Thermistor motor protection relays

Benefits and advantages
Selection table

Operating principle and examples of use of the thermistor motor protection relays

The Thermistor motor protection relays control motors fitted with PTC resistor sensors. The temperature sensors are incorporated in the starter windings and measure directly the motor heating. Direct control is guaranteed under the following operating conditions:

- heavy duty,
- high switching frequency,
- single-phasing,
- high ambient temperature
- insufficient cooling
- breaking a motor
- unbalance

The relay is independent of the motor rated current and the method of starting.
The PTC resistor sensors are connected in series with the terminals Ta and Tb (resp. Ta and Tbx, without short circuit detection). The number of PTC resistor sensors is limited by the sum of the PTC sensor resistors of the individual resistors.
RG = R1 + R2 + RN ≤ 1.5 kΩ.

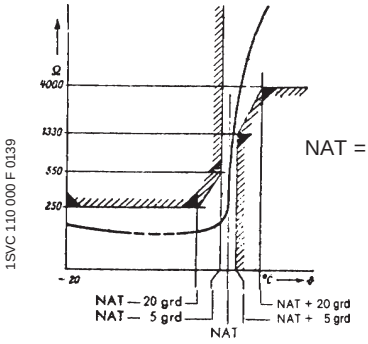
Under normal operating conditions the resistance value is below the response value.
If only one of the PTC resistors heats up excessively, the output relay de-energizes.
After cooling down the output relay energizes automatically, if autoreset is configured.
Devices with hand (push button on front) or remote reset configuration must be controlled on the control input with the required signal.

Further application possibilities:

Temperature monitoring of equipment fitted with PTC resistor sensors, e.g.:

- Machine roller bearings
- Hot-air ventilators
- Oil
- Air
- Heating installations

Resistance characteristic
of one temperature sensor to DIN 44 081.



NAT = rated response temperature

Product overview: Thermistor motor protection

Type	CM-MSE	CM-MSS	CM-MSS	CM-MSS	CM-MSS	CM-MSS	CM-MSS	CM-MSN
Function								
Measuring range								
Number of sensor circuits	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)
Manual reset	-	-	•	•	•	•	•	•
Remote reset	-	-	•	•	•	•	•	•
Test button	-	-	-	•	•	•	•	•
Output contacts								
Principle of operation	closed-circuit principle							
Number / Type	1n/o	1c/o	2c/o	2c/o	1n/o + 1n/c	1c/o per sensor circuit	1n/o +1n/c total evaluation	1 n/o + 1n/c total evaluation
Width	22.5 mm							45 mm
Supply voltages and Order code 24ACV 24VAC/DC 110-130VAC 220-240VAC 380-415VAC 24-240VAC/DC	RS 442-9405			RS 442-9102 RS 442-9348				

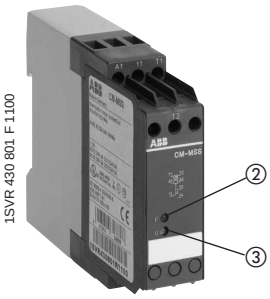
1) Configurable via terminals
2) Auto reset configurable by a permanent link (jumber) by connection terminals S1-T2

Remark: 1c/o = SPDT; 2c/o = DPDT

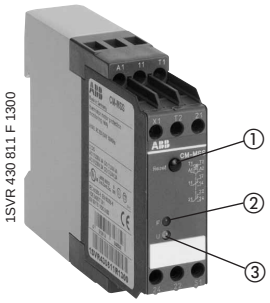
Thermistor motor protection relays CM-MSE, CM-MSS

Ordering details

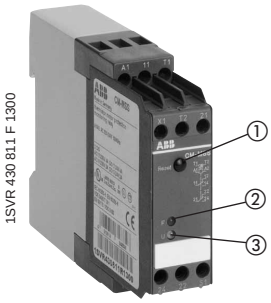
CM-MSE



CM-MSS, Automatic reset



CM-MSS, 2 c/o



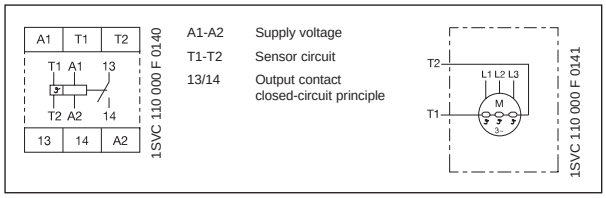
CM-MSS 2 c/o with config. short circuit monitoring

