

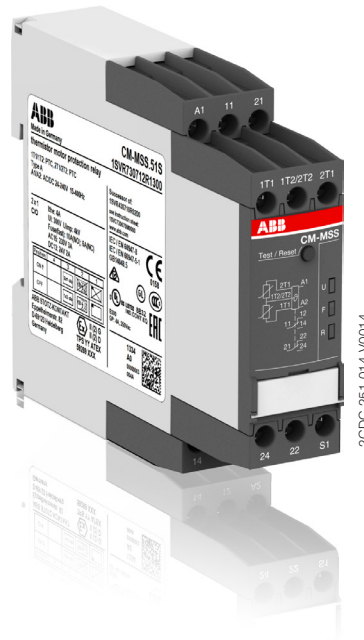
Thermistor motor protection relay

CM-MSS.51

The thermistor motor protection relay CM-MSS.51 monitors the winding temperature of motors and protects them from overheating, overload and insufficient cooling.

The two measuring circuits and the configurable single or accumulative evaluation allow monitoring of two motors together.

The device is 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

- 2 measuring circuits
- Test / Reset button
- Auto, manual or remote reset configurable
- Short-circuit monitoring of the sensor circuit, configurable
- Dynamic interrupted wire detection
- Non-volatile fault storage, configurable
- Easy configuration via DIP switches
- LEDs to distinguish between different failure causes
- Overvoltage protected supply and measuring inputs
- Increased interference immunity acc. to EN 62061 with evaluation criterion "Fail-Safe"
- According to the latest version of the product standard IEC 60947-8
- 2 x 1 c/o (single evaluation) or 1 x 2 c/o contacts (accumulative evaluation) configurable
- Screw connection technology or Easy Connect Technology available
- Housing material for highest fire protection classification UL 94 V-0
- Tool-free mounting on DIN rail as well as demounting
- 22.5 mm (0.89 in) width

Approvals

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

Marks

- CE
- RCM

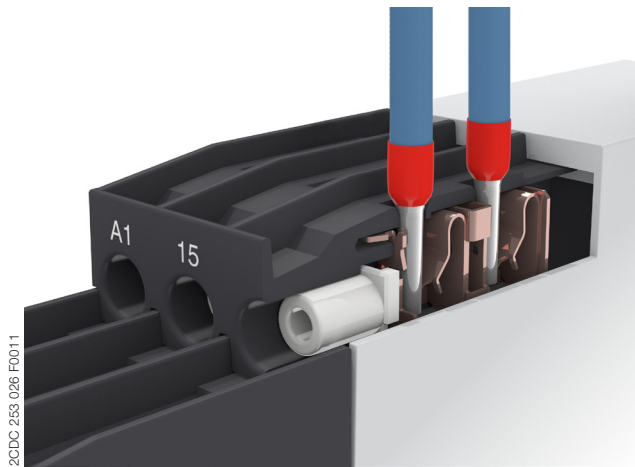
Order data

| Type | Rated control supply voltage | Output contacts | Connection technology | Order code |
|------------|------------------------------|-----------------------|-----------------------|-----------------|
| CM-MSS.51P | 24-240 V AC/DC | 2 c/o (SPDT) contacts | Push-in terminals | 1SVR740712R1300 |
| CM-MSS.51S | | | Screw terminals | 1SVR730712R1300 |

