SC-501

Temperature Control Module

SLIMLINE
MONITORING RELAYS

■ Application Examples

Monitoring and/or controlling temperatures:
- of bearings on large industrial machines
- of electrical machines (e.g. Windings bearings, etc.),
- of large commercial and industrial refrigeration systems
- of injection moulding heads
- in large offices or buildings where there is a centralised air-conditioning Plant
- in hot houses
- in boilers
- in liquid chemical tanks

■ Features

- Failsafe feature.
- Interfaces with industrial standard PT-100 temperature sensors.
- Six programmable overlapping temperature ranges between -50°C to 300°C.
- Programmable for over and under-temperature.
- Temperature level adjustment on calibrated scale 0 - 100%.
- High repetitive accuracy.
- Programmable inversion of relay output for fail-to-safe operation.
- 0 to 1mA proportional output for each temperature range (with PQ72 instrument).
- 4-20mA available on request.
- Proportional output is limited to1,2 mA to protect analogue instruments.
- Latching on under-temperature or over-temperature (programmable).
- Sensor or cable fault detection and indication with automatic relay de-energisation for failsafe operation.
- 10A SPDT relay output.

ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
SC	501	230V	AC	SP

SEE PAGE 94 FOR ORDERING OPTIONS

■ Description of Operation

The **SC-501** is a multi-range temperature control module, interfacing with a standard PT-100 resistive temperature sensor. The module provides either over-temperature or under-temperature detection as well as a 0 - 1mA proportional output (e.g. PQ72 instrument) in six overlapping temperature ranges from -50 to 300°C. Relay tripping and recovery levels are adjustable from 0 -100% of the programmed temperature range. The relay mode of operation is programmable and includes a latching facility. The unit also features sensor fault detection.

Over-temperature sensing: When programmed for over-temperature sensing, the relay will de-energise if the temperature exceeds the setpoint. The relay will energise again if the temperature drops to the recovery level. The recovery level is adjustable from 0 - 100% of the programmed temperature range.

Under-temperature sensing: When programmed for under-temperature sensing, the relay will de-energise if the temperature drops below the setpoint. The relay will energise again if the temperature rises to the recovery level. The recovery level is adjustable from 0 - 100% of the programmed temperature range.
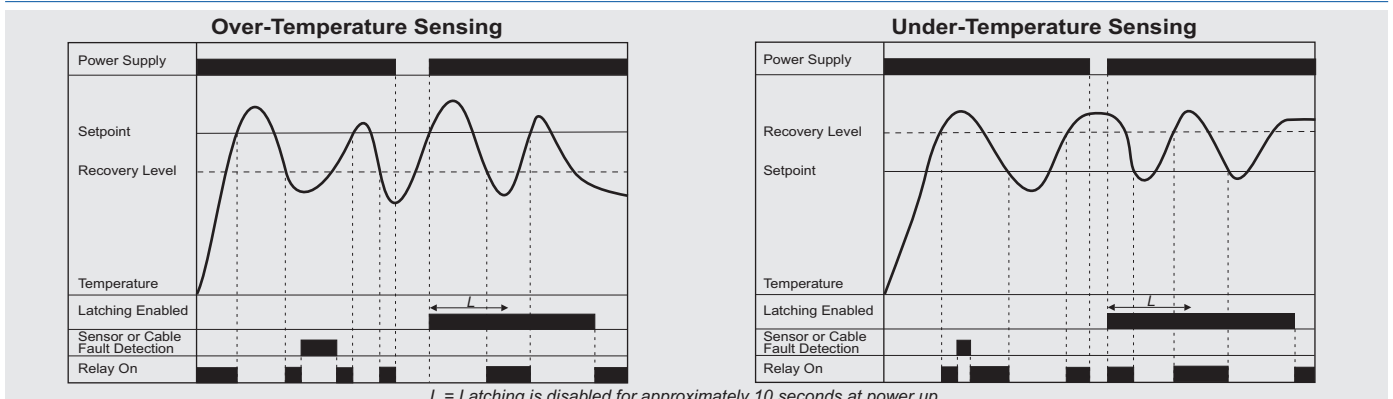
0 to 1mA Output: The module provides a 0 - 1mA proportional output which spans the selected temperature range. If the upper limit of the temperature range is exceeded, the output current is limited at 1,2mA to protect analogue meters. The output has been designed to be used with both digital and analogue instruments.

Latching: When latching is armed, the relay will not recover from a tripped condition but will remain de-energised until reset. The unit may be reset by either breaking and re-applying the power to the unit or by momentarily disabling the latching circuit (e.g. push-to-open switch).