① Reset
② Red LED - fault tripping
③ Green LED - supply voltage

Remark: 1c/o = SPDT; 2c/o = DPDT

CM-MSE

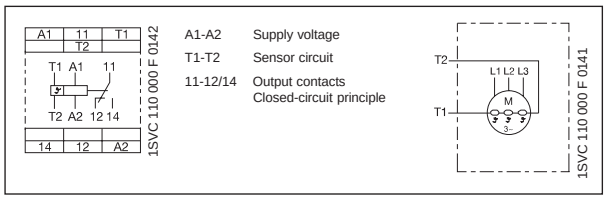
- Automatic reset
- Several sensors can be connected (max. 6 sensors in series)
- Control of bimetals
- 1n/o
- Excellent cost / performance ratio
- Approval c UL us LISTED, PG



Type	Supply voltage	Order number	Pack. unit piece		
CM-MSE	24 VAC 110-130VAC 220-240VAC	**1SVR 550 805 R 9300** **1SVR 550 800 R 9300** **1SVR 550 801 R 9300**	1 1 1		 RS 442-9405

CM-MSS, automatic reset

- Automatic reset
- Several sensors can be connected
- 1c/o, 2 LEDs
- Control of bimetals
- Approval c UL us LISTED, PG

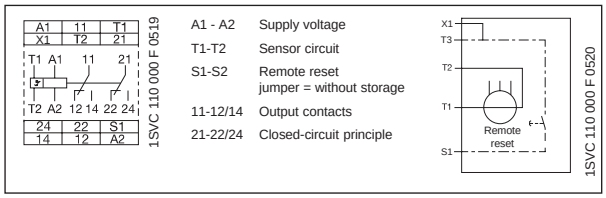


Type	Supply voltage	Order number	Pack. unit piece		
CM-MSS	24 VAC/DC 220-240VAC	**1SVR 430 800 R 9100** **1SVR 430 801 R 1100**	1 1		

CM-MSS, 2 c/o with reset button[1)]

- Storage resettable
- Reset button
- Remote reset
- 2c/o, 2 LEDs
- Approvals c UL us LISTED, GL, PTB, PG

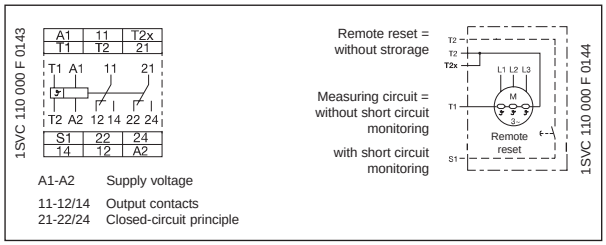
until 06/2003



Type	Supply voltage	Order code	Pack. unit piece		
CM-MSS	24VAC/DC[1)] 24VAC 110-130VAC 220-240VAC	**1SVR 430 810 R 9300** **1SVR 430 811 R 9300** **1SVR 430 811 R 0300** **1SVR 430 811 R 1300**	1 1 1 1		

CM-MSS 2 c/o with reset button and short circuit monitoring configurable

- Storage resettable
- Storage reset button
- Remote reset capability
- 2c/o, 2 LEDs
- Short circuit monitoring of the sensor cable
- Approvals
  Ex II (2) G, PTB 02 ATEX 3080, c UL us LISTED, PG



Type	Supply voltage	Order code	Pack.-unit piece		
CM-MSS	24 VAC/DC 110-130VAC 220-240VAC 380-415 VAC	**1SVR 430 710 R 9300** **1SVR 430 711 R 0300** **1SVR 430 711 R 1300** **1SVR 430 711 R 2300**	1 1 1 1		RS 442-9102 RS 442-9348