Connection technology

Maintenance free Easy Connect Technology with push-in terminals

Type designation CM-xxS.yyP

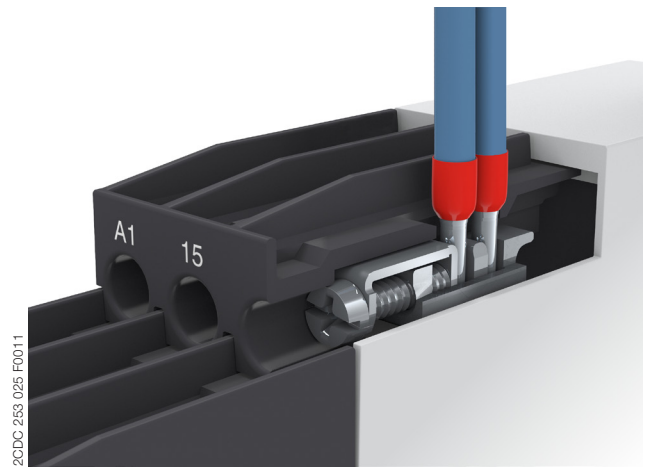


Push-in terminals

- Tool-free connection of rigid and flexible wires with wire end ferrule according to DIN 46228-1-A, DIN 46228-4-E
Wire size: $2 \times 0.5-1.5 \text{ mm}^2$, (2 x 20 - 16 AWG)
- Easy connection of flexible wires without wire end ferrule by opening the terminals
- No retightening necessary
- One operation lever for opening both connection terminals
- For triggering the lever and disconnecting of wires you can use the same tool (Screwdriver according to DIN ISO 2380-1 Form A 0.8 x 4 mm (0.0315 x 0.157 in), DIN ISO 8764-1 PZ1 \varnothing 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:
fine-strand with/without wire end ferrule:
 $1 \times 0.5-2.5 \text{ mm}^2$ (2 x 20 - 14 AWG),
 $2 \times 0.5-1.5 \text{ mm}^2$ (2 x 20 - 16 AWG)
rigid:
 $1 \times 0.5-4 \text{ mm}^2$ (1 x 20 - 12 AWG),
 $2 \times 0.5-2.5 \text{ mm}^2$ (2 x 20 - 14 AWG)
- One screw for opening and closing of both cages
- Pozidrive screws for pan- or crosshead screwdrivers according to DIN ISO 2380-1 Form A 0.8 x 4 mm (0.0315 x 0.157 in), DIN ISO 8764-1 PZ1 \varnothing 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.

Test function

The test function is only possible when there is no fault. By pressing the front-face combined Test / Reset button or by jumpering S1-1T2/2T2 a system test routine is executed. If S1-1T2/2T2 are jumpered for the automatic reset, the test function can only be executed by pressing the Test / Reset button.

After starting the test routine the output relays de-energize. They remain de-energized until control input S1-1T2/2T2 is closed or a reset is executed.



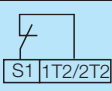
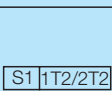
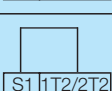

Fault storage , reset function

The fault storage is designed as non-volatile (remanent). This means that after switch-off and return of the control supply voltage the device returns to the state it was prior to the switch-off. If prior to the interruption of control supply voltage there was no fault, the device restarts automatically after re-applying control supply voltage.

If there was a fault prior to the interruption, reset can be made manually by the Test / Reset button or externally by remote reset between S1-1T2/2T2.

With deactivated fault storage reset can be made manually by the Test / Reset button, automatically by jumpering S1-1T2/2T2 or externally by remote reset between S1-1T2/2T2.

Depending on the configuration of DIP switch 1, there are several possibilities of resetting the device, as shown in the picture.

| | | |
|--|---|--|
| DIP switch 1 |  |  |
|  | 1.) Front 2.) Remote 3.) A1-A2 | 1.) Front 2.) Remote |
|  | 1.) Front 2.) A1-A2 | 1.) Front |
|  | 1.) Auto-Reset |  |

2CDC 252 035 F 0214

Single and accumulative evaluation

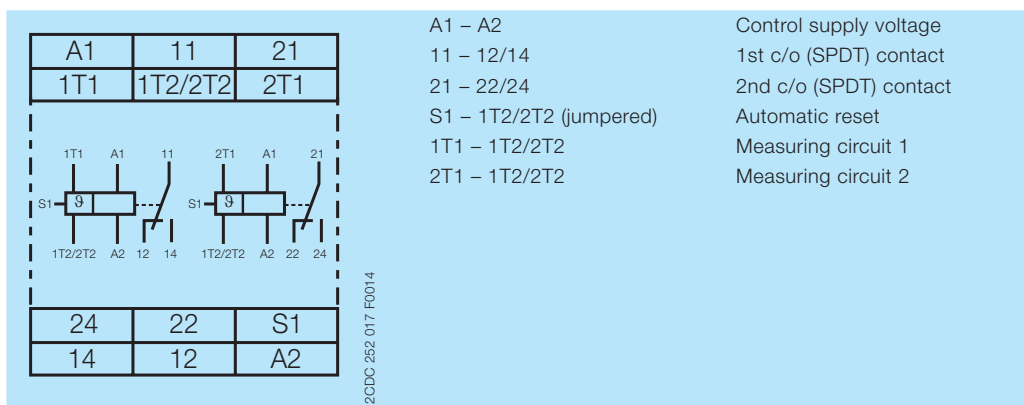
Single evaluation

If a fault occurs in the measuring circuit 1, output relay 1 (11-12/14) de-energizes. If a fault occurs in the measuring circuit 2, output relay 2 (21-22/24) de-energizes.

