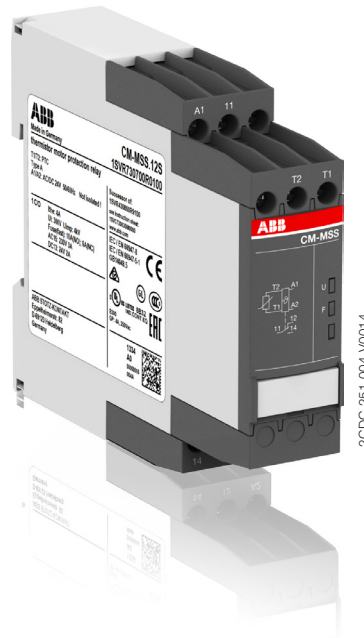


# Thermistor motor protection relays

## CM-MSS.12 and CM-MSS.13

The thermistor motor protection relays CM-MSS.12 and CM-MSS.13 monitor the winding temperature of motors and protect them from overheating, overload and insufficient cooling.

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



### Characteristics

- 1 measuring circuit
- Automatic reset
- Overvoltage protected supply and measuring inputs
- According to the product standard IEC 60947-8
- Screw connection technology or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- 22.5 mm (0.89 in) width
- Various certifications and approvals (see overview, document no. [2CDC112248D0201](#))

### Order data

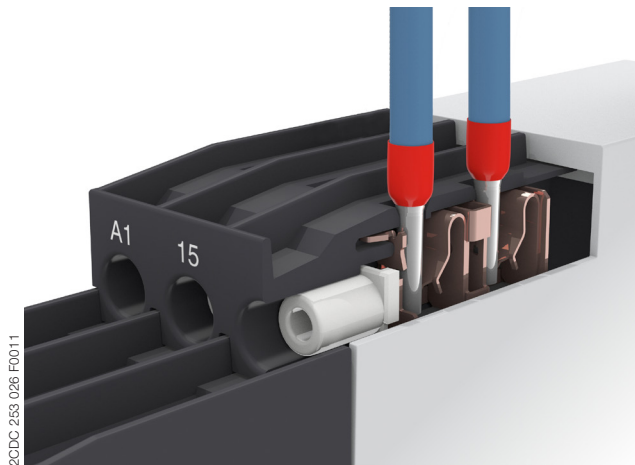
| Type       | Rated control supply voltage | Output contacts      | Connection technology | Order code      |
|------------|------------------------------|----------------------|-----------------------|-----------------|
| CM-MSS.12P | 24 V AC/DC *                 | 1 c/o (SPDT) contact | Push-in terminals     | 1SVR740700R0100 |
| CM-MSS.12S |                              |                      | Screw terminals       | 1SVR730700R0100 |
| CM-MSS.13P | 110-130 V AC, 220-240 V AC   |                      | Push-in terminals     | 1SVR740700R2100 |
| CM-MSS.13S |                              |                      | Screw terminals       | 1SVR730700R2100 |

