

Thermistor motor protection relays

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Thermistor motor protection relays

Benefits and advantages, Applications

The thermistor motor protection relays of the CM-MSx range protect motors with PTC sensors against high temperature. These sensors are incorporated in the motor windings thus measuring the motor heat directly.

Direct temperature measuring

Generally, motor damages caused by overload or overheating situations can be prevented in different ways. Compared to the indirect temperature measuring which monitors the motor current, the temperature inside the motor can be measured by direct temperature measuring.

This enables direct control and evaluation of the following operating conditions like:

- Heavy duty starting
- Increased switching frequency
- Single phase operation
- Phase unbalance
- High ambient temperature
- Insufficient cooling
- Breaking operation

Therefore the consequences from overheating like abrasion as well as electrical failures can be prevented.

The direct measuring principle is carried out by a combination of the thermistor motor protection relay and 3 PTC sensors which are installed directly in the motor by the manufacturer. Those 3 PTC sensors are placed directly at the thermal hotspots, the motor windings.

Monitoring the motor

The thermistor motor protection relay measures the resistance of the PTC sensors which reflects the internal motor temperature permanently.

If the temperature in the motor windings rises excessively and reaches the nominal response temperature (NRT), the thermistor motor protection relay detects this situation and the output relay switches off.

By doing so the motor contactor gets triggered and switches off the motor.

CM-MSS functionality video



Characteristics CM-MSS (1)

- Different types of contacts available
 - 1 x 2 c/o (SPDT) contacts
 - 2 x 1 c/o (SPDT) contact
 - 1 n/o and 1 n/c contact
- 1 or 2 measuring circuits
- Different types of reset functions
 - Automatic
 - Manual
 - Remote
- Rated control supply voltages
 - 24 V AC/DC
 - 24-240 V AC/DC
 - 110-130 V AC, 220-240 V AC

Approvals / Marks



Characteristics CM-MSE

- Auto reset
- Connection of several sensors (max. 6 sensors connected in series)
- Monitoring of bimetals
- 1 n/o contact
- Excellent cost / performance ratio

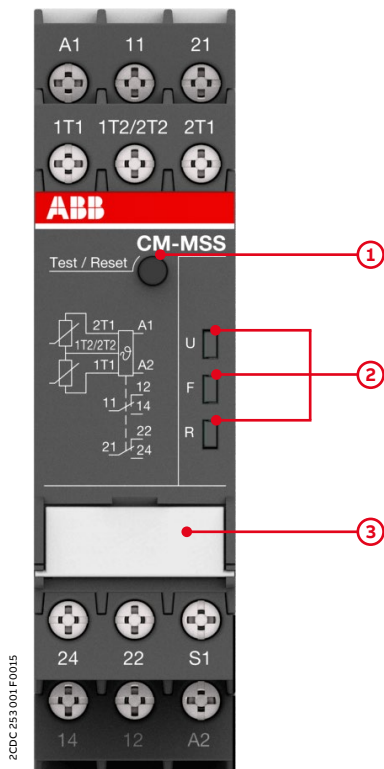
Features (1)

- Additional functions:
 - Dynamic interrupted wire detection
 - Short-circuit monitoring of the sensor circuit
 - Non-volatile fault storage
 - Single or sum evaluation
- Easy configuration via DIP switches
- LEDs to distinguish between different failure causes
- Screw connection technology or Easy Connect Technology available
- Test/Reset button available

(1) Depending on device the characteristics vary, for detailed overview see "Selection table CM-MSx range" on page 4.

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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

R: yellow LED - Status indication of the output relay

③ Marker label / DIP switches (depending on device) e.g.

Single evaluation 2 x 1 c/o (SPDT) contact

Accumulative evaluation 1 x 2 c/o (SPDT) contacts

Short-circuit detection de-activated

Short-circuit detection activated

Non-volatile fault storage activated

Non-volatile fault storage de-activated

Remote Reset

Remote Test/Reset

LEDs, status information and fault messages CM-MSS

Operational state	U: green LED	F: red LED	R: yellow LED
Absence of control supply voltage	OFF	OFF	OFF
Internal fault (2)	OFF		
Internal fault (2)			
Control supply voltage not within the tolerance range			OFF
Short circuit			OFF
Interrupted wire			OFF
Measuring circuit 2: Overtemperature			OFF
Measuring circuit 1: Overtemperature			OFF
Fault rectified but not confirmed		-- (1)	
Test function		OFF	OFF
Change of configuration not confirmed		OFF	
No fault		OFF	

(1) Depending on the fault with the highest priority

(2) Restart the device. If after restart the same fault is indicated, replace the device.