Accumulative evaluation







In case of a fault in one of the two measuring circuits, both output relays de-energize synchronously.

Electrical connection

























Connection diagram CM-MSS.51

DIP switches

| | DIP switch 4 | DIP switch 3 | DIP switch 2 | DIP switch 1 |
|------------------|--------------|---|---|--|
| ON | |  Single evaluation 2 x 1 c/o (SPDT) contact |  Short-circuit detection de-activated |  Non-volatile fault storage de-activated |
| OFF (default) | |  Accumulative evaluation 1 x 2 c/o (SPDT) contacts |  Short-circuit detection activated |  Non-volatile fault storage activated |

Indication of operational states

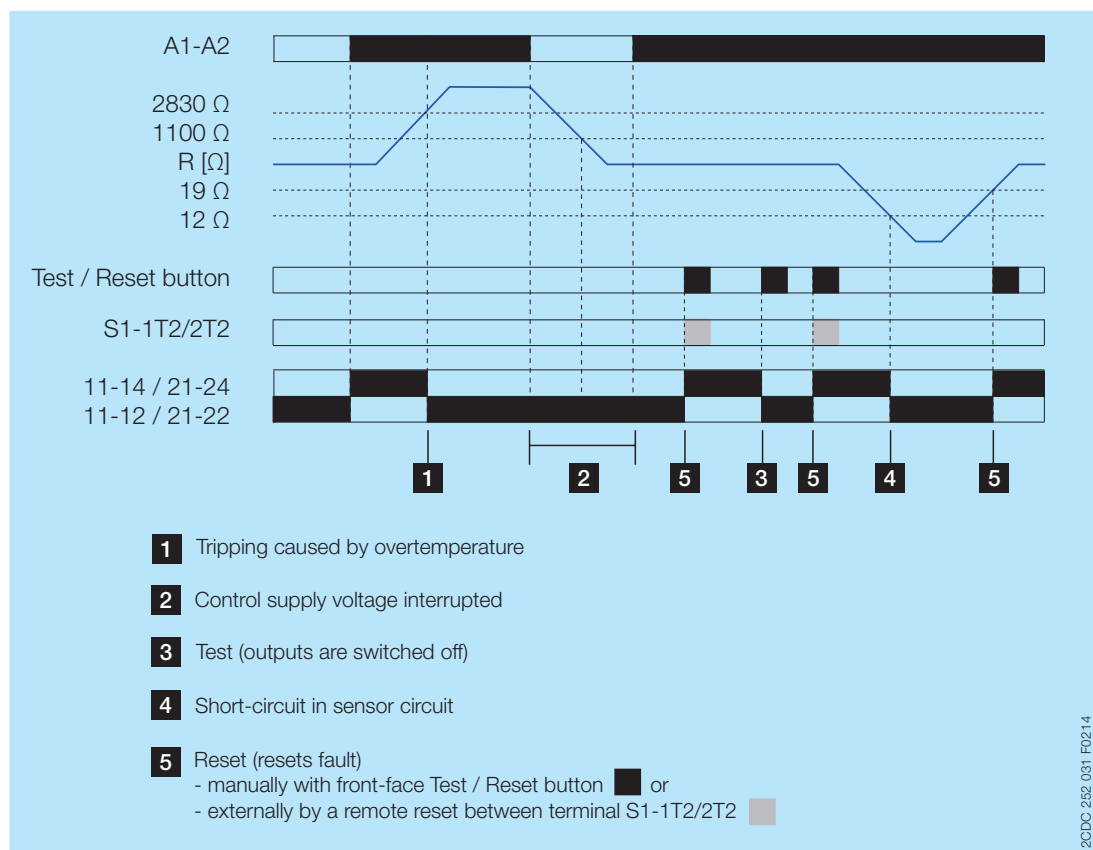
LEDs, status information and fault messages

