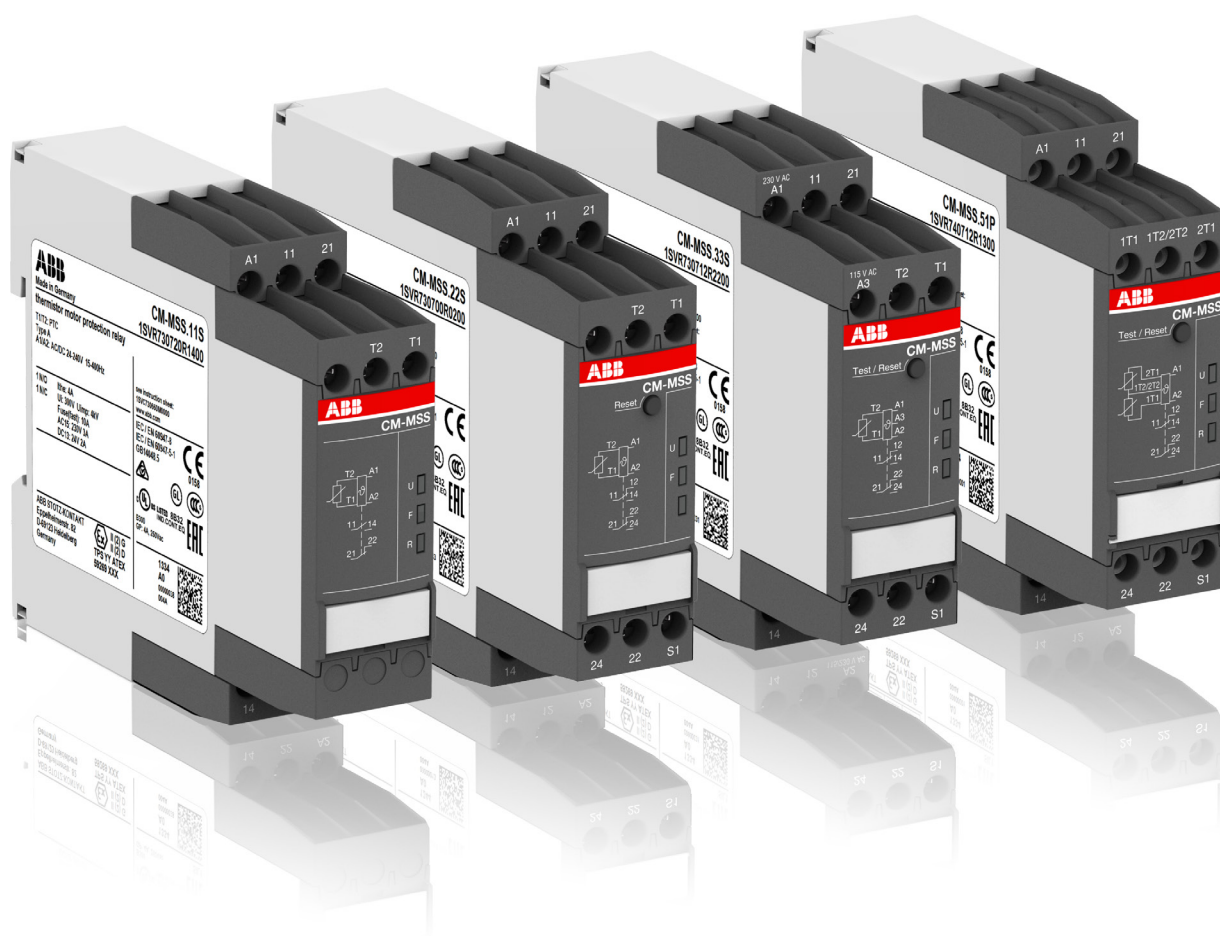


# Thermistor motor protection relays

## Product group picture

2



# Thermistor motor protection relays

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### Thermistor motor protection relays

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# Thermistor motor protection relays

## Benefits and advantages, Applications

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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.