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Selection table CM-MSx range

Type	Order code
CM-MSE	1SVR550805R9300
CM-MSE	1SVR550800R9300
CM-MSE	1SVR550801R9300
CM-MSS.11P	1SVR740720R1400
CM-MSS.11S	1SVR730720R1400
CM-MSS.12P	1SVR740700R0100
CM-MSS.12S	1SVR730700R0100
CM-MSS.13P	1SVR740700R2100
CM-MSS.13S	1SVR730700R2100
CM-MSS.21P	1SVR740722R1400
CM-MSS.21S	1SVR730722R1400
CM-MSS.22P	1SVR740700R0200
CM-MSS.22S	1SVR730700R0200
CM-MSS.23P	1SVR740700R2200
CM-MSS.23S	1SVR730700R2200
CM-MSS.31P	1SVR740712R1400
CM-MSS.31S	1SVR730712R1400
CM-MSS.32P	1SVR740712R0200
CM-MSS.32S	1SVR730712R0200
CM-MSS.33P	1SVR740712R2200
CM-MSS.33S	1SVR730712R2200
CM-MSS.41P	1SVR740712R1200
CM-MSS.41S	1SVR730712R1200
CM-MSS.51P	1SVR740712R1300
CM-MSS.51S	1SVR730712R1300

Characteristics

ATEX approval				■	■					■	■					■	■	■	■	■	■	■	■	■	■	■	■	■
Number of sensor circuits	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
Single or accumulative evaluation																										■	■	■
Number of LEDs				3	3	2	2	2	2	3	3	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3

Contacts

1 c/o (SPDT) contact								■	■	■	■																	
2 c/o (SPDT) contacts														■	■	■	■											
1 n/o	■		■		■																							
1 n/c and 1 n/o						■		■																				
2 x 1 c/o or 1 x 2 c/o contacts, configurable																												

Reset

Manual													■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Remote													■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Auto	■	■	■	■	■	■	■	■	■	■	■	■	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (2)	■ (2)
Test button																		■	■	■	■	■	■	■	■	■	■	■

Functions

Short-circuit detection											■	■							■	■	■	■	■	■					
Short-circuit detection, configurable																									■	■	■	■	
Dynamic interrupted wire detection				■	■						■	■							■	■	■	■	■	■	■	■	■	■	■
Non-volatile fault storage				■	■						■	■							■	■									
Non-volatile fault storage, configurable																									■	■	■	■	

Rated control supply voltage U_c

24 V AC	■																											
110-130 V AC		■																										
220-240 V AC			■																									
24-240 V AC/DC				■	■					■	■							■	■						■	■	■	■
24 V AC/DC						■	■					■	■							■	■							
110-130 V AC, 220-240 V AC								■	■					■	■							■	■					

Connection type

Push-in terminals				■		■		■		■		■		■		■		■		■		■		■		■		■
Double-chamber cage connection terminals					■		■		■		■		■		■		■		■		■		■		■		■	■

(1) For automatic reset, connect terminals S1 to T2.

(2) For automatic reset, connect Terminals S1 to 1T2/2T2.

Thermistor motor protection relays

Ordering details



CM-MSS.12S

2CDC 251 004 V0014



CM-MSS.41S

2CDC 251 013 V0014



CM-MSS.51S

2CDC 251 014 V0014

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.

