

SEM215

Programmable DIN Rail Universal Temperature Transmitter



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INDEX

SECTION	CONTENTS	PAGE NO.
1.0	DESCRIPTION	1
2.0	SPECIFICATION	1-3
3.0	INSTALLATION	4-7

1.0 DESCRIPTION

The transmitter is a universal DIN rail mounted temperature transmitter that accepts most commonly used temperature sensors, slide wire transducers or millivolt signals and transmits them as a (4 to 20) mA signal to a host system. The unit can be programmed by the user from a selection of preset ranges selected by DIL switches or by the software package RCPW if required.

2.0 SPECIFICATION @ 24 °C

2.1 RTD INPUT (Pt100)

Sensor Range		(-200 to 850) °C (18 to 390) Ω
Minimum Span*1		25 °C
Linearisation		BS EN60751 (IEC 751) BS1904 (DIN 43670) JISC 1604 CUSTOM [X], please contact Sales Office
Basic Measurement Accuracy*2		± 0.01 % FRI*5 ± 0.05 % Rdg
Thermal Drift	Zero	0.008 °C/°C
	Span	0.01 %/°C
Excitation Current		(300 to 550) µA
Maximum Lead Resistance		50 Ω/leg
Lead Resistance Effect		0.002 °C/Ω
Preset Ranges		Refer to Section 3.3

2.2 THERMOCOUPLE INPUT

SENSOR RANGES

Thermocouple Type	Measuring Range*4 °C	Minimum Span*1 °C
TC Type K	-200 to 1370	50
TC Type J	-200 to 1200	50
TC Type T	-210 to 400	25
TC Type R	-10 to 1760	100
TC Type S	-10 to 1760	100
TC Type E	-200 to 1000	50
TC Type L	-100 to 600	25
TC Type N	-180 to 1300	50
TC Type [X]*3	±9999	Custom

Linearisation		BS EN 60584, IEC 584 (BS 4937)
Basic Measurement Accuracy*2		± 0.04 % FRI*5 ± 0.04 % RDG or 0.5 °C (whichever is greater)
Thermal Drift	Zero	0.1 µV/°C,
	Span	0.01 %/°C
Cold Junction Error		± 0.5 °C
Cold Junction Tracking		0.05 °C/°C
Cold Junction Range		(-40 to 85) °C
Preset Ranges		Refer to Section 3.3

2.3 MILLIVOLT INPUT*6

Input		Voltage source
Range		(-10 to 75) mV
Characterisation		Linear. Custom[X]*3, 4th order polynomial
Minimum Span*1		5 mV
Basic Measurement Accuracy*2		± 10 µV ± 0.07 % RDG
Input Impedance		10 MΩ
Thermal Drift	Zero	0.1 µV/°C,
	Span	0.01 %/°C

2.4 SLIDEWIRE INPUT*6

Input		3 wire potentiometer
Resistance Range		(10 to 390) Ω (End to End). For input with R > 390 Ω terminals 9 and 10 have to be linked.
Characterisation		Linear. Custom [X]*3, 4th order polynomial
Minimum Span*1		5 % of full range
Basic Measurement Accuracy*2		0.1 % FRI*5
Temperature Drift		0.01 %/°C

2.5 OUTPUT

Output Range	(4 to 20) mA (>3.8 to <20.2) mA
Maximum Output	23 mA
Accuracy	± 5 µA
Voltage Effect	0.2 µA/V
Thermal Drift	1 µA/°C
Supply Voltage	(10 to 35) V
Maximum Output Load	[(Vsupply -10)/20] kΩ (e.g 700 Ω @ 24 V) Restricted to 300 Ω maximum for in loop programming
Protection	Reverse connection overvoltage 35 V

*NOTES:

- Any span may be selected, full accuracy is only guaranteed for spans greater than the minimum recommended.
- Basic measurement accuracy includes the effects of calibration, linearisation and repeatability.
- Customer linearisation requirements are available pre-programmed at the factory, contact your supplier for details.
- Consult thermocouple reference standards for thermocouple material limitation.
- FRI = Full Range Input
- If the unit is to be configured for either millivolts or slidewire input, the following procedure should be followed. Configure unit for RTD with BS1904 linearisation (Not EN60751) and up load to unit. The unit can now be configured for millivolts or slidewire input.