Sensor or cable fault: If the PT-100 sensor, or its connecting cable, has either an open-circuit or a short-circuit fault, the relay will de-energise and the LED marked "Sensor Fault" will illuminate.
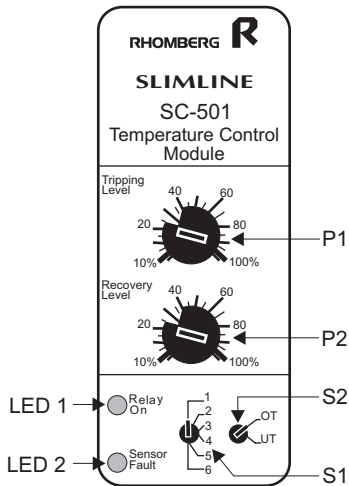
Hysteresis: The hysteresis of the unit may be adjusted by varying the difference between the tripping level and the recovery level. To prevent relay "chatter", this difference should always exceed 2%.

■ Operational Diagrams

Over-Temperature Sensing

Power Supply
Setpoint
Recovery Level
Temperature
Latching Enabled
Sensor or Cable Fault Detection
Relay On

Under-Temperature Sensing

Power Supply
Recovery Level
Setpoint
Temperature
Latching Enabled
Sensor or Cable Fault Detection
Relay On

L = Latching is disabled for approximately 10 seconds at power up

Description of Controls

P1: **Tripping Level** is adjusted on P1. The setting of 0% and 100% correspond with the minimum and maximum levels selected on S1.

P2: **Recovery Level** is adjusted on P2. The settings of 0% and 100% correspond with the minimum and maximum levels set on S1.

S1: The **Temperature Sensing Range** is set on S1.

S2: **Function Selection** is provided on S2. If set to "OT", the unit operates as an over-temperature detector. If set to "UT", the unit operates as an under-temperature detector

LED1: The green LED marked "**Relay ON**", illuminates when the relay is energised.

LED 2: The red LED marked **"Sensor Fault"**, illuminates when:
- A short circuit occurs in either the PT-100 sensor or its connection cable.
- An open-circuit fault occurs in either the PT-100 sensor or its connection cable.
- The sensor is disconnected.

SC-501 Temperature Control Module

Tripping Level / Recovery Level / Relay On / Sensor Fault / LED 1 / LED 2 / P1 / P2 / S2 / S1 / OT / UT

Wiring and Connection

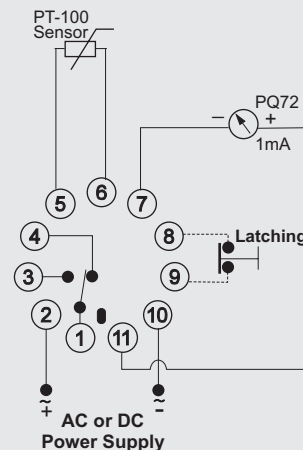| Power Supply	
Phase/Positive	2
Neutral/Negative	10

Relay Contacts	
Normally open	1+3
Normally closed	1+4

Latching
Latching to be enabled by interconnecting pin 8 & pin 9 (e.g. Push-to-open reset switch)

Sensing Input
Connect the 2-wire PT-100 between pin 5 & pin 6.

Analogue Output
Connect the instrument to pin 7 (-) and pin 11 (+) observing polarity.

PT-100 Temperature Sensor Table Of Temperatures vs. Resistance (DIN 48760)

C	Ohm	C	Ohm
-50	80.25	130	149.82
-40	84.21	140	153.57
-30	88.17	150	157.32
-20	92.13	160	161.05
-10	96.07	170	164.76
0	100.00	180	168.47
10	103.90	190	172.16
20	107.79	200	175.84
30	111.67	210	179.51
40	115.54	220	183.17
50	119.40	230	186.82
60	123.24	240	190.46
70	127.07	250	194.08
80	130.89	260	197.70
90	134.70	270	201,30
100	138.50	280	204,88
110	142.28	290	208,46
120	146.06	300	212,03

PT-100 Sensor / PQ72 / + / 1mA / Latching / AC or DC Power Supply

Technical Specifications

POWER SUPPLY

AC: Supply voltage: 12, 24, 110, 230, 400, 415, 525V ±15%
Isolation (sensor input to power supply): 2kV
Power consumption: 3VA (approx.)
6VA for 415, 525V (approx.)
DC: Supply voltage: 12, 24V 15%
Isolation: no galvanic isolation
Power consumption: 100mA

CONNECTION CABLE

2 - core, unscreened. Resistance of long cables affect temperature accuracy (Approximately 1ºC per 0.3 ohms)

SENSOR INPUT

Type: PT-100 resistive temperature sensor
Short-circuit current: 1mA
Open-circuit voltage: 220mV

TEMPERATURE SENSING RANGE

Range			S1
-50	to	50 C	1
0	to	100 C	2
50	to	150 C	3
100	to	200 C	4
150	to	250 C	5
200	to	300 C	6

Repetitive accuracy: 1%

ANALOGUE OUTPUT

Rating 0 to 1mA (propotional). 0-20mA or 4-20mA also available as an order option.
Maximum voltage between pins 7 and 11 (pin 11 positive): 12V DC
Maximum load: 7k OhM. Current limits at 1.2mA to protect analogue instruments.

Additional information in Section J, page 131.

Process Controllers