CM-MSx

Characteristics	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
	CM-MSE	1SVR550805R9300		0.11 (0.24)
	CM-MSE	1SVR550800R9300		0.11 (0.24)
	CM-MSE	1SVR550801R9300		0.11 (0.24)
	CM-MSS.11P	1SVR740720R1400		0.119 (0.263)
	CM-MSS.11S	1SVR730720R1400		0.127 (0.280)
	CM-MSS.12P	1SVR740700R0100		0.105 (0.231)
	CM-MSS.12S	1SVR730700R0100		0.113 (0.249)
	CM-MSS.13P	1SVR740700R2100		0.147 (0.324)
	CM-MSS.13S	1SVR730700R2100		0.155 (0.342)
	CM-MSS.21P	1SVR740722R1400		0.118 (0.260)
	CM-MSS.21S	1SVR730722R1400		0.126 (0.278)
	CM-MSS.22P	1SVR740700R0200		0.121 (0.267)
	CM-MSS.22S	1SVR730700R0200		0.132 (0.291)
	CM-MSS.23P	1SVR740700R2200		0.163 (0.359)
	CM-MSS.23S	1SVR730700R2200		0.174 (0.384)
	CM-MSS.31P	1SVR740712R1400		0.120 (0.265)
	CM-MSS.31S	1SVR730712R1400		0.128 (0.282)
	CM-MSS.32P	1SVR740712R0200		0.120 (0.265)
	CM-MSS.32S	1SVR730712R0200		0.130 (0.287)
	CM-MSS.33P	1SVR740712R2200		0.162 (0.357)
	CM-MSS.33S	1SVR730712R2200		0.172 (0.379)
	CM-MSS.41P	1SVR740712R1200		0.130 (0.287)
	CM-MSS.41S	1SVR730712R1200		0.141 (0.311)
	CM-MSS.51P	1SVR740712R1300		0.135 (0.298)
	CM-MSS.51S	1SVR730712R1300		0.145 (0.320)

See "Selection table CM-MSx range" on page 4.

S: screw connection
P: push-in connection



Further documentation thermistor motor
protection monitoring relays on www.abb.com

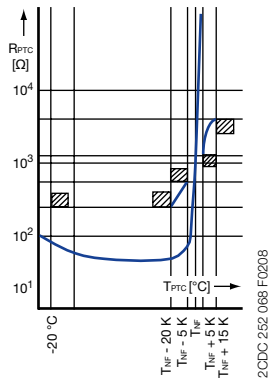
Thermistor motor protection relays

Ordering details - PTC temperature sensors C011



15VC 110 000 F0531

Temperature sensor characteristics



2C0C 252 068 F0208

The PTC temperature sensors (temperature-dependent with positive temperature coefficient) are selected by the manufacturer of the motor depending on:

- the motor insulation class according to IEC/EN 60034-11,
- the special characteristics of the motor, such as the conductor cross-section of the windings, the permissible overload factor etc.
- special conditions prescribed by the user, such as the permissible ambient temperature, risks resulting from locked rotor, extent of permitted overload etc.

One temperature sensor must be embedded in each phase winding. For instance, in case of three-phase squirrel cage motors, three sensors are embedded in the stator windings. For pole-changing motors with one winding (Dahlander connection), 3 sensors are also sufficient. Pole-changing motors with two windings, however, require The sensors are suitable for embedding in motor windings with rated operating voltages of up to 600 V AC. Conductor length: 500 mm per sensor. A 14 V varistor can be connected in parallel to protect the sensors from overvoltage. Due to their characteristics, the thermistor motor protection relays can also be used with PTC temperature sensors of other manufacturers which comply with DIN 44 081 and DIN 44 082 6 sensors.

If an additional warning is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They have to be connected to a second control unit.

CM-MSS accessories

Rated response temperature T_{NF}	Color coding	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
70 °C	white-brown	C011-70 (1)	GHC0110003R0001		0.02 (0.044)
80 °C	white-white	C011-80 (1)	GHC0110003R0002		0.02 (0.044)
90 °C	green-green	C011-90 (1)	GHC0110003R0003		0.02 (0.044)
100 °C	red-red	C011-100 (1)	GHC0110003R0004		0.02 (0.044)
110 °C	brown-brown	C011-110 (1)	GHC0110003R0005		0.02 (0.044)
120 °C	gray-gray	C011-120 (1)	GHC0110003R0006		0.02 (0.044)
130 °C	blue-blue	C011-130 (1)	GHC0110003R0007		0.02 (0.044)
140 °C	white-blue	C011-140 (1)	GHC0110003R0011		0.02 (0.044)
150 °C	black-black	C011-150 (1)	GHC0110003R0008		0.02 (0.044)
160 °C	blue-red	C011-160 (1)	GHC0110003R0009		0.02 (0.044)
170 °C	white-green	C011-170 (1)	GHC0110003R0010		0.02 (0.044)
150 °C	black-black	C011-3-150 (2)	GHC0110033R0008		0.05 (0.11)

(1) Temperature sensor C011, standard version acc. to DIN 44081

(2) Triple temperature sensor C011-3

Technical data

Characteristic data	Sensor type C011
Cold-state resistance	50 -100 Ω at 25 °C
Warm-state resistance ± 5 up to 6 K of rated response temperature T_{NF}	10 000 Ω
Thermal time constant, sensor open (1)	< 5 s
Permitted ambient temperature	+180 °C

