STATUS INSTRUMENTS

# SEM315

## DIN RAIL HART® TEMPERATURE TRANSMITTER

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## INDEX

## 1.0 DESCRIPTION

The SEM315 is a HART DIN Rail temperature transmitter that accepts commonly used temperature sensor, slidewire transducer or millivolt signal and converts the output to the industry standard (4 to 20) mA transmission signal.

The software package M-config or a Hart Communicator with the necessary "Device Description" can be used to program the unit. Separate instructions are available for programming the transmitter using M-CONFIG.

## 2.0 SPECIFICATION @ 20 °C

### 2.1 RTD INPUT (Pt100) 2, 3 OR 4 WIRE

| | | |
|---|---|---|
| Sensor Range | | (-200 to 850) °C, (18 to 390) Ω |
| Minimum Span*1 | | 25 °C |
| Linearisation | | BS EN 60751 (IEC 751), BS 1904 (DIN 43760), JISC 1604, CUSTOM [X]*3 |
| Max Lead Resistance | | 50 Ω per leg (balanced for 3 wire) |
| Basic Measurement Accuracy*2 | | ± 0.01 % FRI ± 0.07 % Rdg (FRI = Full Range Input) |
| RTD Excitation Current | | (300 to 500) µA |
| Thermal Drift | Zero | 0.008 °C/°C |
| | Span | 0.01 %/ °C |

### 2.2 THERMOCOUPLE INPUT

| Thermocouple Type | Measuring Range °C*4 | Minimum Span °C*1 |
|---|---|---|
| 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 | User defined | |

| | |
|---|---|
| Linearisation | BS EN 60584-01/BS 4937/ EC 584-1(multi segment Polynomials) |
| Basic Measurement Accuracy*2 | 0.04 % FRI ± 0.04 % Rdg or 0.5 °C (whichever is greater) |
| Thermal Drift | Span 0.01 %/°C |
| Cold Junction Error | ± 0.5 °C |
| Cold Junction Tracking | 0.05 °C/°C |
| Cold Junction Range | (-40 to 85) °C |



### 2.3 MILLIVOLT INPUT

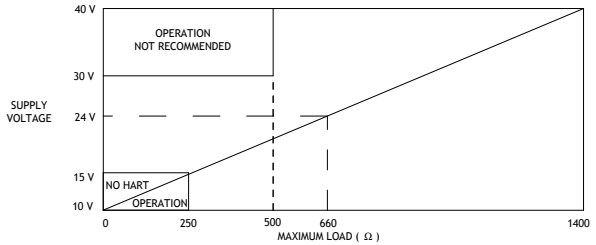
| | | |
|---|---|---|
| Input | | Voltage Source |
| Range | | (-10 to 75) mV |
| Characterisation | | Linear, Custom [X]*3 |
| Minimum Span | | 5 mV |
| Basic Measurement Accuracy*2 | | ± 10 µV ± 0.07 % Rdg |
| Input Impedance | | 10 MΩ |
| Thermal Drift | Zero | 0.1 µA/°C |
| | Span | 0.01 %/°C |

### 2.4 SLIDEWIRE INPUT

| | | |
|---|---|---|
| Input | | 3 wire potentiometer |
| Resistance Range | | (10 to 390) Ω (End to End) Larger values can be accommodated by fitting a link, see Figure 2. |
| Characterisation | | Linear<br>Custom [X]*3 |
| Minimum Span*1 | | 5 % of FRI |
| Basic Measurement Accuracy*2 | | 0.1 % FRI |
| Thermal Drift | Zero | 0.005 % of span/°C |
| | Span | 0.01 % /°C |
| Range | | (0 to 100) % |

### 2.5 OUTPUT

| | |
|---|---|
| Burnout Levels | Low 3.75 mA , High 21.5 mA |
| Input out of Range | Low 3.8 mA, High 20.5 mA |
| Output range | (4 to 20) mA. Minimum 3.75 mA. Maximum 21.5 mA |
| Accuracy | ± 5 µA |
| Thermal Drift | 1 µA /°C |
| Supply Voltage*5 | (10 to 40) V |
| Supply Voltage effect | 0.2 µA/V |
| Maximum output load | [(Vsupply-10)/21.5 KΩ 250 Ω minimum loop load for correct HART operation*5 |




*NOTES:

1. Any span may be selected but full accuracy is only guaranteed for spans greater than the minimum recommended.
2. Includes the effect of calibration, linearisation and repeatability.
3. Custom characterisation is available pre programmed at the factory. Please contact your nearest Sales office.
4. Consult Thermocouple reference tables for practical temperature ranges.
5. For supply voltages over 30 V, a minimum loop load of 500 Ω is necessary.

