

SEM1500TC

DIN Rail Mounted Isolated Thermocouple Transmitter



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52-214-2411-01 Issue: Web 1500TC

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1.0 DESCRIPTION

This device is a low cost isolated thermocouple two wire (4 to 20) mA output temperature transmitter. Automatic thermocouple cold junction compensation is provided. The output is directly referenced to the mV input, allowing linearisation to be carried out by the loop monitoring instrumentation, if required. The device is housed inside a plastic enclosure, suitable for DIN rail mounting. Screw terminal are provided for wire connections. The enclosure provides access to side entry coarse offset and span adjusters together with a thermocouple selector.

2.0 SPECIFICATION @ 20 °C

2.1 OUTPUT

Type	Passive 2 wire current output
Range	(4 to 20) mA (30 mA maximum)
Protection	Reverse connection plus over-voltage
Voltage	(10 to 30) VDC
Ripple	Less than 40 μ A/V (Measured at 1 V ripple 50 Hz)
Response	200 ms to reach 70 % of final value

2.2 INPUT

Type	Isolated mV input to accept mV or T/C. Types K, T, N, J, R, S.
Breakdown Isolation	500 VDC (Flash tested to 1 kV)
Impedance	> 1 Ω
Cold junction	Automatic compensation may be selected for the above T/C or zero compensation may be selected for mV or differential T/C measurement.
Accuracy	(Typical) ± 0.2 °C @ 20 °C (Ambient) ± 0.05 °C/°C
Linearity	± 0.005 % for mV inputs T/C ranges are non-linear and directly referenced to T/C mV.
Burn Out	Up scale standard (Down scale burnout to order)
Range Select	Coarse settings by side entry 16 position rotary screw adjustment switches. Fine by front access pots.

RANGES	OFFSET °C (4 mA reading)	SPAN °C (for (4 to 20) mA)
K	-200 to 400	100 to 1200
T	-200 to 300	100 to 400
J	-200 to 300	70 to 750
N	-200 to 400	150 to 1200
R	0 to 1000	500 to 1700
S	0 to 1000	500 to 1760
mV *	(-5 to 15) mV	(3 to 50) mV

* Also suitable for differential T/C input (i.e. back to back coupled)

2.3 GENERAL

Ambient	(0 to 50) °C; (1 to 95) % RH non condensing
Connection	Captive clamp screws
Cable Size	4 mm ² solid/2.5 mm ² stranded
Case Material	Grey Polyamide
Flammability	To UL94-VO VDE 0304 Part 3, Level IIIA
Dimensions	(60 x 60 x 12.5) mm
Mounting	Snap on "Top Hat" rail (DIN EN50022-35)
Weight	45 g
Compliant with	BS EN61326

3.0 INSTALLATION

3.1 MECHANICAL

This transmitter must be housed within a suitable enclosure that will provide protection from the external environment, ensuring that the stated temperature and humidity operating ranges are not exceeded. It is good practice to mount the transmitter away from sources of electrical and magnetic radiated noise, such as switch gear and transformers. The SEM1500TC enclosure is designed to snap fit onto a standard "Top Hat" DIN rail. To remove from rail, apply pressure at the bottom face at the back upwards towards the rail to release the spring clip and tip away from the top. The transmitter may be mounted in any orientation and stacked side by side along the rail. Span and offset fine adjustments can be made from the front panel, whilst re-ranging the transmitter requires access to adjusters in the case side.

3.2 ELECTRICAL

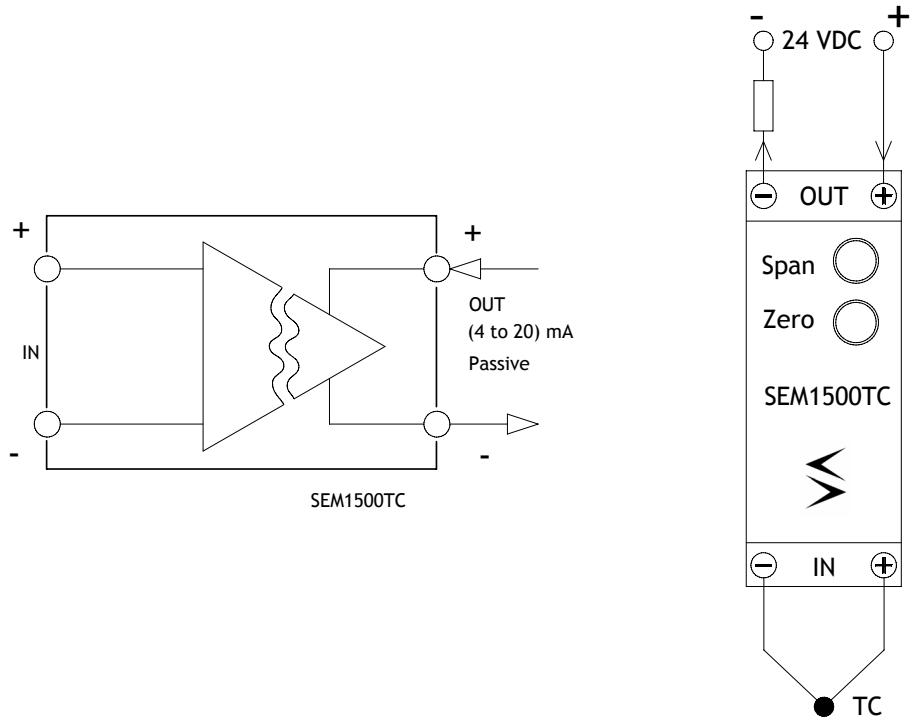
Connection to the transmitter are made via screw terminals. To maintain EMC compliance twisted pair (screened) cables are recommended for the signal connections. The correct type of wire must be used for sensor connections, compensating wire for thermocouple inputs, mV inputs must use screened copper wires. Incorrect sensor connection or sensor wire burnout will result in the output current saturating up scale on standard units (optionally downscale if requested at time of order).

