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# Thermistor motor protection relays

## CM-MSE, CM-MSS, CM-MSN

### Benefits and advantages, Selection table

#### Operating principle and fields of application for thermistor motor protection relays

The CM range of thermistor motor protection relays are used to control motors equipped with PTC temperature sensors. The PTC temperature sensors are incorporated in the motor windings to measure the motor heating. This enables direct control and evaluation of the following operating conditions:

- heavy duty starting
- increased switching frequency
- single-phase operation
- high ambient temperature
- insufficient cooling
- break operation
- unbalance

The relay is independent of the rated motor current, the insulation class and the method of starting.

The PTC sensors are connected in series to the terminals  $T_a$  and  $T_b$  (or  $T_a$  and  $T_{bx}$  without short-circuit detection). The number of possible PTC sensors per measuring circuit is limited by the sum of the individual PTC sensor resistances:  $R_G = R_1 + R_2 + R_N \leq 1.5 \text{ k}\Omega$ .

Under normal operating conditions the resistance is below the response threshold. If only one of the PTC resistors heats up excessively, the output relay de-energizes. If the autoreset function is configured, the output relay energizes automatically after cooling down.

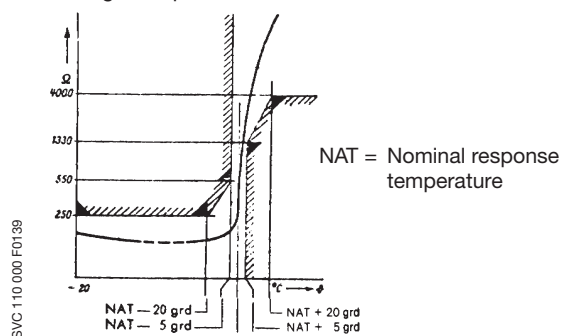
Devices with manual (pushbutton on front-side) or remote reset configuration have to be controlled via the control input by the required signal.

#### Further applications:

Temperature monitoring of equipment with PTC sensors integrated, such as

- machine rolling bearings,
- hot-air ventilators,
- oil,
- air,
- heating installations, etc.

**Resistance characteristic**  
for one single temperature sensor acc. to DIN 44 081.



#### Selection table thermistor motor protection relays

| Type                            | CM-MSE                   | CM-MSS (1)      | CM-MSS (2)      | CM-MSS (3)      | CM-MSS (4)      | CM-MSS (5)      | CM-MSS (6)               | CM-MSS (7)                            | CM-MSN                                |
|---------------------------------|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------------|---------------------------------------|---------------------------------------|
| Function                        |                          |                 |                 |                 |                 |                 |                          |                                       |                                       |
| Measuring range                 |                          |                 |                 |                 |                 |                 |                          |                                       |                                       |
| Number of sensor circuits       | 1                        | 1               | 1               | 1               | 1               | 1               | 2                        | 3                                     | 6                                     |
| Wire break monitoring           | •                        | •               | •               | •               | •               | •               | •                        | •                                     | •                                     |
| Short-circuit detection         | –                        | –               | –               | • 1)            | •               | •               | •                        | •                                     | •                                     |
| Non-volatile fault storage      | –                        | –               | –               | –               | • 2)            | • 2)            | –                        | • 2)                                  | • 2)                                  |
| Operation/Reset                 |                          |                 |                 |                 |                 |                 |                          |                                       |                                       |
| Auto reset                      | •                        | •               | •               | •               | • 2)            | • 2)            | • 2)                     | • 2)                                  | • 2)                                  |
| Manual reset                    | –                        | –               | •               | •               | •               | •               | •                        | •                                     | •                                     |
| Remote reset                    | –                        | –               | •               | •               | •               | •               | •                        | •                                     | •                                     |
| Test button                     | –                        | –               | –               | –               | •               | •               | •                        | •                                     | •                                     |
| Output contacts                 |                          |                 |                 |                 |                 |                 |                          |                                       |                                       |
| Operational principle           | closed-circuit principle |                 |                 |                 |                 |                 |                          |                                       |                                       |
| Number / type                   | 1 c/o                    | 1 n/o           | 2 c/o           | 2 c/o           | 1 n/o + 1 n/c   | 2 c/o           | 1 c/o per sensor circuit | 1 n/o + 1 n/c accumulative evaluation | 1 n/o + 1 n/c accumulative evaluation |
| Width of enclosure              | 22.5 mm                  |                 |                 |                 |                 |                 |                          |                                       | 45 mm                                 |
| Supply voltages and order codes |                          |                 |                 |                 |                 |                 |                          |                                       |                                       |
| 24 V AC                         | 1SVR550805R9300          |                 | 1SVR430811R9300 |                 |                 |                 |                          |                                       |                                       |
| 24 V AC/DC                      |                          | 1SVR430800R9100 | 1SVR430810R9300 | 1SVR430710R9300 |                 |                 |                          |                                       |                                       |
| 110–130 V AC                    | 1SVR550800R9300          |                 | 1SVR430811R0300 | 1SVR430711R0300 |                 |                 |                          |                                       |                                       |
| 220–240 V AC                    | 1SVR550801R9300          | 1SVR430801R1100 | 1SVR430811R1300 | 1SVR430711R1300 |                 |                 |                          |                                       |                                       |
| 380–440 V AC                    |                          |                 |                 | 1SVR430711R2300 |                 |                 |                          |                                       |                                       |
| 24–240 V AC/DC                  |                          |                 |                 |                 | 1SVR430720R0400 | 1SVR430720R0300 | 1SVR430710R0200          | 1SVR430720R0500                       | 1SVR450025R0100                       |