### Characteristics CM-MSS<sup>1)</sup>

- 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
- Various approvals and 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

### 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



### Features <sup>1)</sup>

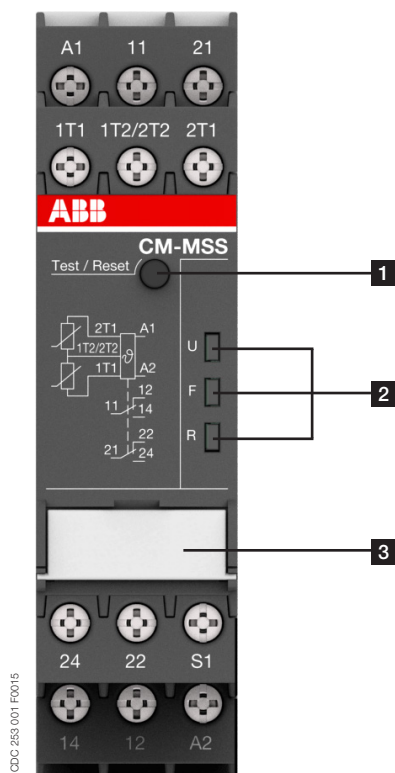
- Additional functions:
  - Dynamic interrupted wire detection
  - Short-circuit monitoring of the sensor circuit
  - Non-volatile fault storage
  - Single or sum evaluation
- Easy configuration via DIP switches
- LEDs to distinguish between different failure causes
- Screw connection technology or Easy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

<sup>1)</sup> Depending on device the characteristics vary, for detailed overview see "Selection table - Thermistor motor protection relays" on page 2/79.

# Thermistor motor protection relays

## Operating controls

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### 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)

## LEDs, status information and fault messages CM-MSS (in order of priority)

Operational state	U: green LED	F: red LED	R: yellow LED
Absence of control supply voltage	OFF	OFF	OFF
Internal fault <sup>1)</sup>	OFF		
Internal fault <sup>1)</sup>			
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		-- <sup>2)</sup>	
Test function		OFF	OFF
Change of configuration not confirmed		OFF	
No fault		OFF	

<sup>1)</sup> Depending on the fault with the highest priority

<sup>2)</sup> Restart the device. If after restart the same fault is indicated, replace the device.

In case of several faults, the fault with the higher priority is shown. The reset can be made after rectification and confirmation of the last fault.

# Thermistor motor protection relays

## Selection table - Thermistor motor protection relays

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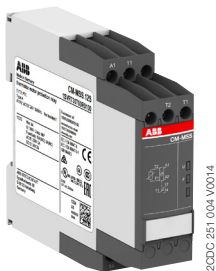
	Type	Order code																									
	CM-MSE	1SVR550805R9300																									
	CM-MSE	1SVR550800R9300																									
	CM-MSE	1SVR550801R9300																									
	CM-MSS.11P	1SVR740720R1400																									
	CM-MSS.11S	1SVR730720R1400																									
	CM-MSS.12P	1SVR740700R0100																									
	CM-MSS.12S	1SVR730700R0100																									
	CM-MSS.13P	1SVR740700R02100																									
	CM-MSS.13S	1SVR730700R02100																									
	CM-MSS.21P	1SVR740722R1400																									
	CM-MSS.21S	1SVR730722R1400																									
	CM-MSS.22P	1SVR740700R0200																									
	CM-MSS.22S	1SVR730700R0200																									
	CM-MSS.23P	1SVR740700R02200																									
	CM-MSS.23S	1SVR730700R02200																									
	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		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of sensor circuits		1																									
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	
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																											
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 <sub>s</sub>																											
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																											

<sup>1)</sup> For automatic reset, connect terminals S1 to T2.

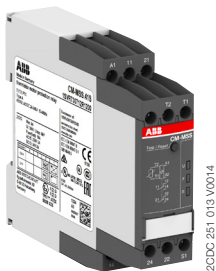
<sup>2)</sup> For automatic reset, connect Terminals S1 to 1T2/2T2.

# Thermistor motor protection relays

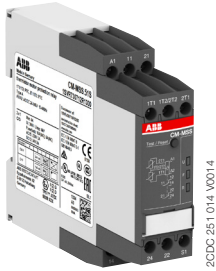
## Ordering details



CM-MSS.12S



CM-MSS.41S



CM-MSS.51S

### Description

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/EN 60947-8.

### Ordering details CM-MSx

Characteristics	Type	Order code	Price	Weight
			1 pc	(1 pc) 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 - Thermistor motor protection relays" on page 2/79.

S: screw connection  
P: push-in connection

# Thermistor motor protection relays

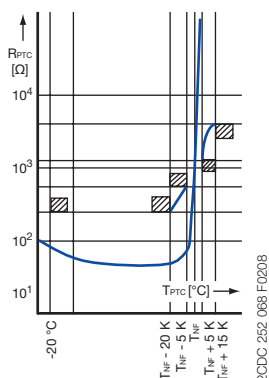
## Ordering details - PTC temperature sensors C011

2



15VC 110 000 F0531

Temperature sensor characteristics



2CDC 252 068 F0208

### Description

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 6 sensors. 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.