Rated response temperature $\pm$ tolerance $T_{NF} \pm \Delta T_{NF}$	PTC resistance R from -20 °C to $T_{NF} - 20 K$	PTC resistance R2) at PTC temperatures of:		
		$T_{NF} - \Delta T_{NF}$ (UPTC $\leq 2.5 V$)	$T_{NF} + \Delta T_{NF}$ (UPTC $\leq 2.5 V$)	$T_{NF} + 15 K$ (UPTC $\leq 7.5 V$)
70 $\pm 5^{\circ}C$	$\leq 100 \Omega$	$\leq 570 \Omega$	$\geq 570 \Omega$	-
80 $\pm 5^{\circ}C$				
90 $\pm 5^{\circ}C$				
100 $\pm 5^{\circ}C$				
110 $\pm 5^{\circ}C$				
120 $\pm 5^{\circ}C$		$\leq 550 \Omega$	$\geq 1330 \Omega$	$\geq 4000 \Omega$
130 $\pm 5^{\circ}C$				
140 $\pm 5^{\circ}C$				
150 $\pm 5^{\circ}C$				
160 $\pm 5^{\circ}C$				
170 $\pm 7^{\circ}C$		$\leq 570 \Omega$	$\geq 570 \Omega$	-

(1) Not embedded in windings.

(2) For triple temperature sensor take values x 3.

Thermistor motor protection relays

Technical data - CM-MSS

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

Supply circuit - Input circuit		CM-MSS.x1	CM-MSS.x2	CM-MSS.x3
Rated control supply voltage U_s	A1-A2	24-240 V AC/DC	24 V AC/DC	220-240 V AC
	A2-A3	-	-	110-130 V AC
Rated control supply voltage U_s tolerance		-15...+10 %		
Rated frequency		15-400 Hz	50-60 Hz	
Electrical insulation between supply circuit and measuring circuit		yes	no	yes
Power failure buffering time		20 ms		

Supply circuit - Measuring circuit / Sensor circuit

Number of circuits		1 (CM-MSS.51: 2)		
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 (relay de-energizes)	2.83 k Ω $\pm$ 1% (CM-MSS.12 / .13 / .22 / .23: 2.7 k Ω $\pm$ 5%)		
	switch-on resistance (relay energizes)	1.1 k Ω $\pm$ 1% (CM-MSS.12 / .13 / .22 / .23: 1.2 k Ω $\pm$ 5%)		
Maximum voltage in sensor circuit	1.33 kW	2.5 V		
	4 kW	3.7 V		
	∞ kW	5.5 V		
Maximum current in sensor circuit		3.7 mA		
Maximum sensor cable length		2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ²		
Accuracy within the rated control supply voltage tolerance		0.50 % (CM-MSS.12 / .13 / .22 / .23: 5 %)		
Accuracy within the temperature range		0.01 %/K (CM-MSS.12 / .13 / .22 / .23: 0.5 %/K)		
Repeat accuracy (constant parameters)		on request		
Reaction time of the safety function		< 100 ms		
Hardware fault tolerance (HFT)		0		

Control circuit

Control function		see "Selection table CM-MSx range" on page 4		
Maximum no-load voltage		5.5 V		
Max. current		0.6 mA (CM-MSS.12 / .13 / .22 / .23: 1.2 mA)		
Maximum cable length		2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ²		

Indication of operational states

Control supply voltage	U	LED green
Relay status	R	LED yellow
Fault message	F	LED red

Output circuit

Kind of output		see "Selection table CM-MSx range" on page 4		
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 data sheet		
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	300 V AC		
	maximum continuous thermal current at B 300	5 A		
	maximum making/breaking apparent power at B 300	3600/360 VA		
	general purpose rating	250 V AC - 4 A		
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 (CM-MSS.12, CM-MSS.13, CM-MSS.51: 6 A)		
	n/o contact	10 A fast-acting		