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

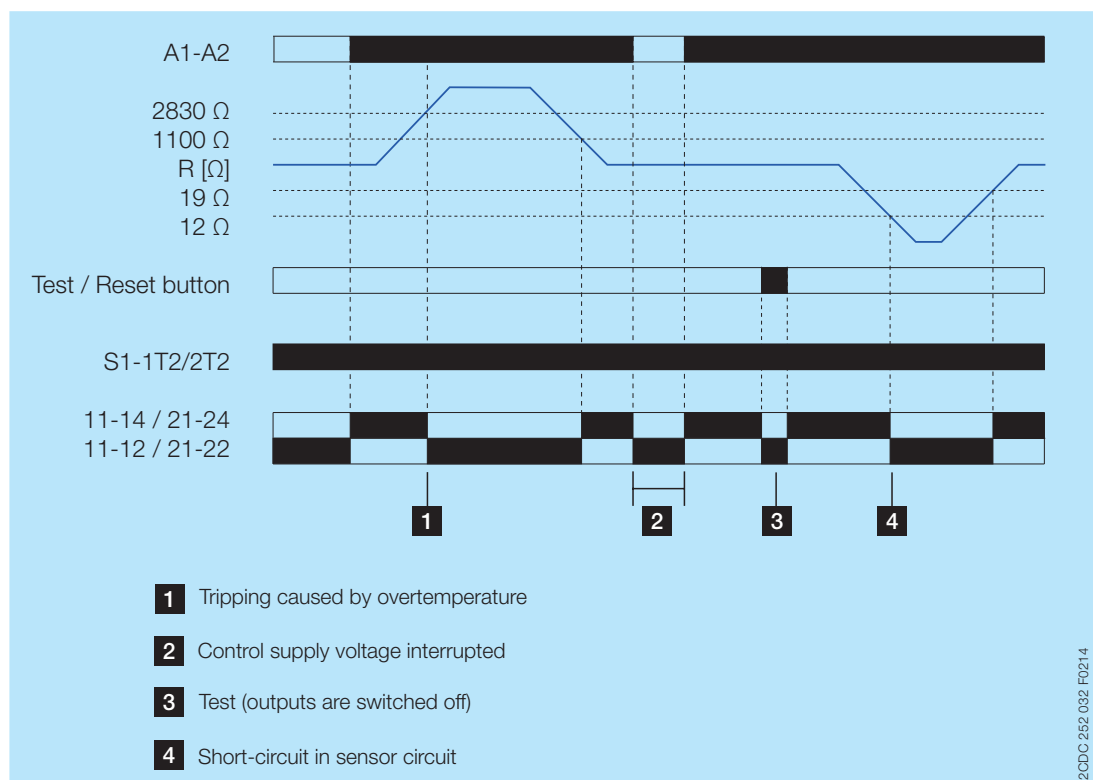
¹⁾ Depending on the fault

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

Function diagrams



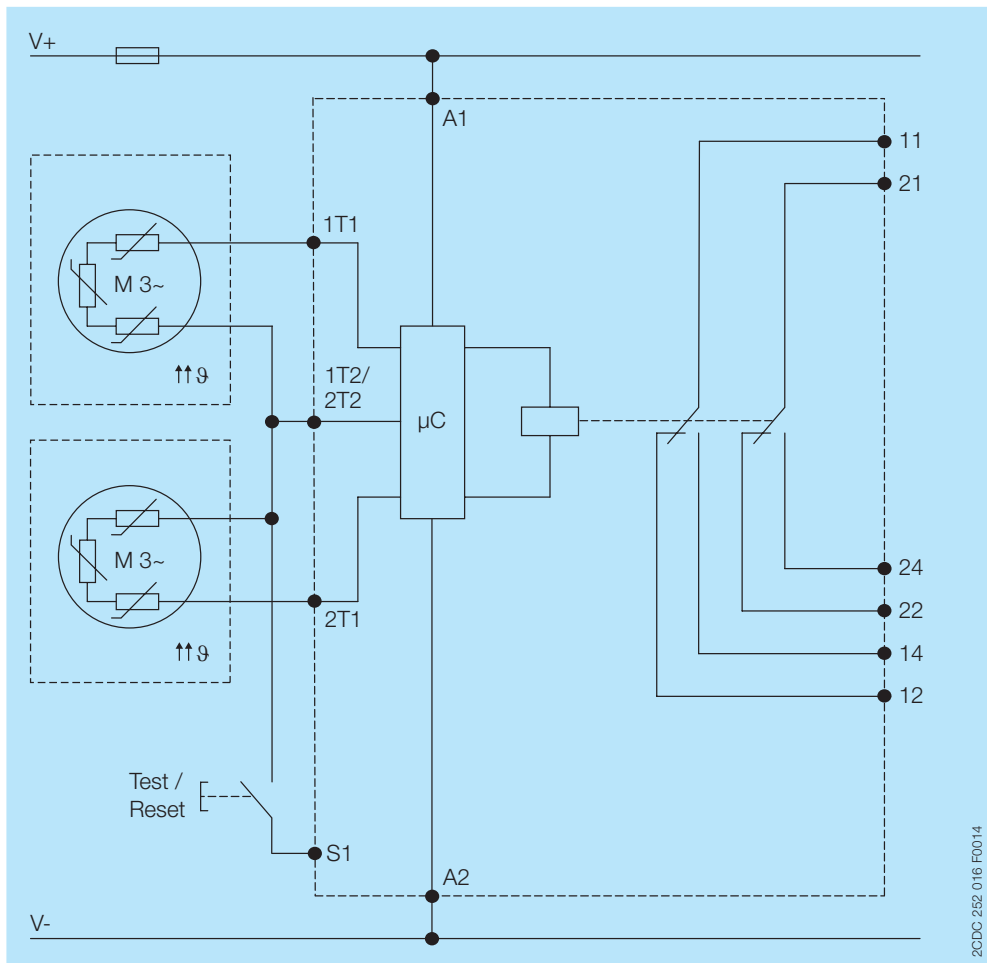
Manual or remote reset (= non-volatile fault storage)