1) configurable via terminals

2) Auto reset without non-volatile fault storage configurable by permanent jumpering of connecting terminals S1-T2 or S1/X1-S2/X2

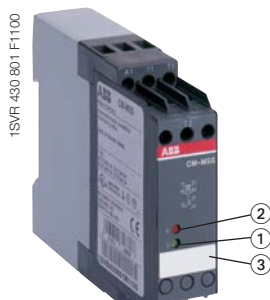
# Thermistor motor protection relays

## CM-MSE, CM-MSS

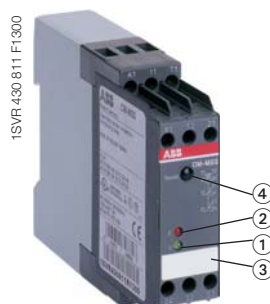
### Ordering details



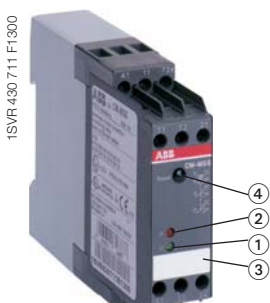
CM-MSE



CM-MSS (1)



CM-MSS (2)

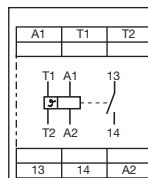


CM-MSS (3)

- ① F: red LED - fault tripping
- ② U: green LED - control supply voltage
- ③ Marker label
- ④ Reset button

#### CM-MSE

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



1SVR 110 000 F0140

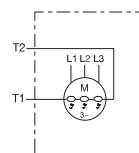
A1-A2

Rated control supply voltage

Sensor circuit

Output contact -

Closed-circuit principle

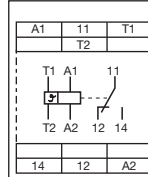


1SVR 110 000 F0141

| Type   | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|--------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSE | 24 V AC                      | 1SVR 550 805 R9300 | 1                 |               | 0.11 / 0.24            |
|        | 110-130 V AC                 | 1SVR 550 800 R9300 | 1                 |               | 0.11 / 0.24            |
|        | 220-240 V AC                 | 1SVR 550 801 R9300 | 1                 |               | 0.11 / 0.24            |

#### CM-MSS (1), 1 c/o contact

- Auto reset
- Connection of several sensors
- Monitoring of bimetals
- 1 c/o contact
- 2 LEDs for status indication



1SVR 110 000 F0142

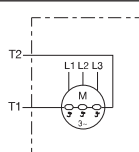
A1-A2

Rated control supply voltage

Sensor circuit

Output contact -

Closed-circuit principle

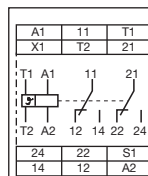


1SVR 110 000 F0141

| Type       | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSS (1) | 24 V AC/DC <sup>1)</sup>     | 1SVR 430 800 R9100 | 1                 |               | 0.15 / 0.33            |
|            | 220-240 V AC                 | 1SVR 430 801 R1100 | 1                 |               | 0.15 / 0.33            |