2.6 GENERAL

Input/Output Isolation	500 VAC rms (galvanically isolated)
Update Time	250 ms maximum
Time Constant (Filter Off)	<1 s (Time to reach 63 % of final value)
Filter Factor Programmable	Off, 2 s, 10 s or adaptive
Warm-up Time	120 s to full accuracy
Stability	0.1 % FRI* ⁵ or 0.1 °C/year

ENVIRONMENTAL

Ambient Operating Range	(-40 to 60) °C
Ambient Storage Temperature	(-25 to 70) °C
Ambient Humidity Range	(10 to 90) % RH non condensing

EMC

BS EN 61326

MECHANICAL

Enclosure	DIN Rail mounted to fit Din EN 50022-35
Material	ABS
Weight	70 g
Flammability	SEI UL 94-VI
Dimensions	(90 x 99 x 18.5) mm
Connections	Tension clamp two part terminals and 3.5 mm jack for comms. Available as "Quick Selector" or via PC

COMMUNICATIONS

PC Interface	RS232 via configurator
Minimum Output Load	250 Ω for 'In loop' programming (Available as quick selector or via PC)
Maximum Cable Length	1000 m
Configurable Parameters	Sensor type: Burnout: °C/°F: Output: PC: Hi/Lo: Filter: Tag: User offset (Available via PC programming only)
Comms Protocol	ANSI X3.28 1976
Data Rate	1200 baud

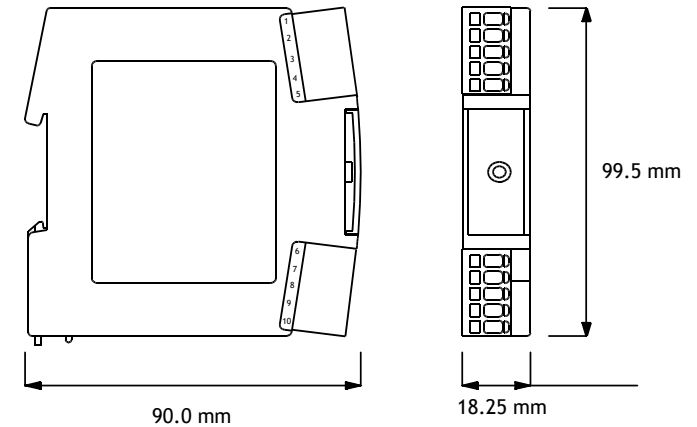
3.0 INSTALLATION

3.1 MECHANICAL

The transmitter is designed to mount onto a standard DIN Rail. The transmitter should be installed with adequate protection from moisture and corrosive atmospheres. The transmitter may be mounted in any orientation.

Care must be taken when locating the transmitter to ensure the ambient temperature remains within the specified operating range. Figure 1 shows the mechanical layout of the transmitter.

Figure 1



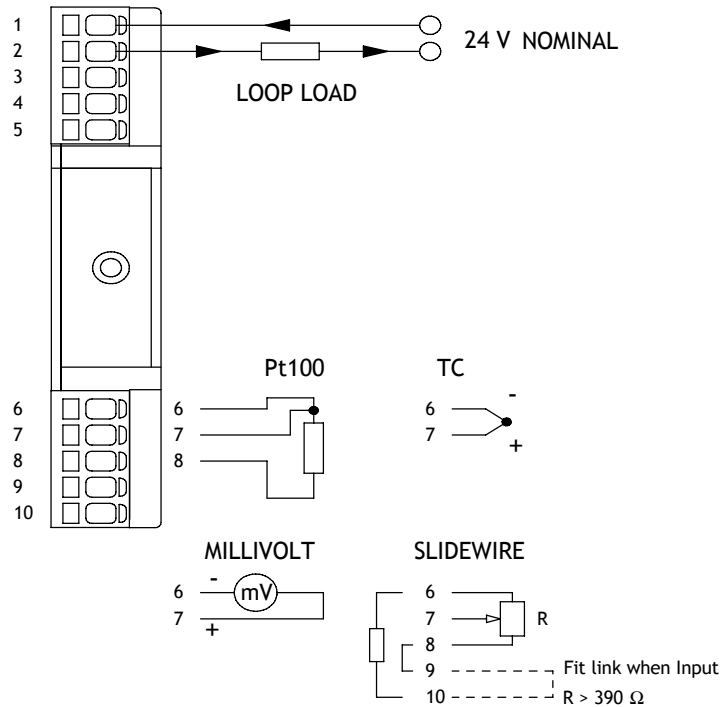
3.2 ELECTRICAL

Connections to the transmitter are made to the tension clamp terminals provided on the front face. Output signal wiring should use screened twisted pair. It is recommended that screened cable is used for the input signal wires for cable runs greater than one metre. For Pt100 inputs all three input wires must have the same core diameter to maintain equal resistance in each wire. If required the user may change the range of the transmitter by selecting one of the ranges from the table shown in Section 3.3. Power must be switched OFF first. The selection switch is located at the rear of the transmitter between the DIN Rail mounting.

Figure 2 shows the method of connection to provide a (4 to 20) mA current loop output. The Pt100 sensor shown would normally take the form of a probe assembly with a three wire connection. The output loop has a voltage power supply used to provide loop excitation. The load symbol represents other equipment in the loop, normally indicators, controllers or loggers. Care must be taken when designing the (4 to 20) mA circuit to ensure that the total voltage requirements of all the equipment in the loop added together, does not exceed the power supply voltage. If a number of instruments are connected in the loop, ensure that only one instrument is tied to ground. Grounding the loop at two points will cause a short circuit of part of the loop leading to measurement errors.

