 AWG)
Stripping length		8 mm (0.32 in)	
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)	-
Wire end ferrule		according to DIN 46228-1-A, DIN 46228-4-E	

Environmental data

Ambient temperature ranges	operation	-25 °C...+60 °C
	storage	-40 °C...+85 °C
Damp heat, cyclic (IEC/EN 60068-2-30)		6 x 24 h cycle, 55 °C, 95 % RH
Climatic category (IEC/EN 60721-3-3)		3K5 (no condensation, no ice formation)
Vibration, sinusoidal (IEC/EN 60255-21-1)		Class 2
Shock (IEC/EN 60255-21-2)		Class 2

Isolation data

		CM-MSS.22	CM-MSS.23
Rated insulation voltage U_i (IEC/EN 60947-1, IEC/EN 60664-1)	Supply circuit / Measuring circuit[1)]	n/a	300 V AC
	Supply circuit / Output circuits	300 V AC	
	Measuring circuit[1)] / Output circuits	300 V AC	
	Output circuit 1 / Output circuit 2	300 V AC	
Rated impulse withstand voltage U_{imp} (IEC/EN 60947-1, IEC/EN 60664-1)	Supply circuit / Measuring circuit[1)]	n/a	4 kV / 6 kV
	Supply circuit / Output circuits	4 kV / 6 kV	
	Measuring circuit[1)] / Output circuits	4 kV / 6 kV	
	Output circuit 1 / Output circuit 2	4 kV	
Basic insulation (IEC/EN 60664-1)	Supply circuit / Measuring circuit[1)]	n/a	600 V AC
	Supply circuit / Output circuits	600 V AC	
	Measuring circuit[1)] / Output circuits	600 V AC	
	Output circuit 1 / Output circuit 2	300 V AC	
Test voltage, routine test (IEC/EN 60255-27, IEC/EN 61010-1)	Supply circuit / Measuring circuit[1)]	n/a	2.5 kV, 50 Hz, 1 min.
	Supply circuit / Output circuits	2.5 kV, 50 Hz, 1 min.	
	Measuring circuit[1)] / Output circuits	2.5 kV, 50 Hz, 1 min.	
Test voltage, type test (IEC/EN 60255-27)	Supply circuit / Measuring circuit[1)]	n/a	6 kV / 1.2 - 50 µs
	Supply circuit / Output circuits	6 kV / 1.2 - 50 µs	
	Measuring circuit[1)] / Output circuits	6 kV / 1.2 - 50 µs	
	Output circuit 1 / Output circuit 2	6 kV / 1.2 - 50 µs	
Protective separation (IEC/EN 61140, IEC/EN 50178)	Supply circuit / Measuring circuit[1)]	no	yes, up to 300 V
	Supply circuit / Output circuits	yes	
	Measuring circuit[1)] / Output circuits	yes	
	Output circuit 1 / Output circuit 2	no	
Pollution degree (IEC/EN 60664-1)		3	
Overvoltage category (IEC/EN 60664-1)		III	

[1)] Potential of measuring circuit = potential of control circuit

Standards

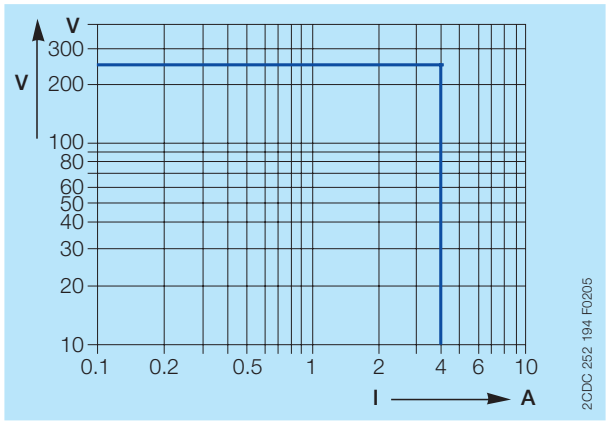
Product standard	IEC/EN 60255-1; IEC/EN 60947-8
Low Voltage Directive	2006/95/EC
EMC directive	2004/108/EC
RoHS directive	2011/65/EC