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.

### Ordering details CM-MSS accessories

Rated response temperature $T_{NF}$	Color coding	Type	Order code	Price 1 pc	Weight (1 pc) kg (lb)
<b>Temperature sensor C011, standard version acc. to DIN 44081</b>					
1 set = 3 pieces					
70 °C	white-brown	C011-70	GHC0110003R0001		0.02 (0.044)
80 °C	white-white	C011-80	GHC0110003R0002		0.02 (0.044)
90 °C	green-green	C011-90	GHC0110003R0003		0.02 (0.044)
100 °C	red-red	C011-100	GHC0110003R0004		0.02 (0.044)
110 °C	brown-brown	C011-110	GHC0110003R0005		0.02 (0.044)
120 °C	gray-gray	C011-120	GHC0110003R0006		0.02 (0.044)
130 °C	blue-blue	C011-130	GHC0110003R0007		0.02 (0.044)
140 °C	white-blue	C011-140	GHC0110003R0011		0.02 (0.044)
150 °C	black-black	C011-150	GHC0110003R0008		0.02 (0.044)
160 °C	blue-red	C011-160	GHC0110003R0009		0.02 (0.044)
170 °C	white-green	C011-170	GHC0110003R0010		0.02 (0.044)
<b>Triple temperature sensor C011-3</b>					
150 °C	black-black	C011-3-150	GHC0110033R0008		0.05 (0.11)

### 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 <sup>1)</sup>	< 5 s
Permitted ambient temperature	+180 °C

Rated response temperature ± tolerance $T_{NF} \pm \Delta T_{NF}$	PTC resistance R from -20 °C to $T_{NF}$ - 20 K	PTC resistance R <sup>2)</sup> at PTC temperatures of:		
		$T_{NF} - \Delta T_{NF}$ (UPTC ≤ 2.5 V)	$T_{NF} + \Delta T_{NF}$ (UPTC ≤ 2.5 V)	$T_{NF} + 15 K$ (UPTC ≤ 7.5 V)
70 ± 5 °C	≤ 100 Ω	≤ 570 Ω	≥ 570 Ω	-
80 ± 5 °C				
90 ± 5 °C				
100 ± 5 °C				
110 ± 5 °C				
120 ± 5 °C		≤ 550 Ω	≥ 1330 Ω	≥ 4000 Ω
130 ± 5 °C				
140 ± 5 °C				
150 ± 5 °C				
160 ± 5 °C				
170 ± 7 °C		≤ 570 Ω	≥ 570 Ω	-

<sup>1)</sup> Not embedded in windings.

<sup>2)</sup> For triple temperature sensor take values x 3.



# Thermistor motor protection relays

## Technical data - CM-MSS

### Technical data

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 <sub>s</sub>	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 <sub>s</sub> 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 kΩ ± 1% (CM-MSS.12 /13 /22 /23: 2.7 kΩ ± 5%)		
	switch-on resistance (relay energizes)	1.1 kΩ ± 1% (CM-MSS.12 /13 /22 /23: 1.2 kΩ ± 5%)		
Maximum voltage in sensor circuit	1.33 kΩ	2.5 V		
	4 kΩ	3.7 V		
	∞ kΩ	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		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 - Thermistor motor protection relays” on page 2/79		
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 mm², 2 x 400 m at 2.5 mm²		
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 - Thermistor motor protection relays” on page 2/79		
Operating principle		closed-circuit principle		
Contact material		AgNi alloy, Cd free		
Rated operational voltage U <sub>e</sub>		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 <sub>e</sub>	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 <sup>6</sup> switching cycles		
Electrical lifetime		at AC-12, 230 V AC, 4 A	0.1 x 10 <sup>6</sup> 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