\* Supply and measuring circuits not electrically isolated

## Connection technology

### Maintenance free Easy Connect Technology with push-in terminals

Type designation CM-xxS.yyP

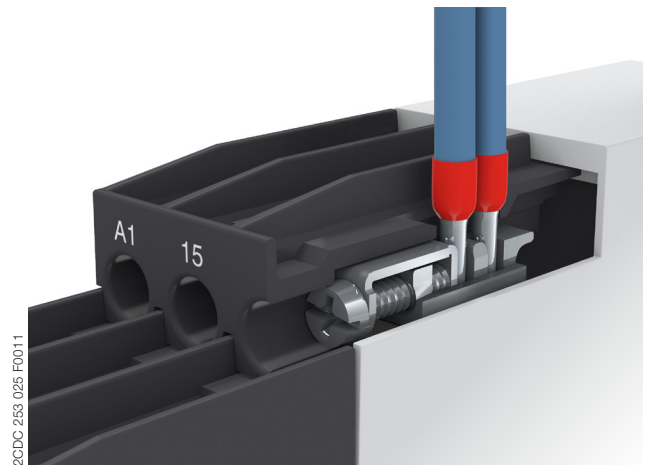


#### Push-in terminals

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

### Approved screw connection technology with double-chamber cage connection terminals

Type designation CM-xxS.yyS



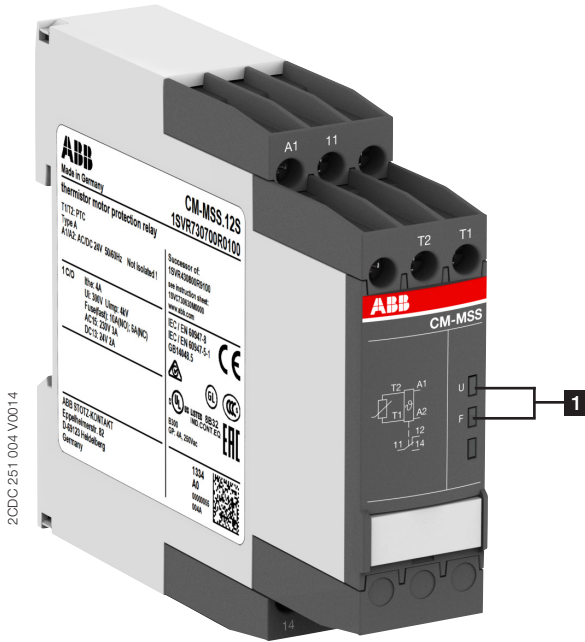
#### Double-chamber cage connection terminals

- Terminal spaces for different wire sizes
- One screw for opening and closing of both cages
- Pozidrive screws for pan- or crosshead screwdrivers according to DIN ISO 2380-1 Form A 0.8 x 4 mm (0.0315 x 0.157 in), DIN ISO 8764-1 PZ1 ø 4.5 mm (0.177 in)

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

## Functions

### Operating controls



#### 1 Indication of operational states with LEDs

U: green LED - Status indication of control supply voltage

Control supply voltage applied

F: red LED - Fault message

### Application / Monitoring function

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

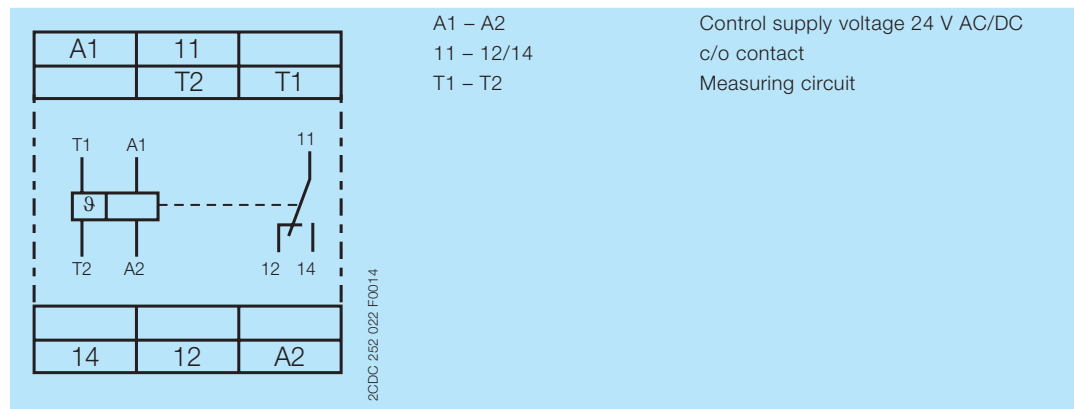
### Operating mode

The thermistor motor protection relays CM-MSS.12 and CM-MSS.13 are used to monitor the temperature of motors or generators equipped with PTC resistor sensors type A. The sensors are built-in into the motor windings, measuring the motor heating. In case of an increase of the temperature in the motor, the resistance of the PTC sensors will increase as well. If the motor heats-up excessively ( $>2.7 \text{ k}\Omega$ ) the output relay de-energizes and the corresponding LED displays the overtemperature. A reset is only possible after cooling down of the motor ( $<1.2 \text{ k}\Omega$ ).