Thermistor motor protection relays

Technical data - CM-MSS

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		see "Ordering details" on page 5
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool
Mounting position		any
Minimum distance to other units	vertical	10 mm (0.394 in) if switching current > 2 A
	horizontal	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)
Connection capacity	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm ² (1 x 18-14 AWG) 2 x 0.5-1.5 mm ² (2 x 18-16 AWG)	2 x 0.5-1.5 mm ² (2 x 18-16 AWG)
	rigid	1 x 0.5-4 mm ² (1 x 20-12 AWG) 2 x 0.5-2.5 mm ² (2 x 20-14 AWG)	2 x 0.5-1.5 mm ² (2 x 20-16 AWG)
Stripping length		8 mm (0.32 in)	
Tightening torque		0.6-0.8 Nm (7.08 lb.in)	-
Wire end ferrule		according to DIN 46228-1-A, DIN 46228-4-E	-

Environmental data

Ambient temperature ranges	operation	-25...+60 °C (-13...+140 °F)
	storage	-40...+85 °C (-40...+185 °F)
Damp heat, cyclic (IEC/EN 60068-2-30)		6 x 24 h cycle, 55 °C, 95 % RH
Climatic class (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

Rated insulation voltage U _i (IEC/EN 60947-1, IEC/EN 60664-1)	Supply circuit / Measuring circuit (1)	300 V AC (CM-MSS.x2: n/a)
	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)	4 kV / 6 kV (CM-MSS.x2: n/a)
	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)	600 V AC (CM-MSS.x2: n/a)
	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)	Supply circuit / Measuring circuit (1)	2.5 kV, 50 Hz, 1 min. (CM-MSS.x2: n/a)
	Supply circuit / Output circuits	2.5 kV, 50 Hz, 1 min.
	Measuring circuit (1) / Output circuits	2.5 kV, 50 Hz, 1 min.
	Output circuit 1 / Output circuit 2	2.5 kV, 50 Hz, 1 min.
Test voltage, type test (IEC/EN 60255-27)	Supply circuit / Measuring circuit (1)	6 kV / 1.2 - 50 μs (CM-MSS.x2: n/a)
	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, EN 50178)	Supply circuit / Measuring circuit (1)	yes, up to 300 V
	Supply circuit / Output circuits	yes (CM-MSS.x2: n/a)
	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

Thermistor motor protection relays

Technical data - CM-MSS

Standards

Product standard	EN 60947-5-1, EN 60947-8
Low Voltage Directive	2014/35/EC
EMC directive	2014/30/EC
ATEX directive	2014/34/EC (only ATEX variants "Selection table CM-MSx range" on page 4)
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
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