It is good practice to ensure all (4 to 20) mA signal loops are grounded at one point. Care must be taken when designing a (4 to 20) mA circuit to ensure that the total burden of the loop, (that is the total voltage requirement of all the equipment connected in the loop at 20 mA) does not exceed the loop power supply voltage.

To operate correctly the SEM1500TC requires a minimum of 10 V across it's output terminals.

The transmitter is protected against reverse connection and over voltage. Figure 1 shows a typical (4 to 20) mA circuit, the load resistor represents equipment such as indicators loggers PLC etc.

Figure 1



4.0 RANGES

The SEM1500TC is normally supplied factory ranged but if required the transmitter range can be changed by means of coarse, and multi turn fine, offset and span adjusters.

The following equipment is required:

- Precision mV/Thermocouple calibrator, to simulate T/C input
- Milliamp meter (digital); accuracy 0.05 % on (0 to 20) mA range
- Power Supply; 24 VDC 30 mA minimum
- Trim tool

Decide on the range required and ensure the transmitter is capable of this range. If a range was not specified at time of order, the transmitter will leave the factory set as Type K (0 to 1000)°C.

5.0 CALIBRATION

1. Connect calibrator to input terminals using the correct cable type, ensure polarity is correct. Connect as above, with the mA meters in place of, or in series with the load. Turn on. Allow a few minutes before calibration to allow the transmitter to stabilise after handling. Set Type selector on side panel to the type of input required, i.e. T/C type or mV.

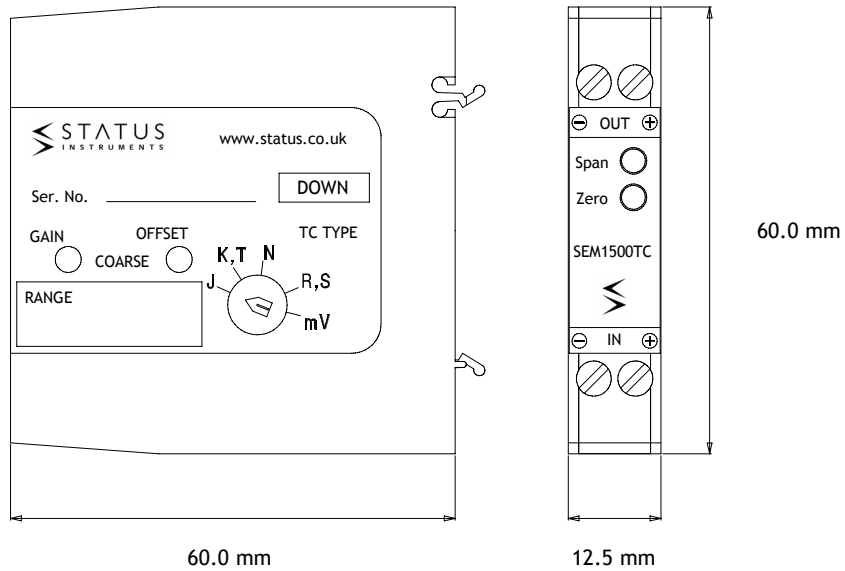
Let: T_{lo} = Temperature (mV) at 4 mA output,

T_{hi} = Temperature (mV) at 20 mA output.

2. Set calibrator to simulate T_{lo} , first rotate offset (COARSE) to obtain a output reading close to 4mA. Use ZERO adjuster to trim reading to $4\text{ mA} \pm 0.005\text{ mA}$. (If ZERO trim reaches end of travel re-adjust COARSE offset adjuster one step then re-adjust ZERO offset).
3. Set calibrator to simulate T_{hi} , first rotate COARSE GAIN to obtain a output reading close to 20 mA. Use span adjuster to trim reading to $20\text{ mA} \pm 0.005\text{ mA}$. (If span trim reaches end of travel re-adjust COARSE GAIN adjuster one step and re-adjust fine SPAN. Note clockwise rotation of the COARSE adjuster reduces output current).
4. Set calibrator to T_{lo} , adjust ZERO for $4.000\text{ mA} \pm 0.005\text{ mA}$.
5. Set calibrator to T_{hi} , adjust ZERO SPAN for $20.000\text{ mA} \pm 0.005\text{ mA}$.
6. Repeat Steps 4, 5 until both points are in calibration.
7. Turn off power and remove wires. Mark transmitter with the new range.

6.0 MECHANICAL DETAIL

Figure 2



NOTE: If word "DOWN" appears where shown in label text box then unit has been factory set in the "Down scale" option, where as if text box has been left blank then "Up scale" option has been set.

ALSO AVAILABLE:

- Smart In Head Temperature Transmitters
- DIN Rail Mounted Temperature Transmitters
- Panel & Field Temperature Indicators
- Temperature Probes
- Trip Amplifiers
- Signal Conditioners
- And many other products

For further information on all products:



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