#### CM-MSS (2), 2 c/o contacts

- Fault storage can be switched off
- Auto reset configurable
- Reset button
- Remote reset
- Monitoring of bimetals
- 2 c/o contacts
- 2 LEDs for status indication



1SVR 110 000 F519

A1-A2

Rated control supply voltage

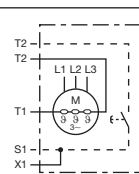
Sensor circuit

Remote reset

jumper = no storage

Output contacts -

Closed-circuit principle

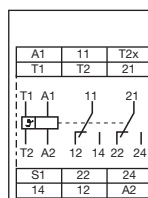


2CDC 252 123 F0607

| Type       | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSS (2) | 24 V AC/DC <sup>1)</sup>     | 1SVR 430 810 R9300 | 1                 |               | 0.15 / 0.33            |
|            | 24 V AC                      | 1SVR 430 811 R9300 | 1                 |               | 0.15 / 0.33            |
|            | 110-130 V AC                 | 1SVR 430 811 R0300 | 1                 |               | 0.15 / 0.33            |
|            | 220-240 V AC                 | 1SVR 430 811 R1300 | 1                 |               | 0.15 / 0.33            |

#### CM-MSS (3), 2 c/o contacts, short-circuit monitoring configurable

- Fault storage can be switched off
- Auto reset configurable
- Reset button
- Remote reset
- Monitoring of bimetals
- Short-circuit monitoring of the sensor circuit configurable
- 2 c/o contacts
- 2 LEDs for status indication



1SVR 110 000 F0143

A1-A2

Rated control supply voltage

remote reset

jumper = without storage

measuring circuit without

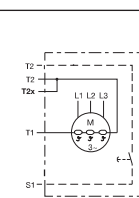
short-circuit monitoring

measuring circuit with

short-circuit monitoring

Output contacts

Closed-circuit principle



1SVR 110 000 F0144

| Type       | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSS (3) | 24 V AC/DC <sup>1)</sup>     | 1SVR 430 710 R9300 | 1                 |               | 0.15 / 0.33            |
|            | 110-130 V AC                 | 1SVR 430 711 R0300 | 1                 |               | 0.15 / 0.33            |
|            | 220-240 V AC                 | 1SVR 430 711 R1300 | 1                 |               | 0.15 / 0.33            |
|            | 380-440 V AC                 | 1SVR 430 711 R2300 | 1                 |               | 0.15 / 0.33            |

<sup>1)</sup> not electrically isolated

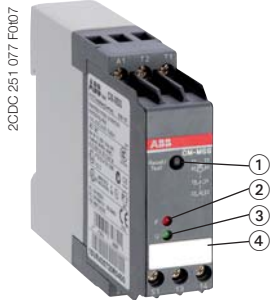
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# Thermistor motor protection relays

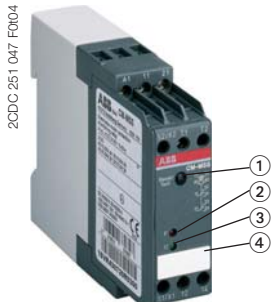
## CM-MSS

### Ordering details

2

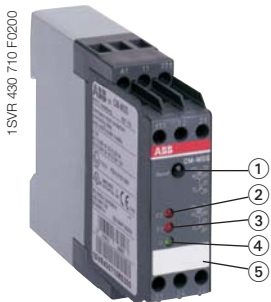


CM-MSS (4)



CM-MSS (5)

- ① Reset / test button
- ② F: red LED - fault tripping
- ③ U: green LED - control supply voltage
- ④ Marker label



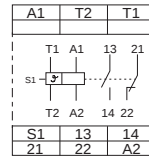
CM-MSS (6)

- ① Reset button
- ② to ③ F1-F2: red LED - fault tripping 1 to 2
- ④ U: green LED - control supply voltage
- ⑤ Marker label

#### CM-MSS (4) + CM-MSS (5), 1-channel

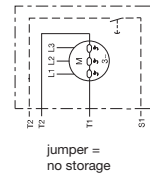
- Short-circuit monitoring of the sensor circuit
- Wide supply voltage range: 24-240 V AC/DC
- Non-volatile fault storage selectable
- Reset and test button
- Remote reset
- Auto reset configurable
- Output contacts: 1 n/c and 1 n/o or 2 c/o contacts
- 2 LEDs for status indication