Thermistor motor protection relays CM range

Technical data and standards

		CM-MSE, CM-MSS, CM-MSN
Input circuit		
Supply voltage - power consumption:		
24VAC	**A1-A2**	approx. 1.5VA
24VAC/DC	**A1-A2**	approx. 1.1VA/0.6W
110-130VAC	**A1-A2**	approx. 1.5VA
220-240VAC	**A1-A2**	approx. 1.5VA
380-440VAC	**A1-A2**	approx. 1.7VA
24-240VAC/DC	**A1-A2**	approx. 1.4-1.7W / approx. 3.5-5.7VA
Tolerance of supply voltage		-15%...+10%
Supply voltage frequency		AC: 50-60Hz AC/DC: 15-400Hz
Duty cycle		100%
Measuring circuit		**T1-T2/T2x, 1Ta...1Tb-T2**
Monitoring function		Temperature control with PTC sensors
Number of sensor circuits		1, 2, 3 or 6, see ordering details
Short circuits detection		see ordering details
Non volatile storage		see ordering details
Test function		see ordering details
Sensor circuit		
Temperature switch off resistance (relay de-energizes)		3.6kOhm +/-5%, CM-MSE: 2.7-3.7kOhm, (3050+/-550Ohm[3])
Temperature switch on resistance (relay energizes)		1.6kOhm +/-5%, CM-MSE: 1.7-2.3kOhm, (1900+/-400Ohm[3])
Short circuit switch off resistance (relay de-energizes)		<20Ohm
Short circuit switch on resistance (relay energizes)		>40Ohm
Max. total resistance in cold states		<=1.5kOhm
Max. cable length for short circuit detection		2x100m at 0.75mm², 2x400m at 2.5mm²
Reaction time		<100ms
Control circuit for storage and hysteresis function		
Remote reset **S1-T2**		n/c contact
Max. no load voltage		approx. 25V, 5.5V (24-240VAC/DC versions)
Max. cable length		<=50m, 100-200m shielded
Display of operational status		
Supply voltage		U - Green LED
Fault tripping		F - Red LED
Output circuits		**11-12/14, 21-22/24, 13-14, 21-22**
Number of contacts		1n/o, 1c/o, 2c/o, 1n/c + 1c/o
Opened circuits principle [1]		closed-circuit principle
Contact material		AgCdO
Rated voltage acc. to VDE0110, IEC664-1, IEC947-1		250 V
Rated switching voltage max.		250V
Rated switching current AC12 (resistive) 230V		4A
Rated switching current AC15 (inductive) 230V		3A
Rated switching current DC12 (resistive) 24V		4A
Rated switching current DC13 (inductive) 24V		2A (1.5A - n/c[2])
Maximum mechanical life		30 (10 [2]) x 10⁶
Maximum electrical life (acc. to AC12, 230V, 4A)		0.1 x 10⁶
Short circuit proof, max. fuse rating	n/c	2A (4A[2]) fast, operation class gL
	n/o	10A (6A[2]) fast, operation class gL
General data		
Enclosure width		22.5mm / 45mm CM-MSN
Wire size		2 x 2.5mm² (2 x 14 AWG) stranded with wire end ferrule, CM-MSE: 2x1.5mm² (2 x 16 AWG)
Weight		approx 150g/0.33lb, CM-MSE: approx. 110g/0.24lb
Mounting position		any
Degree of protection: housing / terminals		IP50 / IP20
Operating temperature		-20°C...+60°C, CM-MSN: -25°C...+65°C
Storage temperature		-40°C...+80°C
Mounting		DIN rail (EN50022)
Standards / directives		
Product standard		IEC255-6, VDE0660 T302, T303, EN60947-5-1
Electromagnetic compatibility		89/336 EWG, 91/263 EWG, 92/31 EWG, 93/68 EWG, 93/67 EWG
ESD acc. to IEC61000-4-2, EN61000-4-2		Level 3 - 6 kV / 8 kV
HF- radiation resistance acc. to IEC61000-4-3, EN61000-4-3		Level 3 - 10 V/m
Burst acc.to IEC61000-4-4, EN61000-4-4		Level 3 - 2 kV / 5 kHz
Surge acc. to IEC61000-4-5, EN61000-4-5		Level 3/4 - 1/2 kV
HF line emmision acc. to IEC61000-4-6, EN61000-4-6		Level 3 - 10 V
Low voltage directive		93/68/EWG
Operating safety		4G
Resistance to vibration		10G, f = 55Hz, a = 0.95 mm, t = 2h per level
Environmental tests acc. to IEC68-2-30 Db		24h Zyklus, 55°C, 93% rel., 96h
Approvals		**cULus, part. GL, part. ATEX, GOST**
Isolation data		
Rated insulation between supply-, measuring- a. output circuit		250V
Rated impulse withstand voltage between all isolated circuits		4kV / 1.2 - 50µs
Test voltage between all isolated circuits		2.5kV, 50Hz, 1min.
Pollution category		3
Overvoltage category		3

[2] 1SVR 430 710 R 0200 [3] 1SVR 430 810 R 9300, 1SVR 430 800 R 9100
1SVR 430 8xx R xxxx

Remark: 1c/o = SPDT; 2c/o = DPDT