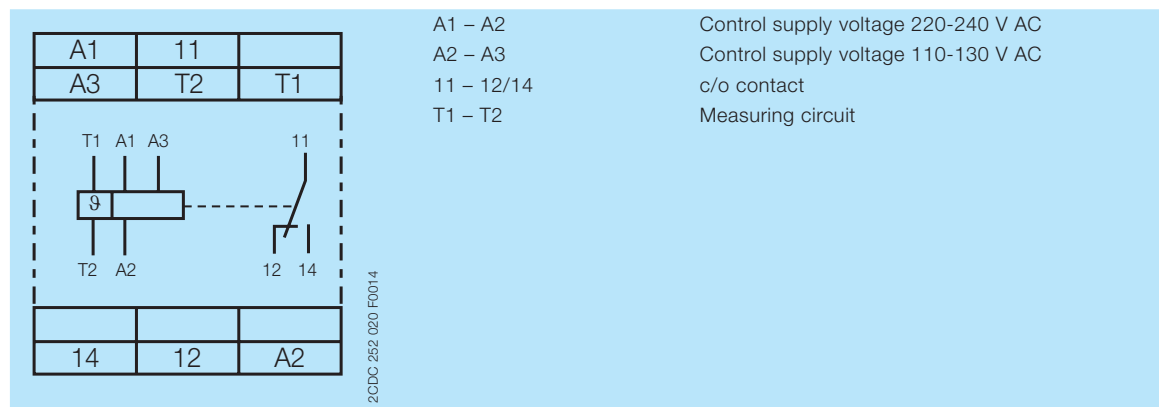
### Reset

Once the fault has been rectified and the measured value has dropped below the release threshold, an automatic reset is executed.