#### CM-MSS (4)



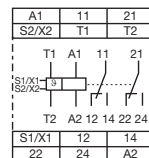
2CDC 252 016 F0004

A1-A2 Rated control supply voltage  
T1-T2 Sensor circuit  
S1-T2 Remote reset  
13-14 Output contacts - Closed-circuit principle  
21-22



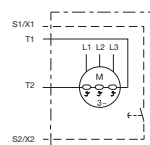
1SVC 110 000 F0145

#### CM-MSS (5)



2CDC 252 147 F0006

A1-A2 Rated control supply voltage  
T1-T2 Sensor circuit  
S1/X1-S2/X2 Reset  
11-12/14 Output contacts - Closed-circuit principle  
21-22/24

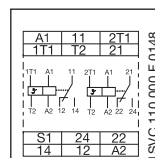


2CDC 252 044 F0004

| Type                               | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------------------------------------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSS (4)<br>1-channel 1n/c, 1n/o | 24-240 V AC/DC               | 1SVR 430 720 R0400 | 1                 |               | 0.15 / 0.33            |
| CM-MSS (5)<br>1-channel 2 c/o      | 24-240 V AC/DC               | 1SVR 430 720 R0300 | 1                 |               | 0.15 / 0.33            |

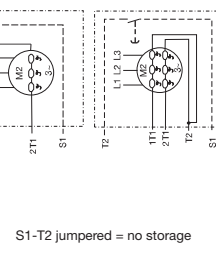
#### CM-MSS (6), 2-channel, single evaluation

- Short-circuit monitoring for the sensor circuits
- Wide supply voltage range: 24-240 V AC/DC
- 2 separate sensor circuits for monitoring of two motors or one motor with 2 sensor circuits (prewarning and final switch off)
- Reset button
- Auto reset configurable
- Output contacts: 2 x 1 c/o contact
- 3 LEDs for status indication



1SVC 110 000 F 0148

A1-A2 Rated control supply voltage  
11-12/14, 21-22/24 Output contacts - Closed-circuit principle  
1T1-T2, 2T1-T2 Sensor circuit



1SVC 110 000 F 0146

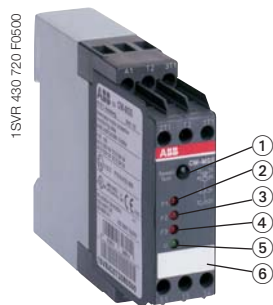
| Type       | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSS (6) | 24-240 V AC/DC               | 1SVR 430 710 R0200 | 1                 |               | 0.15 / 0.33            |

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# Thermistor motor protection relays

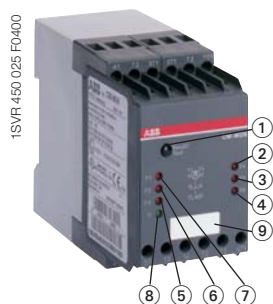
## CM-MSS, CM-MSN

### Ordering details



CM-MSS (7)

- ① Reset / test button
- ② to ④ F1-F3: red LED - fault tripping 1 to 3
- ⑤ U: green LED - control supply voltage
- ⑥ Marker label

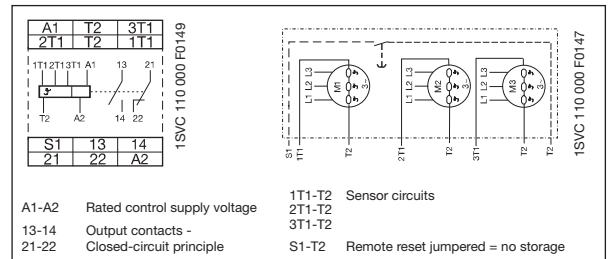


CM-MSN

- ① Reset / Test button
- ② to ⑦ F1-F6: red LED - fault tripping F1 to F6
- ⑧ U: green LED - control supply voltage
- ⑨ Marker label