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General data				
MTBF		on request		
Duty time		100 %		
Dimensions		see 'Dimensional drawings'		
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position		any		
Minimum distance to other units		vertical / horizontal	10 mm (0.39 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 mm² (1 x 18-14 AWG) 2 x 0.5-1.5 mm² (2 x 18-16 AWG)	2 x 0.5-1.5 mm² (2 x 18-16 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 (7.08 lb.in) -		
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		5-13.2 Hz: ± 1 mm; 13.2-100 Hz: 0.7 g		
Shock		10 g / 11 ms		
Isolation data				
Rated insulation voltage U <sub>i</sub>		supply circuit / measuring circuit <sup>1)</sup>	300 V AC (CM-MSS.x2: n/a)	
		supply circuit / output circuits	300 V AC	
		measuring circuit <sup>1)</sup> / output circuits	300 V AC	
		output circuit 1 / output circuit 2	300 V AC	
Rated impulse withstand voltage U <sub>imp</sub>		supply circuit / measuring circuit <sup>1)</sup>	4 kV (CM-MSS.x2: n/a)	
		supply circuit / output circuits	4 kV	
		measuring circuit <sup>1)</sup> / output circuits	4 kV	
		output circuit 1 / output circuit 2	4 kV	
Basic insulation		supply circuit / measuring circuit <sup>1)</sup>	600 V AC (CM-MSS.x2: n/a)	
		supply circuit / output circuits	600 V AC	
		measuring circuit <sup>1)</sup> / output circuits	600 V AC	
		output circuit 1 / output circuit 2	300 V AC	
Protective separation (IEC/EN 61140, EN 50178)		supply circuit / measuring circuit <sup>1)</sup>	yes, up to 300 V	
		supply circuit / output circuits	yes (CM-MSS.x2: n/a)	
		measuring circuit <sup>1)</sup> / output circuits	yes	
		output circuit 1 / output circuit 2	no	
Pollution degree		3		
Overvoltage category		III		
Standards / Directives				
Standards		IEC/EN 60947-5-1, IEC/EN 60947-8		
Low Voltage Directive		2014/35/EU		
EMC directive		2014/30/EU		
ATEX directive		2014/34/EC (only ATEX variants, "Selection table - Thermistor motor protection relays" on page 2/79)		
RoHS directive		2011/65/EU		

<sup>1)</sup> Potential of measuring circuit = Potential of control circuit

# Thermistor motor protection relays

## Technical data - CM-MSS

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Electromagnetic compatibility		
Interference immunity to		IEC/EN 61000-6-2, IEC/EN 60947-8
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 IEC/EN 60255-1 (reference on IEC/EN 60255-26)		
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
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

### Technical data

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

Supply circuit - Input circuit		CM-MSE
Rated control supply voltage $U_s$ 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 $U_s$ 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		
Sensor type		PTC type A (DIN/EN 44081, DIN/EN 44082)
Max. total resistance of sensors connected in series, cold state		$\leq 1.0\text{ k}\Omega$
Overtemperature monitoring	switch-off resistance (relay de-energizes)	2.0-3.0 $\text{k}\Omega$
	switch-on resistance (relay energizes)	1.2-1.65 $\text{k}\Omega$
Maximum voltage in sensor circuit	4 $\text{k}\Omega$	5 V
	$\infty\text{ k}\Omega$	15 V
Maximum current in sensor circuit		2 mA
Maximum sensor cable length		2 x 100 m at 0.75 mm <sup>2</sup> , 2 x 400 m at 2.5 mm <sup>2</sup>
Reaction 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)
Rated operational voltage $U_e$		250 V
Maximum switching voltage		250 V
Rated operating current $I_e$	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 <sup>6</sup> switching cycles
Electrical lifetime	at AC-12, 230 V AC, 4 A	0.1 x 10 <sup>6</sup> 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		see 'Dimensional drawings'
Duty time		100 %
Mounting		DIN rail (IEC/EN 60715)
Mounting position		any
Degree of protection	housing / terminals	IP50 / IP20
Electrical connection		
Connecting capacity	fine strand with wire end ferrule	2 x 1.5 mm <sup>2</sup> (2 x 16 AWG)
	fine strand without wire end ferrule	2 x 0.75-1.5 mm <sup>2</sup> (2 x 18-16 AWG)
	rigid	2 x 1-1.5 mm <sup>2</sup> (2 x 18-16 AWG)
Stripping length		2 x 0.75-1.5 mm <sup>2</sup> (2 x 18-16 AWG)
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)
Environmental data		
Ambient temperature ranges	operation	-20...+60 °C
	storage	-40...+85 °C
Damp heat	IEC/EN 60068-2-30	40 °C, 93 % RH, 4 days
Vibration withstand	IEC/EN 60068-2-6	10-57 Hz: 0.075 mm; 57-150 Hz: 1 g