## Electrical connection

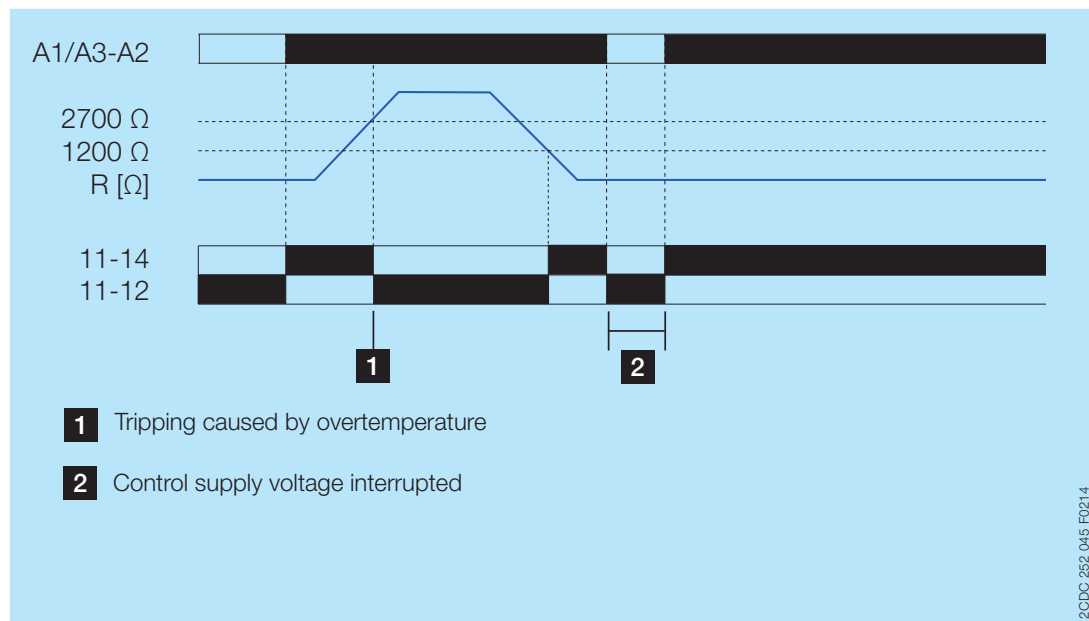


Connection diagram CM-MSS.12



Connection diagram CM-MSS.13

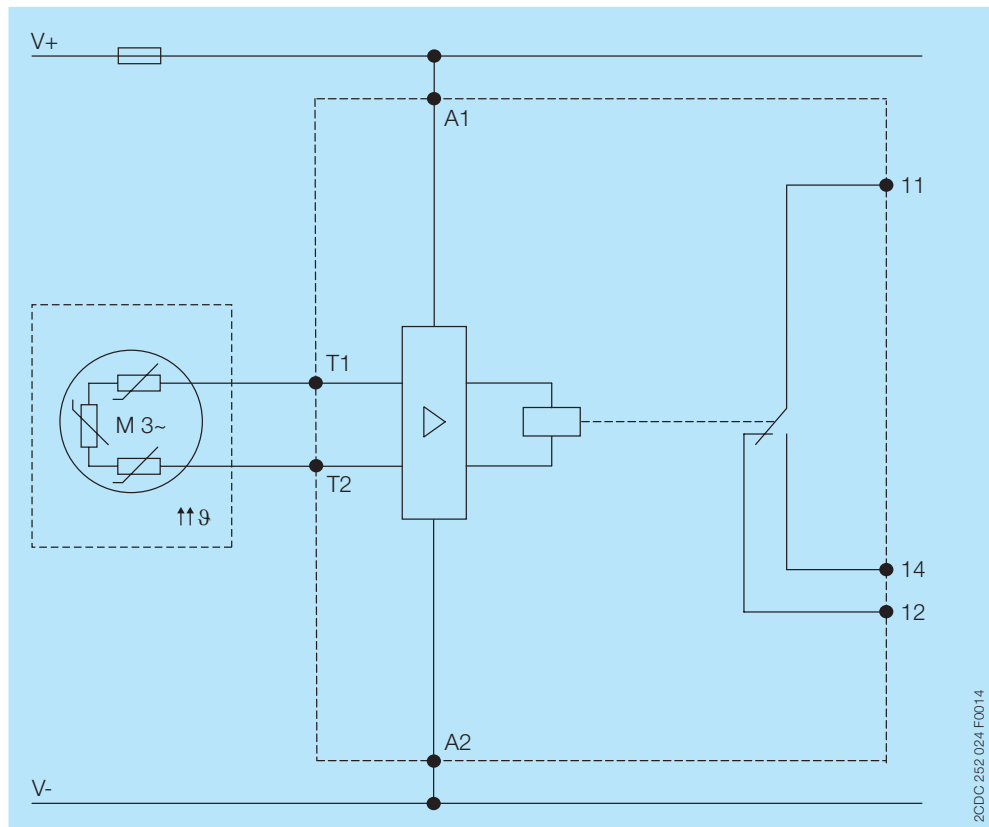
## Function diagram



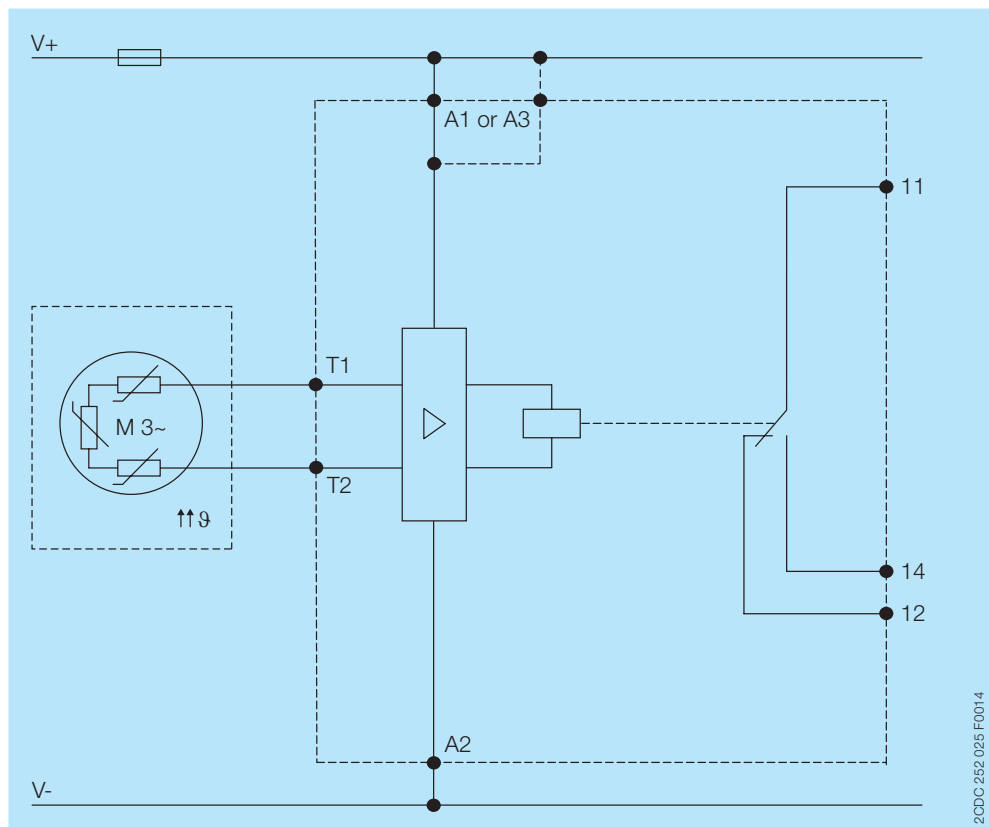
CM-MSS.12, CM-MSS.13

## Example of application

### Circuit diagrams



CM-MSS.12



CM-MSS.13

## Technical data

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

### Input circuit

| Supply circuit                                                     |              | CM-MSS.12       | CM-MSS.13      |
|--------------------------------------------------------------------|--------------|-----------------|----------------|
| Rated control supply voltage $U_s$                                 | A1-A2        | 24V AC/DC       | 220-240 V AC   |
|                                                                    | A2-A3        | -               | 110-130 V AC   |
| Rated control supply voltage $U_s$ tolerance                       |              | -15...+10 %     |                |
| Rated frequency                                                    |              | 50-60 Hz        |                |
| Typical current / power consumption                                | 24 V AC/DC   | 33 mA / 0.55 VA | -              |
|                                                                    | 110-130 V AC | -               | 24 mA / 3 VA   |
|                                                                    | 220-240 V AC | -               | 10 mA / 2.2 VA |
| Electrical insulation between supply circuit and measuring circuit |              | no              | yes            |
| Power failure buffering time                                       |              | 20 ms           |                |

| Measuring circuit / Sensor circuit                               |                                            | T1-T2                                                                |
|------------------------------------------------------------------|--------------------------------------------|----------------------------------------------------------------------|
| Number of sensor circuits                                        |                                            | 1                                                                    |
| Sensor type                                                      |                                            | PTC type A (DIN/EN 44081, DIN/EN 44082)                              |
| Max. total resistance of sensors connected in series, cold state |                                            | < 750 $\Omega$                                                       |