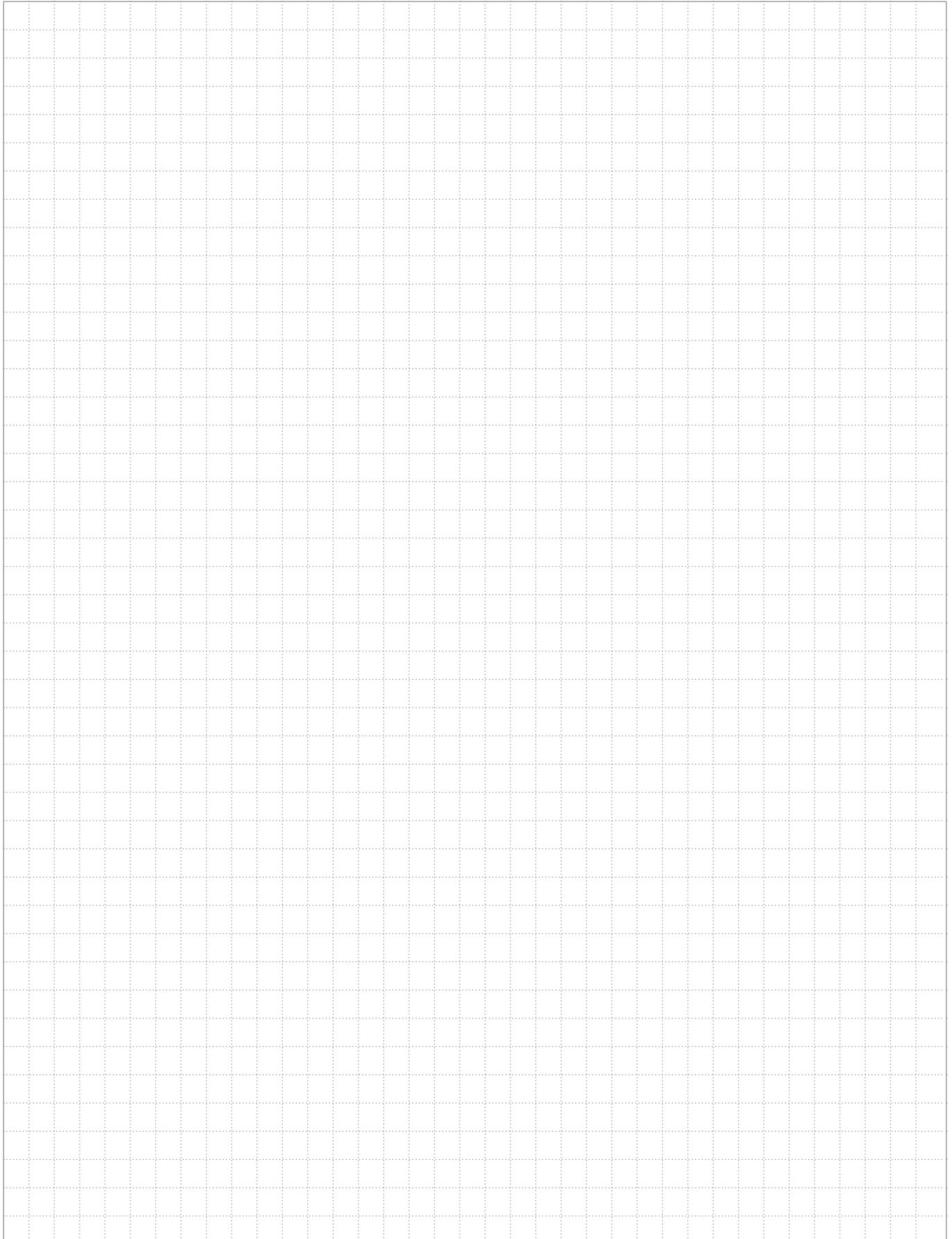
Thermistor motor protection relays

Technical data - CM-MSE

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

Supply circuit - Input circuit		CM-MSE
Rated control supply voltage U _i , power consumption	1SVR550805R9300	24 V AC approx. 1.5 A
	1SVR550800R9300	110-130 V AC approx. 1.5 A
	1SVR550801R9300	220-240 V AC approx. 1.5 A
Rated control supply voltage U _i tolerance		-15...+10 %
Rated frequency		50-60 Hz
Measuring circuit		
Monitoring function	T1-T2	temperature monitoring by means of PTC sensors
Number of sensor circuits		1
Sensor circuit		
Temperature threshold (relay de-energizes)		2.7-3.7 kΩ
Temperature hysteresis (relay energizes)		1.7-2.3 kΩ
Short-circuit threshold (relay de-energizes)		<18 Ω
Short-circuit hysteresis (relay energizes)		>45 Ω
Maximum total resistance of sensors connected in series (cold state)		≤1.5 kΩ
Maximum sensor cable length for short-circuit detection		2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ²
Response time		<100 ms
Output circuit		
Kind of output	13-14	1 n/o contact
Operational principle		closed-circuit principle (output relay de-energizes if the measured value exceeds/drops below the adjusted threshold)
Contact material		AgCdO
Rated voltage	VDE 0110, IEC 664-1, IEC 60947-1	250 V
Maximum switching voltage		250 V
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	300 V AC
	maximum continuous thermal current at B 300	5 A
	maximum making/breaking apparent power at B 300	3600/360 VA
Mechanical lifetime	general purpose rating	250 V AC - 4 A
		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		
Dimensions (W x H x D)		22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in)
Duty time		100 %
Weight		approx. 0.11 kg (0.24 lb)
Mounting position		any
Degree of protection	housing / terminals	IP50 / IP20
Ambient temperature range	operation	-20...+60 °C
	storage	-40...+85 °C
Mounting		DIN rail (IEC/EN 60715)
Electrical connection		
Wire size	fine strand with wire end ferrule	2 x 1.5 mm ² (2 x 16 AWG)
		2 x 0.75-1.5 mm ² (2 x 18-16 AWG)
	fine strand without wire end ferrule	2 x 1-1.5 mm ² (2 x 18-16 AWG)
Stripping length	rigid	2 x 0.75-1.5 mm ² (2 x 18-16 AWG)
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)
Standards		
Product standard		IEC 255-6, EN 60255-6
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC, 91/263/EEC, 92/31/EEC, 93/68/EEC, 93/67/EEC
Electromagnetic compatibility		
electrostatic discharge	IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3 (10 V/m)
electrical fast transient /burst	IEC/EN 61000-4-4	Level 3 (2 kV / 5 kHz)
surge	IEC/EN 61000-4-5	Level 3/4 (1/2 kV)
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3 (10 V)
Operational reliability (IEC 68-2-6)		6 g
Resistance to vibration (IEC 68-2-6)		10 g
Environmental testing (IEC 68-2-30)		24 h cycle time, 55 °C, 93 % rel., 96 h
Electromagnetic compatibility		
Rated voltage between supply, measuring and output circuit		250 V
Rated impulse withstand voltage between all isolated circuits		4 kV / 1.2 - 50 μs
Test voltage between all isolated circuits		2.5 kV, 50 Hz, 1 min.
Pollution degree		3
Overvoltage category		III