#### CM-MSS (7), 3 sensor circuits, accumulative evaluation

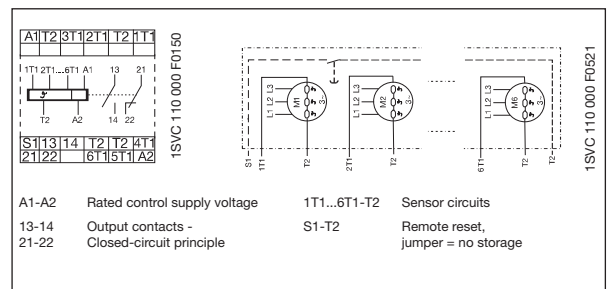
- Short-circuit monitoring for the sensor circuits
- Wide supply voltage range 24-240 V AC/DC
- Non-volatile fault storage configurable
- Remote reset
- Auto reset configurable
- Reset and test button
- Output contacts: 1 n/c and 1 n/o contact
- 4 LEDs for status indication



| Type       | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSS (7) | 24-240 V AC/DC               | 1SVR 430 720 R0500 | 1                 |               | 0.15 / 0.33            |

#### CM-MSN, 6 sensor circuits, accumulative evaluation

- Short-circuit monitoring of the sensor circuit
- Wide supply voltage range: 24-240 V AC/DC
- Non-volatile fault storage configurable
- Remote reset
- Auto reset configurable
- Reset and test button
- Output contacts: 1 n/c, 1 n/o contact
- 7 LEDs for status indication



| Type   | Rated control supply voltage | Order code         | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|--------|------------------------------|--------------------|-------------------|---------------|------------------------|
| CM-MSN | 24-240 V AC/DC               | 1SVR 450 025 R0100 | 1                 |               | 0.23 / 0.51            |

accumulative evaluation = if any input exceeds the threshold, the output relay will trip

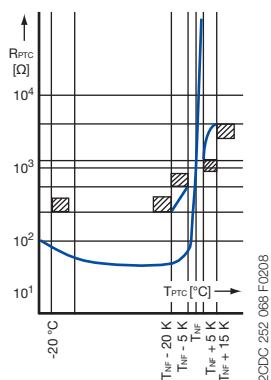
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# Thermistor motor protection

## PTC temperature sensors C011

### Ordering details, technical data

Temperature sensor characteristic



2CDC 252 068 F0208

1SVC 110 000 F0531



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.

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.

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.

| Type | Rated response temperature $T_{NF}$ | Color coding | Order code | Pack. unit set | Price 1 set | Weight 1 piece kg / lb |
|------|-------------------------------------|--------------|------------|----------------|-------------|------------------------|
|------|-------------------------------------|--------------|------------|----------------|-------------|------------------------|

#### Temperature sensor C011, standard version acc. to DIN 44081

1 set = 3 pieces

|          |        |             |                    |   |  |            |
|----------|--------|-------------|--------------------|---|--|------------|
| C011-70  | 70 °C  | white-brown | GHC 011 0003 R0001 | 1 |  | 0.02/0.044 |
| C011-80  | 80 °C  | white-white | GHC 011 0003 R0002 | 1 |  | 0.02/0.044 |
| C011-90  | 90 °C  | green-green | GHC 011 0003 R0003 | 1 |  | 0.02/0.044 |
| C011-100 | 100 °C | red-red     | GHC 011 0003 R0004 | 1 |  | 0.02/0.044 |
| C011-110 | 110 °C | brown-brown | GHC 011 0003 R0005 | 1 |  | 0.02/0.044 |
| C011-120 | 120 °C | gray-gray   | GHC 011 0003 R0006 | 1 |  | 0.02/0.044 |
| C011-130 | 130 °C | blue-blue   | GHC 011 0003 R0007 | 1 |  | 0.02/0.044 |
| C011-140 | 140 °C | white-blue  | GHC 011 0003 R0011 | 1 |  | 0.02/0.044 |
| C011-150 | 150 °C | black-black | GHC 011 0003 R0008 | 1 |  | 0.02/0.044 |
| C011-160 | 160 °C | blue-red    | GHC 011 0003 R0009 | 1 |  | 0.02/0.044 |
| C011-170 | 170 °C | white-green | GHC 011 0003 R0010 | 1 |  | 0.02/0.044 |

| Type | Rated response temperature $T_{NF}$ | Color coding | Order code | Pack. unit pieces | Price 1 piece | Weight 1 piece kg / lb |
|------|-------------------------------------|--------------|------------|-------------------|---------------|------------------------|
|------|-------------------------------------|--------------|------------|-------------------|---------------|------------------------|