| Overtemperature monitoring                                       | switch-off resistance (relay de-energizes) | 2.7 k $\Omega$ $\pm$ 5 %                                             |
|                                                                  | switch-on resistance (relay energizes)     | 1.2 k $\Omega$ $\pm$ 5 %                                             |
| Maximum voltage in sensor circuit                                | 1.33 k $\Omega$                            | 2.5 V                                                                |
|                                                                  | 4 k $\Omega$                               | 3.7 V                                                                |
|                                                                  | $\infty$ k $\Omega$                        | 5.5 V                                                                |
| Maximum current in sensor circuit                                |                                            | 3.7 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> |
| Accuracy within the rated control supply voltage tolerance       |                                            | 5 %                                                                  |
| Accuracy within the temperature range                            |                                            | 0.5 %/K                                                              |
| Repeat accuracy (constant parameters)                            |                                            | on request                                                           |
| Reaction time of the safety function                             |                                            | <100 ms                                                              |
| Hardware fault tolerance (HFT)                                   |                                            | -                                                                    |

| Control circuit         |            |                                                                      |
|-------------------------|------------|----------------------------------------------------------------------|
| Control function        | auto reset | yes                                                                  |
| Maximum no-load voltage |            | 5.5 V                                                                |
| Max. current            |            | 1.2 mA                                                               |
| Maximum cable length    |            | 2 x 100 m at 0.75 mm <sup>2</sup> , 2 x 400 m at 2.5 mm <sup>2</sup> |

