Technical Note

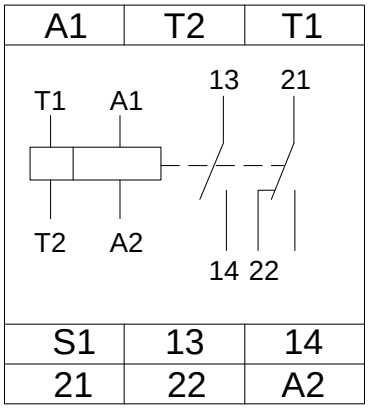
Thermistor Motor Protection Monitoring Relay

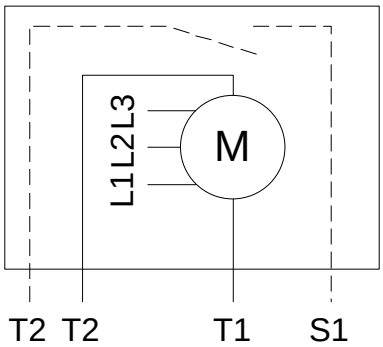
Motors utilizing thermistor protection may use an external monitoring relay to evaluate the temperature of the motor for acceptable and unacceptable levels. The thermistor monitoring relay approved by SEW-Eurodrive, USA is the **CM-MSS 1SVR430720R0400** by ABB.

CM-MSS, 24-240VAC/DC

- Short-circuit monitoring of the sensor circuit
- Continuous supply voltage range 24-240VAC/DC
- Configurable non-volatile storage in case of failure
- Storage resettable and test button
- Remote reset button
- Automatic reset configurable
- 2 output contacts – 1 N/O, 1 N/C, 2 LEDs
- SEW part number 19084765
- Approvals:

II (2) G, PTB 02 ATEX 3080,





A1-A2: Supply Voltage

T1-T2: Measuring Circuit

S1: Remote Reset

13-14: N/O Contacts

21-22: N/C Contacts

Operating Principle:
T1 and T2 act as a 30-60mA current source to measure the resistance of the temperature sensor. When the motor temperature rises beyond safe levels, the relay activates and changes the states of N.O. 13-14 and N.C. 21-22.

Installation:

- Connect the TF sensor leads to T1 and T2.
- Separate these TF sensor leads from the motor power leads.
- Connect supply voltage to A1 (+) and A2 (-).
- Connect any remote reset leads to S1 and T2.
- Use N.O. relay 13-14 and / or N.C. relay 21-22 to operate logical inputs, motor contactors, or other relays.

Short Circuit Monitoring:
When the T1-T2 output senses a short circuit of 20Ω or less in the TF sensor leads, the relay activates and displays a red LED fault. The CM-MSS cannot be reset until the resistance across the T1-T2 circuit is greater than 40Ω.

Supply Voltage:
Supply voltage may be either AC or DC and may range from 24 to 240 volts. For dependable operation, the supply voltage should remain constant.

Remote Reset Button:
Terminal S1 is a remote reset terminal. Closing the path between S1 and T2 activates the reset function.

Non-Volatile State Storage in case of Fault:
The CM-MSS retains its previous state when the supply voltage cycles off and on. Reset occurs via the face-mounted reset button or via the remote reset terminal, S1. The user may also configure the CM-MSS to reset automatically.

Test Button:
The 'Reset / Test' button activates or deactivates the relay for purposes of functionality testing. Pushing the button causes a faulted relay to reset or causes a reset relay to fault.

Automatic Reset Configurable:
A direct connection made between S1 and T2 automatically resets the relay once an acceptable motor temperature is sensed. Safety precautions are necessary with this configuration to avoid unintentional motor starts.

LED indicators:
The red (F) LED indicates a fault or no fault state. The green (U) LED indicates power or no power.

Manufacturer Specifications

Type	CM-MSS
Reference Number	1SVR430720R0400
Supply Circuit	
Rated Voltage	24-240V AC/DC (+10%…. -15%)
Frequency	15-400 Hz.
Power Consumption	≤1.7 W @ 24…240VDC ≤3.5 VA @ 24...240V/50Hz
Electrical Isolation	Yes
Short Circuit Monitoring (T1-T2)	Yes
Non-volatile State Storage	Yes
Test Function	Yes
Reaction Time	<100ms
Sensor Circuit	
Number of Sensor Circuits	1
Temperature OFF resistance	3.6k ±5%
Temperature ON resistance	1.6k ±5%
Short Circuit OFF resistance	<20 Ω
Short Circuit ON resistance	>40 Ω
Maximum Total Resistance of sensors in line (cold state)	≤1.5kΩ
Maximum Cable Length to guarantee short circuit protection	2 x 100m w/ 0.75mm² 2 x 400m w/ 2.5mm²
Control Circuit for memory – Hysteresis Function	
No-Load Voltage	≤ 5.5V
Maximum Cable Length	≤ 50m recommended (100-200m with shielding)

Manufacturer Specifications (cont.)

Output Circuit	
Maximum Switching Voltage	250V
Maximum Switching Current	6A acc. to AC1
Switching Capacity EN60947-5-1	AC12: 230V/4A AC15: 230V/3A DC13: 24V/2A
Electrical Life	170,000 @ 250V/4A
Mechanical Life	30 Mio.
Max. Fuse rating – N.O. contact	10A gL
Max. Fuse rating – N.C. contact	2A gL
Ambient Temperature	
Operating Temperature	-20…+60°C
Storage Temperature	-50…+80°C
Terminals	
Wire Size	2 x 2.5mm
Electrical Safety	
Protection against accidental contact Terminals: Housings:	 IP20 IP50
Isolation	Basic isolation
Degree of Pollution	3
Overvoltage Category	3
Testing Voltage – Routine Test (all isolated circuits against each other)	2.5kV
Mounting Position	Any
Approvals	cUL, PTB

Measured Value Analysis

The ABB CM-MSS is a suitable replacement for the BBC C106 motor-protection monitoring relay that was formerly used by SEW. Below is a comparison of the two products, based upon measurements obtained at SEW.

TF Monitor Type	BBC C106	ABB CM-MSS
Permissible Input Voltage	AC 115V	AC/DC 24 – 240 V
Additional System Load @24V	n/a	30-60 mA
Additional System Load @115V	up to 120 µA	up to 200 µA
TF Short Circuit Analysis	No	Yes <20 ohms to activate >40 ohms to reset
Fault Test Function	No	Yes
Contact Configuration	DPDT	1 N.O. & 1 N.C.
TF Flow Current	2.0 – 2.7 mA	0.65 – 1.3 mA
TF Current at Fault	~2.0 mA	~0.65 mA
T1-T2 Voltage Drop at Fault (DC)	~6.2 V	~2.3 V
T1-T2 Voltage Drop to Allow Reset	<= 5.6 V	<=1.39 V
TF Resistance at Fault with Relay Leads Connected	~2.9 k ohm	~2.9 k ohm
TF Resistance at Fault with Relay Leads Disconnected	~3.6k ohm	~3.6k ohm
TF Resistance to Allow Reset	~2.55 k ohm	1.63 k ohm