#### Triple temperature sensor C011-3

|            |        |             |                    |   |  |           |
|------------|--------|-------------|--------------------|---|--|-----------|
| C011-3-150 | 150 °C | black-black | GHC 011 0033 R0008 | 1 |  | 0.05/0.11 |
|------------|--------|-------------|--------------------|---|--|-----------|

#### Technical data

| Characteristic data                                                            |                                                 | Sensor type C011                                 |                                                  |                                         |
|--------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------|--------------------------------------------------|-----------------------------------------|
| Cold-state resistance                                                          |                                                 | 50 -100 $\Omega$ at 25 °C                        |                                                  |                                         |
| Warm-state resistance $\pm 5$ up to 6 K of rated response temperature $T_{NF}$ |                                                 | 10 000 $\Omega$                                  |                                                  |                                         |
| Thermal time constant, sensor open <sup>1)</sup>                               |                                                 | < 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 R at PTC temperatures of:         |                                                  |                                         |
|                                                                                |                                                 | $T_{NF} - \Delta T_{NF}$ ( $U_{PTC} \leq 2.5$ V) | $T_{NF} + \Delta T_{NF}$ ( $U_{PTC} \leq 2.5$ V) | $T_{NF} + 15$ K ( $U_{PTC} \leq 7.5$ V) |
| 70 $\pm 5$ °C                                                                  | $\leq 100 \Omega$                               | $\leq 570 \Omega$                                | $\geq 570 \Omega$                                | -                                       |
| 80 $\pm 5$ °C                                                                  |                                                 | $\leq 550 \Omega$                                | $\geq 1330 \Omega$                               | $\geq 4000 \Omega$                      |
| 90 $\pm 5$ °C                                                                  |                                                 |                                                  |                                                  |                                         |
| 100 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 110 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 120 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 130 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 140 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 150 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 160 $\pm 5$ °C                                                                 |                                                 |                                                  |                                                  |                                         |
| 170 $\pm 7$ °C                                                                 |                                                 | $\leq 570 \Omega$                                | $\geq 570 \Omega$                                | -                                       |