### User interface

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

## Output circuit

|                                                                     |                                                    |                                        |
|---------------------------------------------------------------------|----------------------------------------------------|----------------------------------------|
| Kind of output                                                      | 11-12/14                                           | relay, 1 c/o (SPDT) contact            |
| Operating principle                                                 |                                                    | closed-circuit principle               |
| Contact material                                                    |                                                    | AgNi alloy, Cd free                    |
| Minimum switching voltage / Minimum switching current               |                                                    | 24 V / 10 mA                           |
| Maximum switching voltage / Maximum switching current               |                                                    | see "Load limit curves" on page 10     |
| Rated operational voltage $U_e$ and rated operational 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                                        | 6 A fast-acting                        |
|                                                                     | n/o contact                                        | 10 A fast-acting                       |

## General data

|                                 |           |                                                            |
|---------------------------------|-----------|------------------------------------------------------------|
| MTBF                            |           | on request                                                 |
| Duty cycle                      |           | 100 %                                                      |
| Dimensions                      |           | see "Dimensional drawing"                                  |
| Weight, net                     |           | <b>Screw connection technology</b>                         |
|                                 |           | <b>Easy Connect Technology (push-in)</b>                   |
|                                 |           |                                                            |
|                                 | CM-MSS.12 | 0.113 kg                                                   |
|                                 | CM-MSS.13 | 0.155 kg                                                   |
| Mounting                        |           | DIN rail (IEC/EN 60715), snap-on mounting without any tool |
| Mounting position               |           | any                                                        |
| Minimum distance to other units |           | 10 mm (0.39 in) if switching current > 2 A                 |
|                                 |           | 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

|                          |                                        |                                                                              |                                                |
|--------------------------|----------------------------------------|------------------------------------------------------------------------------|------------------------------------------------|
|                          |                                        | <b>Screw connection technology</b>                                           | <b>Easy Connect Technology (push-in)</b>       |
| Connecting capacity      | fine-strand with(out) wire end ferrule | 1 x 0.5-2.5 mm <sup>2</sup><br>(1 x 18-14 AWG)                               | 2 x 0.5-1.5 mm <sup>2</sup><br>(2 x 18-16 AWG) |
|                          |                                        | 2 x 0.5-1.5 mm <sup>2</sup><br>(2 x 18-16 AWG)                               |                                                |
|                          | rigid                                  | 1 x 0.5-4 mm <sup>2</sup><br>(1 x 20-12 AWG)                                 | 2 x 0.5-1.5 mm <sup>2</sup><br>(2 x 20-16 AWG) |
|                          |                                        | 2 x 0.5-2.5 mm <sup>2</sup><br>(2 x 20-14 AWG)                               |                                                |
| Stripping length         |                                        | 8 mm (0.32 in)                                                               |                                                |
| Tightening torque        |                                        | 0.6-0.8 Nm<br>(7.08 lb.in)                                                   | -                                              |
| Recommended screw driver |                                        | DIN ISO 2380-1:<br>Form A / 0.8x4.0 mm<br>DIN ISO 8764-1:<br>PZ 1 / Ø 4.5 mm | -                                              |