Auto reset (= no fault storage)

Example of application

Circuit diagram



Technical data

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

Input circuit

| Supply circuit | | |
|--|--------------|-----------------|
| Rated control supply voltage U_s | A1-A2 | 24-240 V AC/DC |
| Rated control supply voltage U_s tolerance | | -15...+10 % |
| Rated frequency | | 15-400 Hz |
| Typical current / power consumption | 24 V AC/DC | 44 mA / 0.85 VA |
| | 220-240 V AC | 11 mA / 1.6 VA |
| Electrical insulation between supply circuit and measuring circuit | | yes |
| Power failure buffering time | | 20 ms |

| Measuring circuit / Sensor circuit | | 1T1, 2T1 - 1/T2/2T2 |
|--|--|--|
| Number of sensor circuits | | 2 |
| Sensor type | | PTC type A (DIN/EN 44081, DIN/EN 44082) |
| Max. total resistance of sensors connected in series, cold state | | < 750 Ω |
| Overtemperature monitoring | switch-off resistance (relays de-energize) | 2.83 k Ω \pm 1% |
| | switch-on resistance (relays energize) | 1.1 k Ω \pm 1% |
| Short-circuit detection | | configurable |
| | switch-off resistance (relays de-energize) | <12 Ω |
| | switch-on resistance (relays energize) | >19 Ω |
| Interrupted wire detection | | yes |
| | switch-off resistance (relays de-energize) | dynamic |
| | switch-on resistance (relays energize) | not available |
| Non-volatile fault storage | | configurable |
| Test function | | yes |
| Maximum voltage in sensor circuit | 1.33 k Ω | 2.5 V |
| | 4 k Ω | 3.7 V |
| | ∞ k Ω | 5.5 V |
| Maximum current in sensor circuit | | 3.7 mA |
| Maximum sensor cable length | | 2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ² |
| Accuracy within the rated control supply voltage tolerance | | 0.50 % |
| Accuracy within the temperature range | | 0.01 %/K |
| Repeat accuracy (constant parameters) | | on request |
| Reaction time of the safety function | | <100 ms |
| Hardware fault tolerance (HFT) | | 0 |

| Control circuit | | S1 - 1/T2/2T2 |
|---|--------------|--|
| Control function | manual reset | yes |
| | auto reset | adjustable |
| | remote reset | adjustable |
| Maximum no-load voltage (S1-1T2/2T2 open) | | 5.5 V |
| Max. current (S1-1T2/2T2 jumpered) | | 0.6 mA |
| Maximum cable length | | 2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ² |

User interface

| Indication of operational states | | |
|----------------------------------|---|---|
| Control supply voltage | U | LED green |
| Relay status | R | LED yellow |
| Fault message | F | See 'LEDs, status information and fault messages' on page 5 |

| Operating controls | | |
|--------------------|--------------|---|
| Test / Reset | | front-face button |
| Configuration of | DIP switch 1 | non-volatile fault storage |
| | DIP switch 2 | short-circuit detection |
| | DIP switch 3 | 2 x 1 c/o (SPDT) (single evaluation), 1 x 2 c/o (SPDT) (accumulative evaluation) |