# Thermistor motor protection relays

## Technical data - CM-MSE

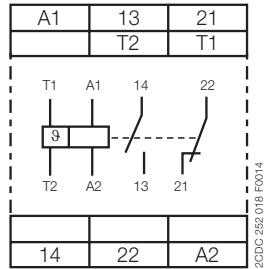
<b>Isolation data</b>		
Rated insulation voltage U <sub>i</sub>	supply, measuring / output circuit	250 V
Rated impulse withstand voltage U <sub>imp</sub>	between all isolated circuits	4 kV / 1.2 - 50 µs
Pollution degree		3
Overvoltage category		III
<b>Standards / Directives</b>		
Standards		IEC/EN 60947-5-1, IEC/EN 60947-8
Low Voltage Directive		2014/35/EU
EMC Directive		2014/30/EU
RoHS directive		2011/65/EU
<b>Electromagnetic compatibility</b>		
Interference immunity to		IEC/EN 61000-6-2, IEC/EN 60947-8
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)
Interference emission		IEC/EN 61000-6-3
high-frequency radiated	IEC/CISPR 22, EN 55022	class B
high-frequency conducted	IEC/CISPR 22, EN 55022	class B

# Thermistor motor protection relays

## Connection diagrams

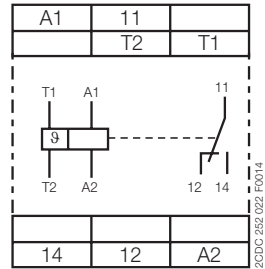
2

CM-MSS.11, CM-MSS.21



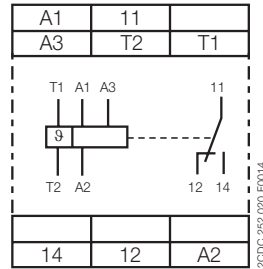
A1 – A2 Control supply voltage  
13 – 14 n/o contact  
21 – 22 n/c contact  
T1 – T2 Measuring circuit

CM-MSS.12



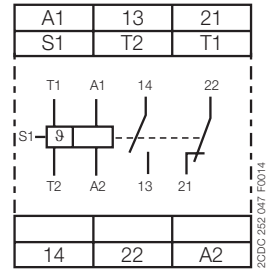
A1 – A2 Control supply voltage  
11 – 12/14 c/o contact  
T1 – T2 Measuring circuit

CM-MSS.13



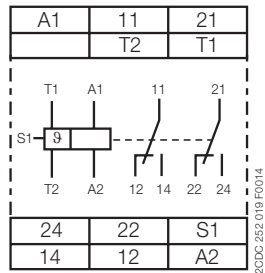
A1 – A2 Control supply voltage  
220-240 V AC  
A2 – A3 Control supply voltage  
110-130 V AC  
11 – 12/14 c/o contact  
T1 – T2 Measuring circuit

CM-MSS.31



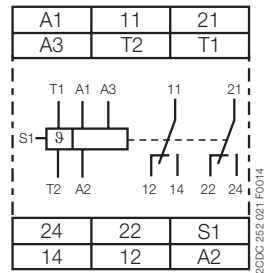
A1 – A2 Control supply voltage  
13 – 14 n/o contact  
21 – 22 n/c contact  
S1 – T2 Automatic reset (jumped)  
T1 – T2 Measuring circuit

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



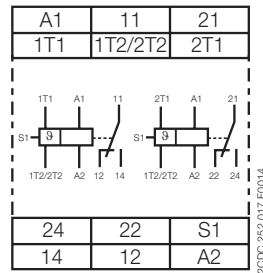
A1 – A2 Control supply voltage 24 V AC/DC  
11 – 12/14 1st c/o (SPDT) contact  
21 – 22/24 2nd c/o (SPDT) contact  
S1 – T2 Automatic reset (jumped)  
T1 – T2 Measuring circuit

CM-MSS.23, CM-MSS.33



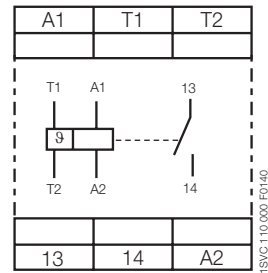
A1 – A2 Control supply voltage 220-240 V AC  
A2 – A3 Control supply voltage 110-130 V AC  
11 – 12/14 1st c/o (SPDT) contact  
21 – 22/24 2nd c/o (SPDT) contact  
S1 – T2 Automatic reset (jumped)  
T1 – T2 Measuring circuit