## 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

|                                                   |                                                   | CM-MSS.12 | CM-MSS.13        |
|---------------------------------------------------|---------------------------------------------------|-----------|------------------|
| Rated insulation voltage $U_i$                    | Supply circuit / Measuring circuit <sup>1)</sup>  | n/a       | 300 V AC         |
|                                                   | Supply circuit / Output circuits                  | 300 V AC  |                  |
|                                                   | Measuring circuit <sup>1)</sup> / Output circuits | 300 V AC  |                  |
|                                                   | Output circuit 1 / Output circuit 2               | n/a       |                  |
| Rated impulse withstand voltage $U_{imp}$         | Supply circuit / Measuring circuit <sup>1)</sup>  | n/a       | 4 kV             |
|                                                   | Supply circuit / Output circuits                  | 4 kV      |                  |
|                                                   | Measuring circuit <sup>1)</sup> / Output circuits | 4 kV      |                  |
|                                                   | Output circuit 1 / Output circuit 2               | n/a       |                  |
| Basic insulation                                  | Supply circuit / Measuring circuit <sup>1)</sup>  | n/a       | 600 V AC         |
|                                                   | Supply circuit / Output circuits                  | 600 V AC  |                  |
|                                                   | Measuring circuit <sup>1)</sup> / Output circuits | 600 V AC  |                  |
|                                                   | Output circuit 1 / Output circuit 2               | n/a       |                  |
| Protective separation<br>(IEC/EN 61140, EN 50178) | Supply circuit / Measuring circuit <sup>1)</sup>  | no        | yes, up to 300 V |
|                                                   | Supply circuit / Output circuits                  | yes       |                  |
|                                                   | Measuring circuit <sup>1)</sup> / Output circuits | yes       |                  |
|                                                   | Output circuit 1 / Output circuit 2               | n/a       |                  |
| Pollution degree                                  |                                                   | 3         |                  |
| Overvoltage category                              |                                                   | III       |                  |

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

## Standards / Directives

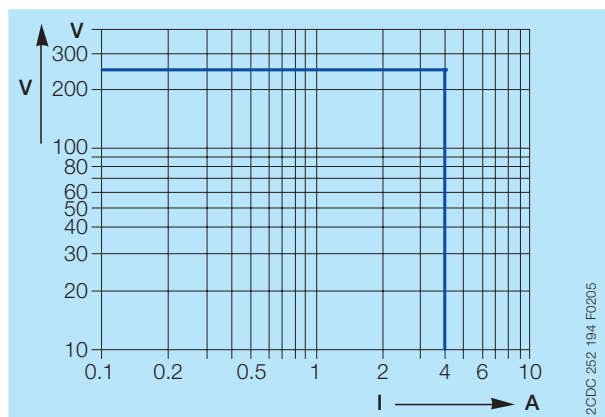
|                       |                                  |
|-----------------------|----------------------------------|
| Standards             | IEC/EN 60947-5-1, IEC/EN 60947-8 |
| Low Voltage Directive | 2014/35/EU                       |
| EMC Directive         | 2014/30/EU                       |
| RoHS Directive        | 2011/65/EU                       |

## Electromagnetic compatibility

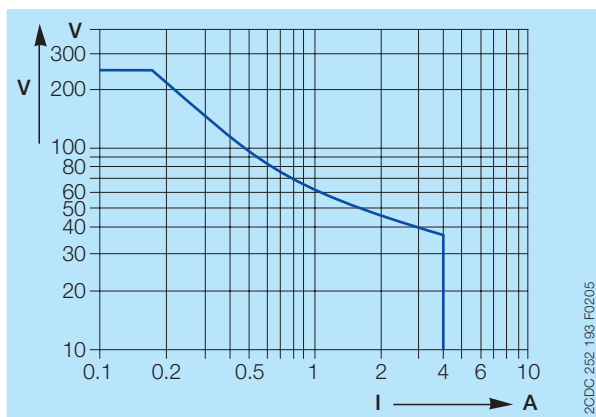
|                                                                                                      |                        |                                                                                                                      |
|------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------|
| 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 EN 60255-1 (reference on 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:<br>1 kV peak voltage<br>Power supply, asymmetric coupling:<br>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                                                          |