Electromagnetic compatibility

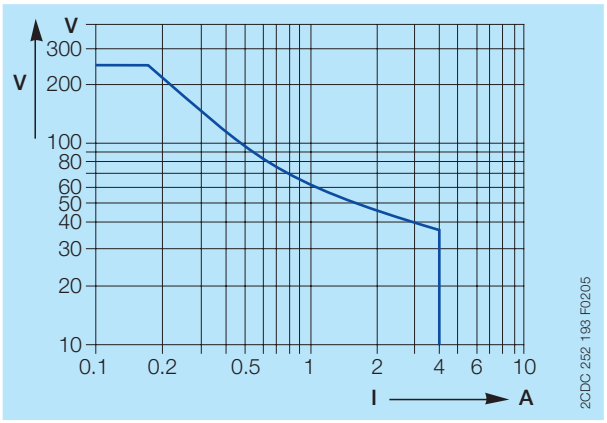
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV contact discharge, 8 kV air discharge
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (1 GHz), 3 V/m (2 GHz), 1 V/m (2.7 GHz)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz
surge	IEC/EN 61000-4-5	Level 3, Installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-N
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 0.15-80 MHz, 10 V, 80 % AM (1kHz)
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Class 3
harmonics and interharmonics	IEC/EN 61000-4-13	Class 3
Additional interference immunity according to product standard EN 60255-1 (reference on EN 60255-26_2011)		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	10 V/m (80 MHz - 3 GHz)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	10 V at stated frequencies
damped oscillatory waves	IEC/EN 61000-4-18	Signal lines, symmetric coupling: 1 kV peak voltage Power supply, asymmetric coupling: 2.5 kV peak voltage,
Increased interference immunity acc. to EN 62061 for safety with the evaluation criterion "Fail-Safe" against		IEC/EN 61000-6-1, IEC/EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV contact discharge, 8 kV air discharge
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 20 V/m (1 GHz), 6 V/m (2 GHz), 3 V/m (2.7 GHz)
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3, 4 kV / 5 kHz
surge	IEC/EN 61000-4-5	Level 3, Installation class 3, supply circuit and measuring circuit 2 kV L-L, 4 kV L-N
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 10 V
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Class 3
harmonics and interharmonics	IEC/EN 61000-4-13	Class 3
Interference emissions		IEC/EN 61000-6-3, IEC/EN 61000-6-4
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B
high-frequency radiated	Germanischer Lloyd	increased requirements in the emergency call frequency band