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

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

# Thermistor motor protection relays

## CM-MSE, CM-MSS, CM-MSN

### Technical data

| Type                                                                 |                                                    | CM-MSE                                                                                                                | CM-MSS                                                                                                                     | CM-MSN                                   |
|----------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Input circuit                                                        |                                                    |                                                                                                                       |                                                                                                                            |                                          |
| Rated control supply voltage U <sub>s</sub> - power consumption      | A1-A2                                              | 24 V AC                                                                                                               | approx. 1.5 VA                                                                                                             |                                          |
|                                                                      | A1-A2                                              | 24 V AC/DC                                                                                                            | approx. 1.1 VA / 0.6 W                                                                                                     |                                          |
|                                                                      | A1-A2                                              | 110-130 V AC                                                                                                          | approx. 1.5 VA                                                                                                             |                                          |
|                                                                      | A1-A2                                              | 220-240 V AC                                                                                                          | approx. 1.5 VA                                                                                                             |                                          |
|                                                                      | A1-A2                                              | 380-440 V AC                                                                                                          | approx. 1.7 VA                                                                                                             |                                          |
|                                                                      | A1-A2                                              | 24-240 V AC/DC                                                                                                        | approx. 1.4-1.7 W / approx. 3.5-5.7 VA                                                                                     |                                          |
| Rated control supply voltage U <sub>s</sub> tolerance                |                                                    | -15 % ... +10 %                                                                                                       |                                                                                                                            |                                          |
| Rated frequency                                                      |                                                    | AC: 50-60 Hz / 24-240 V AC/DC versions: 15-400 Hz                                                                     |                                                                                                                            |                                          |
| Duty time                                                            |                                                    | 100 %                                                                                                                 |                                                                                                                            |                                          |
| Measuring circuit                                                    |                                                    | T1-T2                                                                                                                 | T1-T2/T2x, 1T1...6T1-T2                                                                                                    | 1T1...6T1-T2                             |
| Monitoring function                                                  |                                                    | temperature monitoring by means of PTC sensors                                                                        |                                                                                                                            |                                          |
| Number of senor circuits                                             |                                                    | 1                                                                                                                     | 1, 2 oder 3 (see order. details)                                                                                           | 6                                        |
| Short-circuit monitoring                                             |                                                    | -                                                                                                                     | see ordering details                                                                                                       | yes                                      |
| Non-volatile fault storage                                           |                                                    | -                                                                                                                     | see ordering details                                                                                                       | configurable                             |
| Test function                                                        |                                                    | -                                                                                                                     | see ordering details                                                                                                       | yes                                      |
| Sensor circuit                                                       |                                                    |                                                                                                                       |                                                                                                                            |                                          |
| Temperature threshold (relay de-energizes)                           |                                                    | 2.7-3.7 kΩ                                                                                                            | CM-MSS (1+2): 3050±550 Ω<br>CM-MSS (3-7): 3.6 kΩ ±5 %                                                                      | 3.6 kΩ ±5 %                              |
| Temperature hysteresis (relay energizes)                             |                                                    | 1.7-2.3 kΩ                                                                                                            | CM-MSS (1+2): 1900±400 Ω<br>CM-MSS (3-7): 1.6 kΩ ±5 %                                                                      | 1.6 kΩ ±5 %                              |
| Short circuit threshold (relay de-energizes)                         |                                                    |                                                                                                                       | <20 Ω                                                                                                                      |                                          |
| Short circuit hysteresis (relay energizes)                           |                                                    |                                                                                                                       | >40 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 mm², 2 x 400 m at 2.5 mm²                                                                                |                                          |
| Response time                                                        |                                                    |                                                                                                                       | <100 ms                                                                                                                    |                                          |
| Control circuit for storage and hysteresis function                  |                                                    |                                                                                                                       |                                                                                                                            |                                          |
| Remote reset                                                         | S1-T2 or S1/X1-S2/X2                               | -                                                                                                                     | n/o contact                                                                                                                |                                          |
| Maximum no-load voltage                                              |                                                    | -                                                                                                                     | approx. 25 V, 24-240 V; AC/DC versions: 5.5 V                                                                              |                                          |
| Maximum cable length                                                 |                                                    | -                                                                                                                     | ≤ 50 m, 100-200 m if shielded                                                                                              |                                          |
| Indication of operational states                                     |                                                    |                                                                                                                       |                                                                                                                            |                                          |
| Control supply voltage                                               | U: green LED                                       | -                                                                                                                     | □: control supply voltage applied                                                                                          |                                          |
| Fault indication                                                     | F: red LED                                         | -                                                                                                                     | □: output relay de-energized                                                                                               |                                          |
| Output circuits                                                      |                                                    |                                                                                                                       |                                                                                                                            |                                          |
|                                                                      |                                                    | 13-14                                                                                                                 | 11-12/14, 21-22/24, 13-14, 21-22                                                                                           | 13-14, 21-22                             |
| Kind of output                                                       |                                                    | 1 n/o contact                                                                                                         | CM-MSS (1): 1 c/o contact<br>CM-MSS (2,3,5): 2 c/o contacts<br>CM-MSS (4, 7): 1 n/o + 1 n/c<br>CM-MSS (6): 2x1 c/o contact | 1 n/o + 1 n/c contact                    |
| Operational principle                                                |                                                    | closed-circuit principle (output relay de-energizes if the measured value exceeds/drops below the adjusted threshold) |                                                                                                                            |                                          |
| Contact material                                                     |                                                    | AgCdO                                                                                                                 | CM-MSS (1+2+6): AgCdO<br>CM-MSS (3+4+5+7): AgNi                                                                            | AgNi                                     |
| Rated voltage (VDE 0110, IEC 664-1, IEC 60947-1)                     |                                                    |                                                                                                                       | 250 V                                                                                                                      |                                          |
| Maximum switching voltage                                            |                                                    |                                                                                                                       | 250 V                                                                                                                      |                                          |
| Rated operational current I <sub>e</sub> (IEC/EN 60947-5-1)          | AC12 (resistive)                                   | 230 V                                                                                                                 | 4 A                                                                                                                        |                                          |
|                                                                      | AC15 (inductive)                                   | 230 V                                                                                                                 | 3 A                                                                                                                        |                                          |
|                                                                      | DC12 (resistive)                                   | 24 V                                                                                                                  | 4 A                                                                                                                        |                                          |
|                                                                      | DC13 (inductive)                                   | 24 V                                                                                                                  | 2 A (1.5 A - n/c contact <sup>1)</sup> )                                                                                   |                                          |
| AC rating (UL 508)                                                   | Utilization category (Control Circuit Rating Code) |                                                                                                                       | B 300                                                                                                                      |                                          |
|                                                                      | max. rated operational voltage                     |                                                                                                                       | 300 V AC                                                                                                                   |                                          |
|                                                                      | max. continuous thermal current at B 300           |                                                                                                                       | 5 A                                                                                                                        |                                          |
|                                                                      | max. making/breaking apparent power at B 300       |                                                                                                                       | 3600/360 VA                                                                                                                |                                          |
| Mechanical lifetime                                                  |                                                    | 30 (10 <sup>-11</sup> ) x 10 <sup>6</sup> switching cycles                                                            |                                                                                                                            |                                          |
| Electrical lifetime (AC12, 230 V, 4 A)                               |                                                    | 0.1 x 10 <sup>6</sup> switching cycles                                                                                |                                                                                                                            |                                          |
| Max. fuse rating to achieve short circuit protection                 | n/c contact                                        | 10 A fast-acting                                                                                                      | 4 A (10 A <sup>1)</sup> ) fast-acting                                                                                      | 10 A fast-acting                         |
|                                                                      | n/o contact                                        | 10 A fast-acting                                                                                                      | 6 A (10 A <sup>1)</sup> ) fast-acting                                                                                      | 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)                                                                           | 22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)                                                                                 | 45 x 78 x 100 mm (1.77 x 3.07 x 3.94 in) |
| Weight                                                               |                                                    | approx. 0.11 kg (0.24 lb)                                                                                             | approx. 0.15 kg (0.33 lb)                                                                                                  | approx. 0.23 kg (0.51 lb)                |
| Mounting position                                                    |                                                    | any                                                                                                                   |                                                                                                                            |                                          |
| Degree of protection                                                 | enclosure / terminals                              | IP50 / IP20                                                                                                           |                                                                                                                            |                                          |
| Ambient temperature range                                            | operation                                          | -20...+60 °C                                                                                                          |                                                                                                                            | -25...+65 °C                             |
|                                                                      | storage                                            | -40...+85 °C                                                                                                          |                                                                                                                            |                                          |
| Mounting                                                             |                                                    | DIN rail (IEC/EN 60715)                                                                                               |                                                                                                                            |                                          |