Output circuit

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

General data

| | | |
|---------------------------------|----------------------|--|
| MTBF | | on request |
| Duty time | | 100 % |
| Dimensions (W x H x D) | product dimensions | 22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in) |
| | packaging dimensions | 97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in) |
| Weight | | Screw connection technology |
| | | Easy Connect Technology (push-in) |
| | net weight | 0.145 kg |
| | gross weight | 0.172 kg |
| Mounting | | DIN rail (IEC/EN 60715), snap-on mounting without any tool |
| Mounting position | | any |
| Minimum distance to other units | vertical | 10 mm (0.394 in) if switching current > 2 A |
| | horizontal | 10 mm (0.394 in) if switching current > 2 A |
| Material of housing | | UL 94 V-0 |
| Degree of protection | housing | IP50 |
| | terminals | IP20 |

Electrical connection

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

Environmental data

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

Isolation data

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

¹⁾ Potential of measuring circuit = Potential of control circuit

Standards

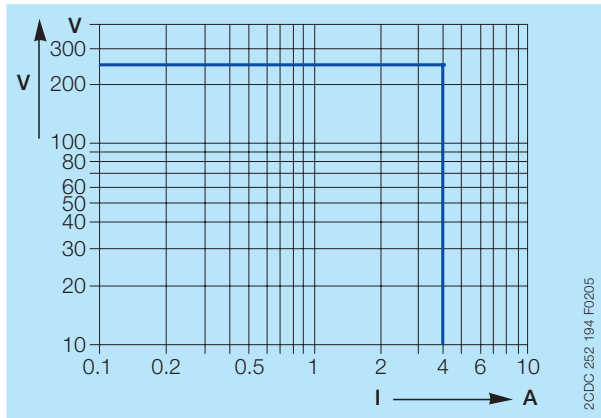
| | |
|-----------------------|--------------------------------|
| Product standard | IEC/EN 60255-1; IEC/EN 60947-8 |
| Low Voltage Directive | 2006/95/EC |
| EMC directive | 2004/108/EC |
| ATEX directive | 94/9/EC |
| RoHS directive | 2011/65/EC |

Electromagnetic compatibility

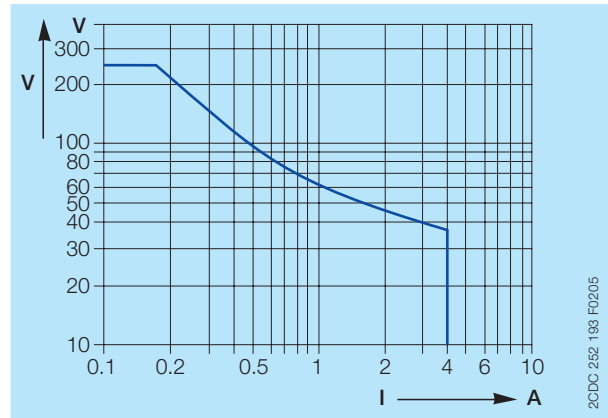
| | | |
|---|------------------------|--|
| Interference immunity to | | IEC/EN 61000-6-1, IEC/EN 61000-6-2 |
| electrostatic discharge | IEC/EN 61000-4-2 | Level 3, 6 kV contact discharge, 8 kV air discharge |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | Level 3, 10 V/m (1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