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

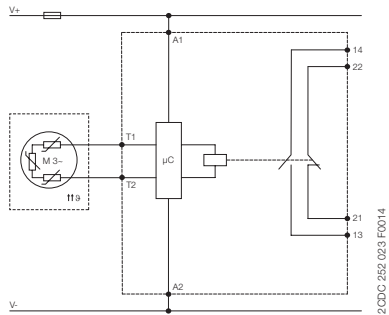


A1 – A2 Control supply voltage 24 V AC  
T1-T2 Sensor circuit  
13-14 Output contact - Closed circuit principle

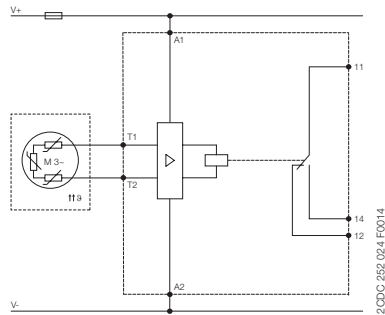
## Thermistor motor protection relays

### Circuit diagrams

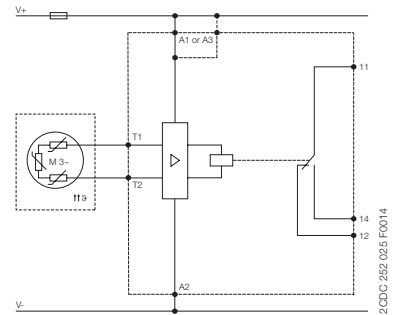
CM-MSS.11, CM-MSS.21



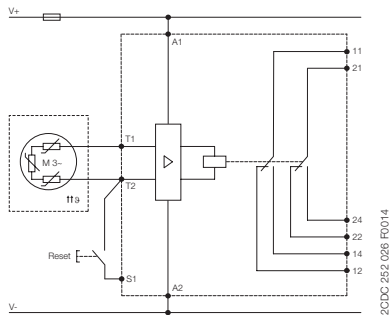
CM-MSS.12



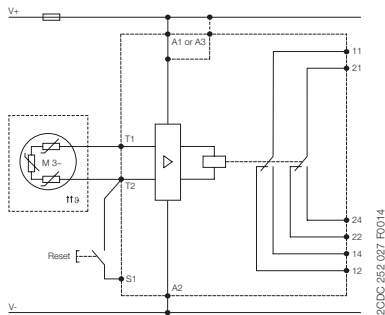
CM-MSS.13



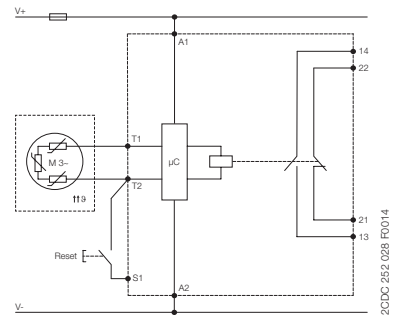
CM-MSS.22



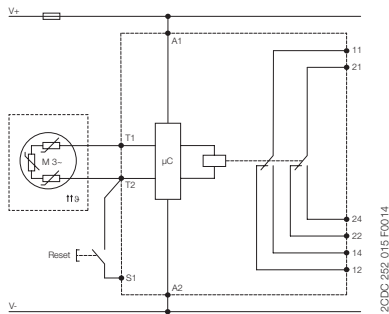
CM-MSS.23



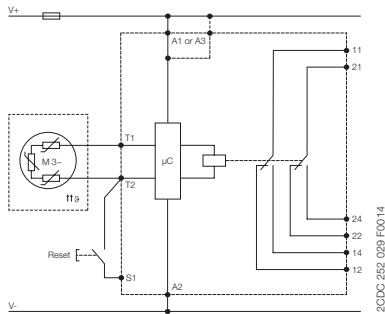
CM-MSS.31



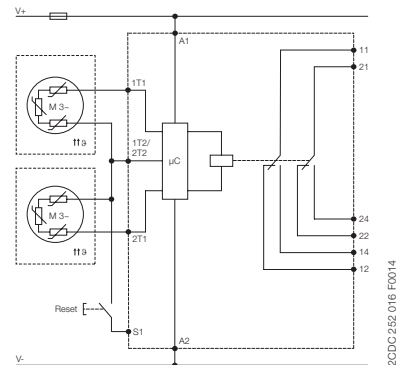
CM-MSS.32, CM-MSS.41



CM-MSS.33



CM-MSS.51



CM-MSE