To maintain CE compliance the transmitter should be mounted in an enclosure to prevent access to the transmitter during normal operation.

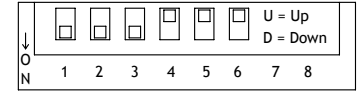
Figure 2



3.3 PRESET RANGES

- **WARNING - POWER MUST BE REMOVED BEFORE CHANGING DIP SETTINGS.**

Example opposite shows 1, 2, 3 DOWN 4, 5, 6 UP.



Sensor and temperature ranges may be preset using table shown below.

Computer Programmable

RANGE	1	2	3	4	5	6	CODE
Prog.	U	U	U	U	U	U	00

Use this code to configure unit using RCPW software

Pt100, EN60751

RANGE °C	1	2	3	4	5	6	CODE
-100 to 100	D	U	U	U	U	U	01
-50 to 50	U	D	U	U	U	U	02
-50 to 100	D	D	U	U	U	U	03
-50 to 150	U	U	D	U	U	U	04
0 to 50	D	U	D	U	U	U	05
0 to 100	U	D	D	U	U	U	06
0 to 150	D	D	D	U	U	U	07
0 to 200	U	U	U	D	U	U	08
0 to 300	D	U	U	D	U	U	09
0 to 400	U	D	U	D	U	U	10
0 to 500	D	D	U	D	U	U	11
0 to 600	U	U	D	D	U	U	12
50 to 150	D	U	D	D	U	U	13

Pt100, IEC 584-1

RANGE °C	1	2	3	4	5	6	CODE
-25 to 125	U	D	D	D	U	U	14
0 to 100	D	D	D	D	U	U	15
0 to 250	U	U	U	U	D	U	16
250 to 500	D	U	U	U	D	U	17
-50 to 150	U	D	U	U	D	U	18
0 to 200	D	D	U	U	D	U	19
50 to 150	U	U	D	U	D	U	20

Pt100, JISC 1604

RANGE °C	1	2	3	4	5	6	CODE
-25 to 125	D	U	D	U	D	U	21
0 to 100	U	D	D	U	D	U	22
0 to 250	D	D	D	U	D	U	23
250 to 500	U	U	U	D	D	U	24
-50 to 150	D	U	U	D	D	U	25
0 to 200	U	D	U	D	D	U	26
50 to 150	D	D	U	D	D	U	27

TYPE E, IEC 584-3 BS 4937

RANGE °C	1	2	3	4	5	6	CODE
0 to 1000	D	U	U	D	D	D	57

TYPE J, IEC 584-3 BS 4937

RANGE °C	1	2	3	4	5	6	CODE
0 to 100	D	D	U	U	U	D	35
0 to 150	U	U	D	U	U	D	36
0 to 200	D	U	D	U	U	D	37
0 to 400	U	D	D	U	U	D	38
0 to 600	D	D	D	U	U	D	39
0 to 2000	U	D	U	D	D	D	58

TYPE K, IEC 584-3 BS 4937

RANGE °C	1	2	3	4	5	6	CODE
0 to 100	U	U	D	D	D	D	28
0 to 200	D	U	D	D	D	D	29
0 to 500	U	D	D	D	D	D	30
0 to 600	D	D	D	D	D	D	31
0 to 800	U	U	U	U	D	D	32
0 to 1000	D	U	U	U	U	D	33
0 to 1200	U	D	U	U	U	D	34
0 to 2400	D	D	U	D	D	D	59

TYPE N, IEC 584-3 BS 4937

RANGE °C	1	2	3	4	5	6	CODE
0 to 100	U	D	U	U	D	D	50
0 to 200	D	D	U	U	D	D	51
0 to 400	U	U	D	U	D	D	52
0 to 600	D	U	D	U	D	D	53
0 to 800	U	D	D	U	D	D	54
0 to 1000	D	D	D	U	D	D	55
0 to 1200	U	U	U	D	D	D	56

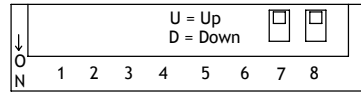
TYPE S, IEC 584-3 BS 4937

RANGE °C	1	2	3	4	5	6	CODE
0 to 1000	U	U	U	U	D	D	48
0 to 1600	D	U	U	U	D	D	49

TYPE T, IEC 584-3 BS 4937

RANGE °C	1	2	3	4	5	6	CODE
-50 to 50	U	U	U	D	U	D	40
-50 to 100	D	U	U	D	U	D	41
0 to 100	U	D	U	D	U	D	42
-100 to 100	D	D	U	D	U	D	43
0 to 200	U	D	D	D	U	D	44
0 to 400	D	U	D	D	U	D	45

Temperature units and Burnout Options may be preset using table shown below.



Temperature Units, Switch 7	Burnout, Switch 8
U= °C	U= Low
D= °F	D= High

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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