Technical diagrams

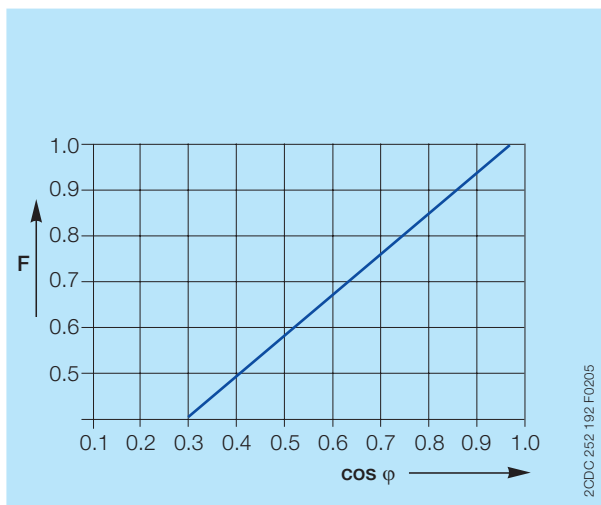
Load limit curves



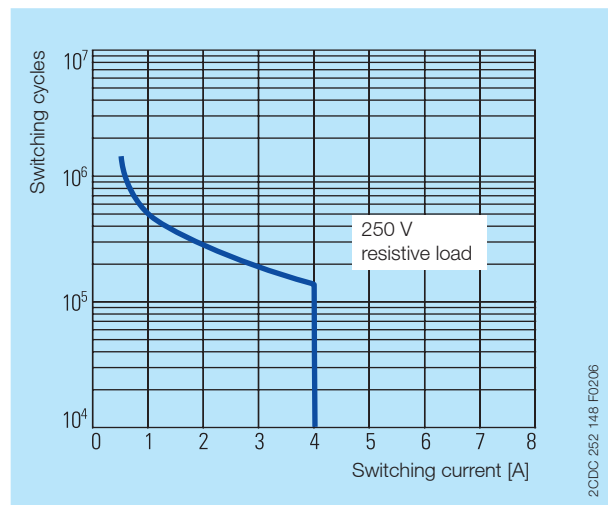
AC load (resistive)



DC load (resistive)



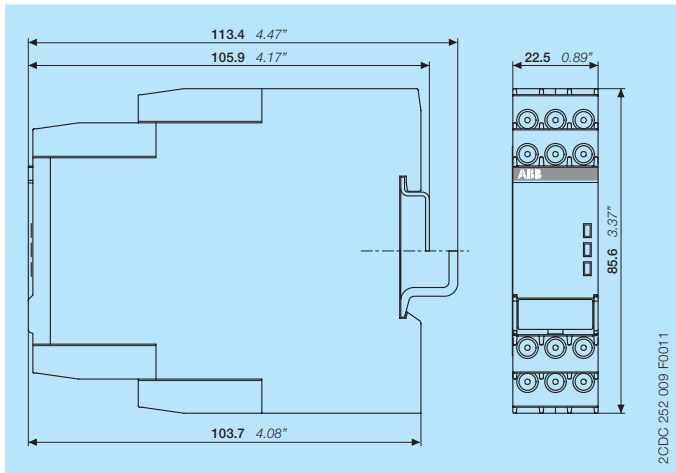
Reduction factor F for inductive AC load



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

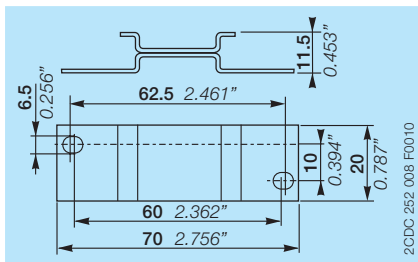
Dimensions

in mm and inches

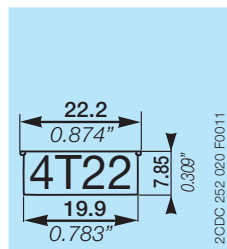


Accessories

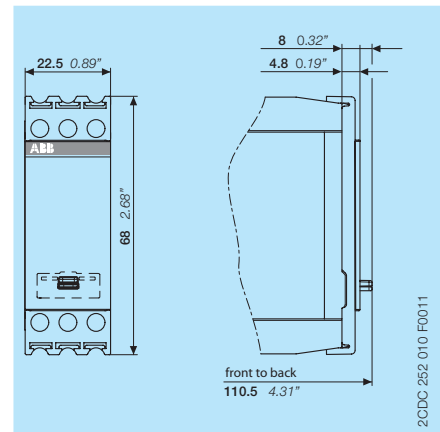
in mm and inches



ADP.01 - Adapter for screw mounting



MAR.12 - Marker label for devices with DIP switches



COV.11 - Sealable transparent cover

Further documentation

| Document title | Document type | Document number |
|---|---------------------|--------------------|
| Electronic products and relays | Technical catalogue | 2CDC 110 004 C02xx |
| Operating and installation instructions CM-MSS.51 | Instruction manual | 1SVC 730 670 M0000 |

You can find the documentation on the internet at

<http://new.abb.com/low-voltage/products/epr/monitors/thermistor-motor-protection-relays>

CAD system files

You can find the CAD files for CAD systems at

<http://abb-control-products.partcommunity.com/portal/portal/abb-control-products>

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

-> Thermistor Motor Protection Relays.

Contact us

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ABB home page
<http://www.abb.com/contacts>
-> Low Voltage Products and Systems

Note:

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