## Technical diagrams

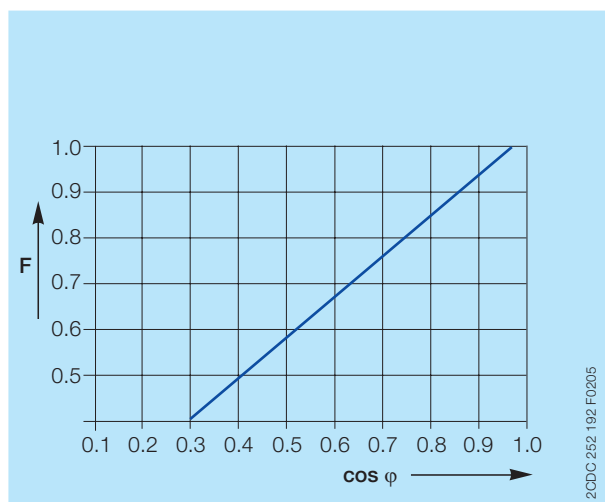
### Load limit curves



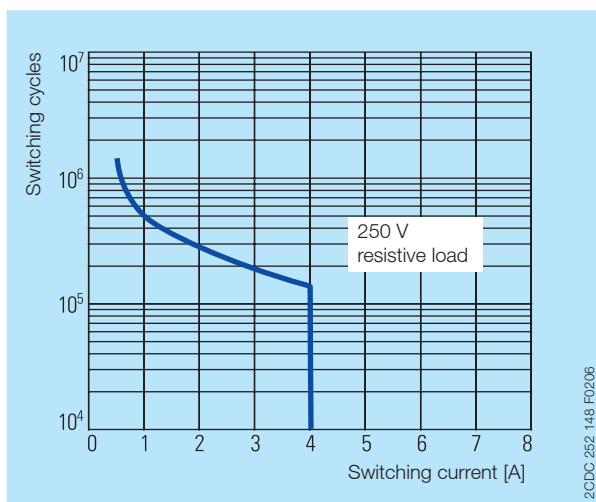
AC load (resistive)



DC load (resistive)



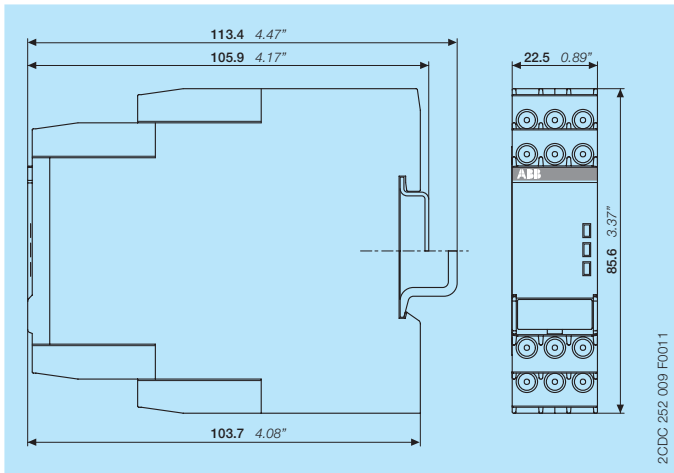
Reduction factor F for inductive AC load



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

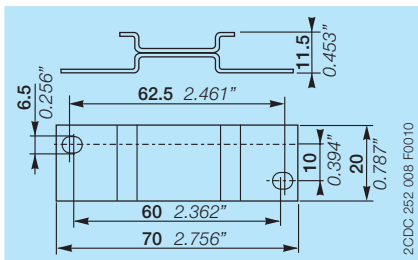
## Dimensions

in **mm** and inches

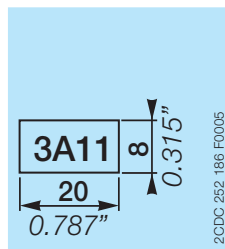


## Accessories

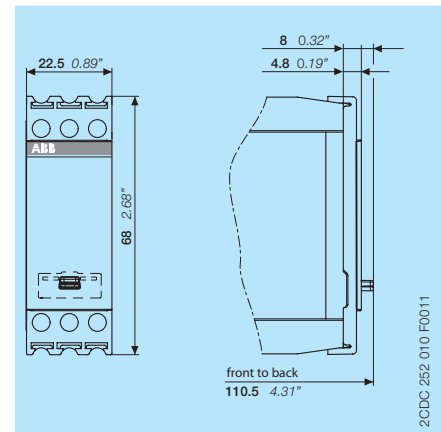
in **mm** and inches



ADP.01 - Adapter for screw mounting



MAR.01 - Marker label for devices without DIP switches



COV.11 - Sealable transparent cover

## Further documentation

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

You can find the documentation on the internet at [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

-> Automation, control and protection -> Electronic relays and controls -> Measuring and monitoring relays

## CAD system files

You can find the CAD files for CAD systems at <http://abb-control-products.partcommunity.com>

-> Low Voltage Products & Systems -> Control Products -> Electronic Relays and Controls

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