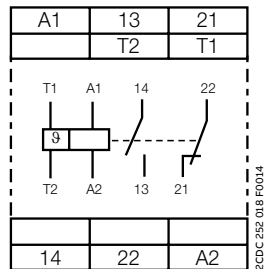
Notes

A large rectangular area filled with a grid of small, light gray dotted lines, intended for handwritten notes.

Thermistor motor protection relays

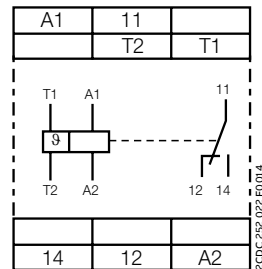
Connection diagrams

CM-MSS.11, CM-MSS.21



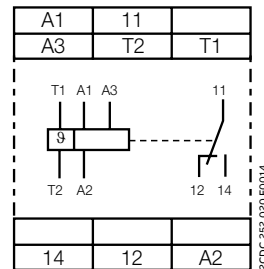
A1 – A2	Control supply voltage
13 – 14	n/o contact
21 – 22	n/c contact
T1 – T2	Measuring circuit

CM-MSS.12



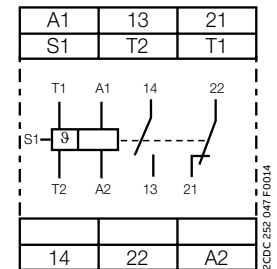
A1 – A2	Control supply voltage
11 – 12/14	c/o contact
T1 – T2	Measuring circuit

CM-MSS.13



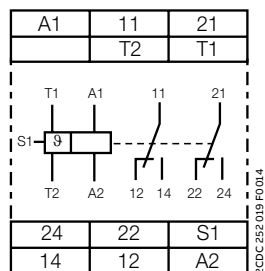
A1 – A2	Control supply voltage 220-240 V AC
A2 – A3	Control supply voltage 110-130 V AC
11 – 12/14	c/o contact
T1 – T2	Measuring circuit

CM-MSS.31



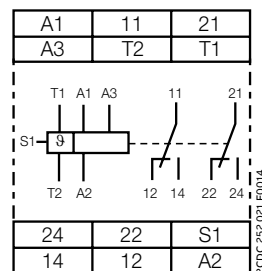
A1 – A2	Control supply voltage
13 – 14	n/o contact
21 – 22	n/c contact
S1 – T2	Automatic reset (jumped)
T1 – T2	Measuring circuit

CM-MSS.22, CM-MSS.32, CM-MSS.41



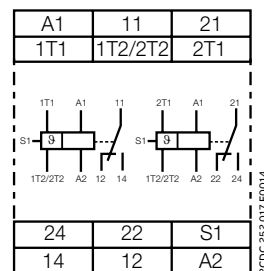
A1 – A2	Control supply voltage 24 V AC/DC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – T2	Automatic reset (jumped)
T1 – T2	Measuring circuit

CM-MSS.23, CM-MSS.33



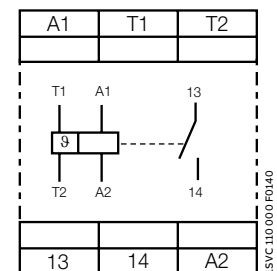
A1 – A2	Control supply voltage 220-240 V AC
A2 – A3	Control supply voltage 110-130 V AC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – T2	Automatic reset (jumped)
T1 – T2	Measuring circuit