<sup>1)</sup> 1SVR 430 710 R 0200, 1SVR 430 8xx R xxxx

# Thermistor motor protection relays

## CM-MSE, CM-MSS, CM-MSN

### Technical data

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| Type                                                                       |                                      | CM-MSE                                                   | CM-MSS                                          | CM-MSN |
|----------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------|-------------------------------------------------|--------|
| Electrical connection                                                      |                                      |                                                          |                                                 |        |
| Wire size                                                                  | fine strand with wire end ferrule    | 2 x 1.5 mm <sup>2</sup><br>(2 x 16 AWG)                  | 2 x 2.5 mm <sup>2</sup><br>(2 x 14 AWG)         |        |
|                                                                            | fine strand without wire end ferrule | 2 x 0.75-1.5 mm <sup>2</sup><br>(2 x 18-16 AWG)          | 2 x 0.75-2.5 mm <sup>2</sup><br>(2 x 18-14 AWG) |        |
|                                                                            | rigid                                | 2 x 1-1.5 mm <sup>2</sup><br>(2 x 18-16 AWG)             | 2 x 0.75-2.5 mm <sup>2</sup><br>(2 x 18-14 AWG) |        |
| Stripping length                                                           |                                      | 2 x 0.75-1.5 mm <sup>2</sup><br>(2 x 18-16 AWG)          | 2 x 0.5-4 mm <sup>2</sup><br>(2 x 20-12 AWG)    |        |
| Tightening torque                                                          |                                      | 10 mm (0.39 inch)                                        | 7 mm (0.28 inch)                                |        |
| 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                                              |                                      | EN 61000-6-2, EN 61000-6-4                               |                                                 |        |
| 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                                                      | 4 g                                             | 5 g    |
| Resistance to vibration (IEC 68-2-6)                                       |                                      | 10 g                                                     | 6 g                                             | 10 g   |
| Environmental testing (IEC 68-2-30 )                                       |                                      | 24 h cycle time, 55 °C, 93 % rel., 96 h                  |                                                 |        |
| Isolation data                                                             |                                      |                                                          |                                                 |        |
| 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                                                      |                                                 |        |