Technical diagrams

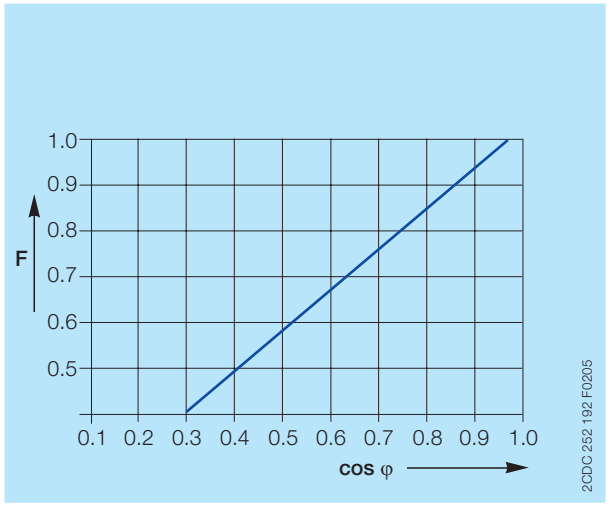
Load limit curves



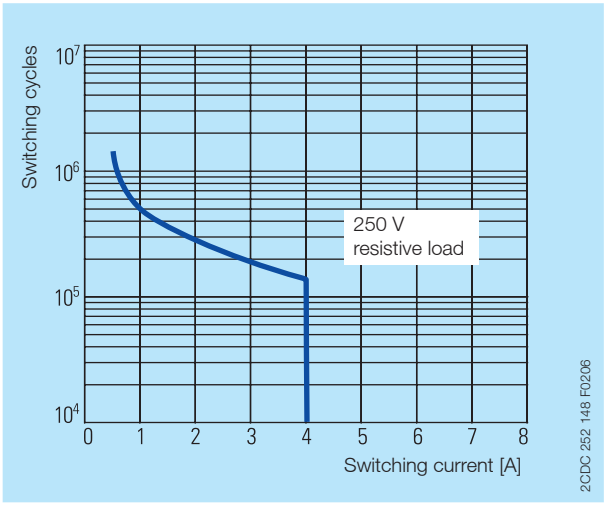
AC load (resistive)



DC load (resistive)



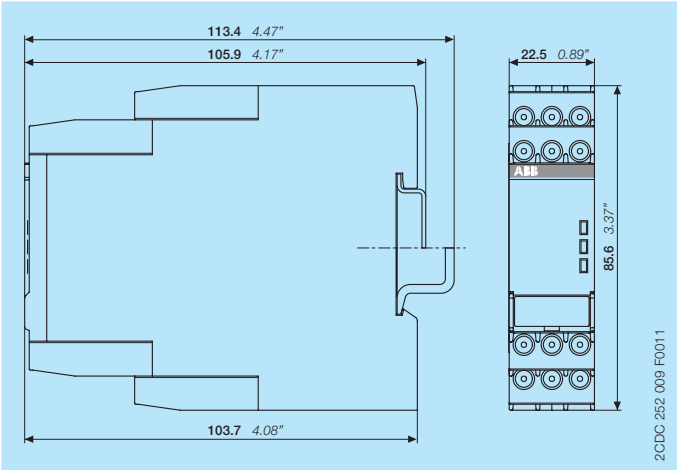
Reduction factor F for inductive AC load



Contact life time / number of operations N
220 V 50 Hz 1 AC, 360 operations/h

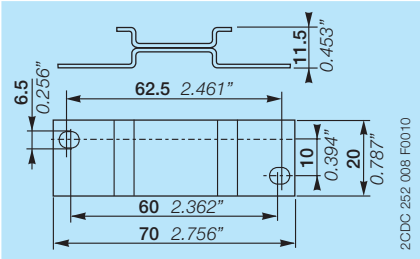
Dimensions

in **mm** and inches

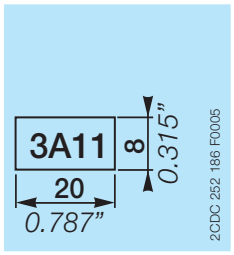


Accessories

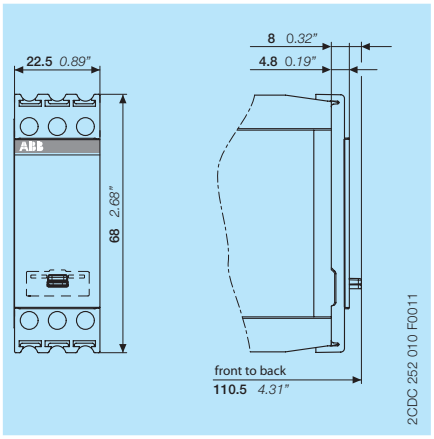
in **mm** and inches



ADP.01 - Adapter for screw mounting



MAR.01 - Marker label for devices without DIP switches



COV.11 - Sealable transparent cover

Further documentation

Document title	Document type	Document number
Electronic products and relays	Technical catalogue	2CDC 110 004 C02xx
Operating and installation instructions CM-MSS.12, CM-MSS.13, CM-MSS.22, CM-MSS.23	Instruction manual	1SVC 730 630 M0000

You can find the documentation on the internet at
http://new.abb.com/low-voltage/products/epr/monitors/thermistor-motor-protection-relays

CAD system files

You can find the CAD files for CAD systems at
http://abb-control-products.partcommunity.com/portal/portal/abb-control-products
-> Low Voltage Products & Systems -> Control Products -> Electronic Relays and Controls
-> Thermistor Motor Protection Relays.

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