CM-MSS.51



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

CM-MSE

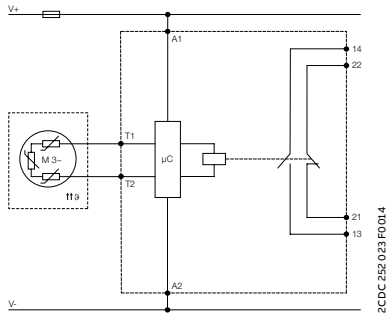


A1 – A2	Control supply voltage 24 V AC
T1-T2	Sensor circuit
13-14	Output contact - Closed circuit principle

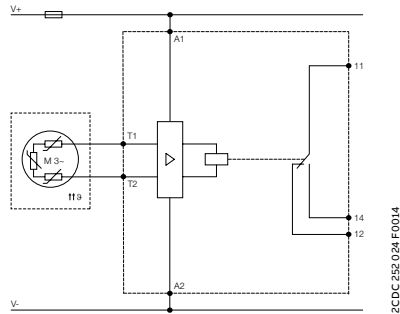
Thermistor motor protection relays

Circuit diagram

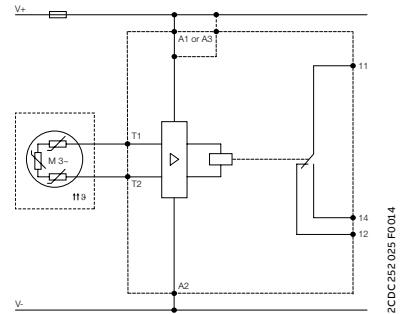
CM-MSS.11, CM-MSS.21



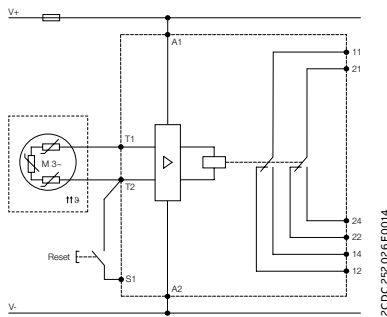
CM-MSS.12



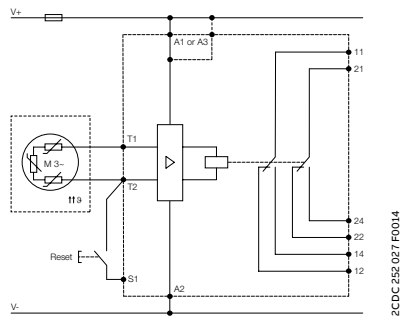
CM-MSS.13



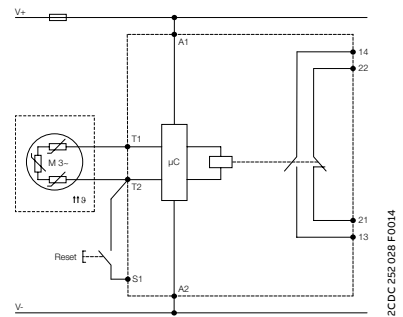
CM-MSS.22



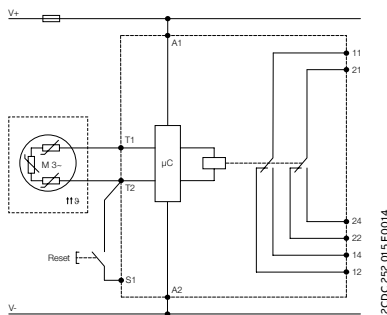
CM-MSS.23



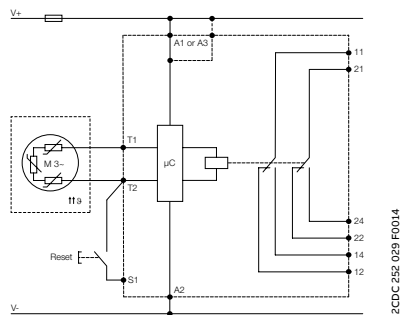
CM-MSS.31



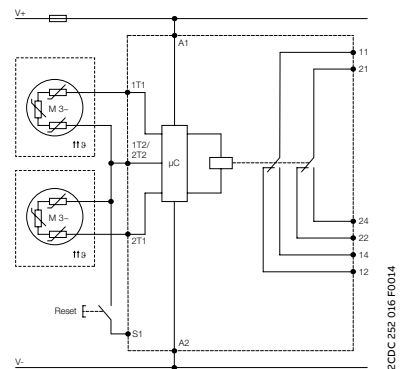
CM-MSS.32, CM-MSS.41



CM-MSS.33



CM-MSS.51



CM-MSE