## 2.6 GENERAL

| | |
|---|---|
| Input/Output Isolation | 500 VAC (breakdown voltage 3000 VAC) |
| Time Constant (Filter Off) | 0.5 s (to 90 % of final value) |
| Filter Factor Programmable | Off/selectable between 1 and 32 seconds/or Adaptive |
| Warm-up Time | 120 s to full accuracy |
| Re-calibration Interval | 1 year, to maintain accuracy to published specification. |
| | 5 years, to maintain accuracy to less than twice published specification. |
| **ENVIRONMENTAL** | |
| Ambient Operating Range | (-40 to 85) ºC |
| Ambient Storage Temperature | (-50 to 90) ºC |
| Ambient Humidity Range | (10 to 95) % RH non condensing |
| **EMC** | |
| Emissions | BS EN61326;1998 |
| Immunity | BS EN61326;1998 |
| **MECHANICAL** | |
| Enclosure | DIN Rail mounted to fit DIN EN 50022-35 |
| Material | ABS |
| Weight | 70g |
| Dimensions | (90 x 99 x 18.5) mm |
| Flammability | UL94-V0 |
| Connections | Tension clamp two part terminals and 3.5 mm jack for comms |



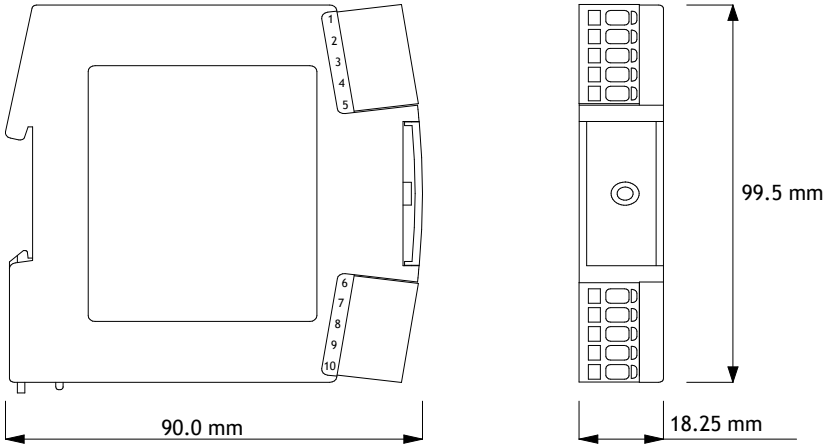
## 3.0 INSTALLATION

## 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

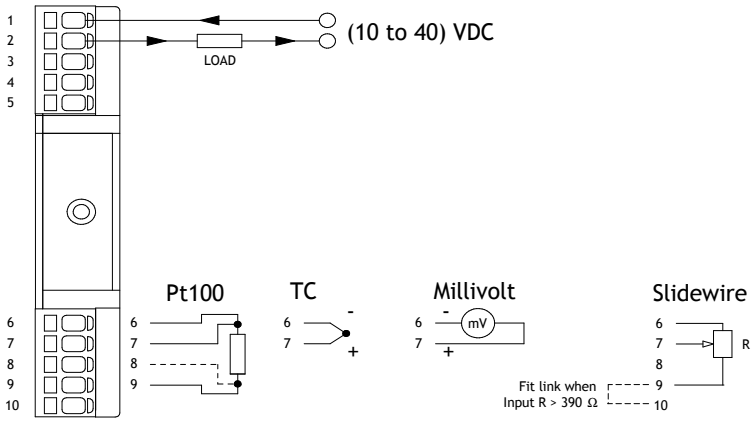



## 3.2 ELECTRICAL

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 input wires must have the same core diameter to maintain equal resistance in each wire.

Figure 2 shows the method of connection to provide a (4 to 20) mA current loop output. 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




* Resistance Range, 10 Ω το 390 Ω (End to End). Larger values can be accommodated by linking terminals as shown.

## 4.0 HART PROGRAMMING

Consult HART website for more details: www.hartcomm.org

## 4.1 CONNECTION ARRANGEMENT FOR HART COMMUNICATOR

Figure 3.1 a

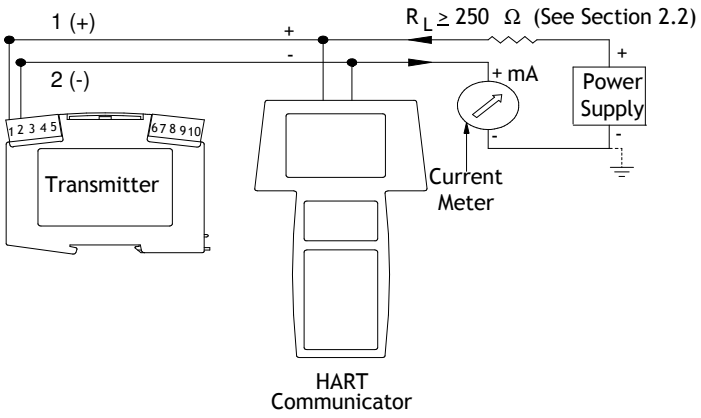
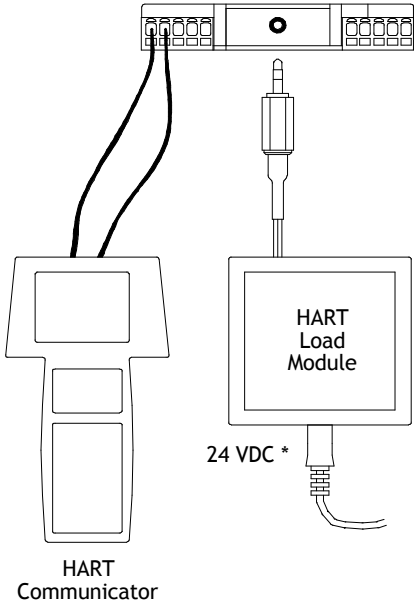





Figure 3.1b




## 4.2 CONNECTION ARRANGEMENTS FOR HART MODEM (e.g. M-CONFIG)

Figure 3.2a

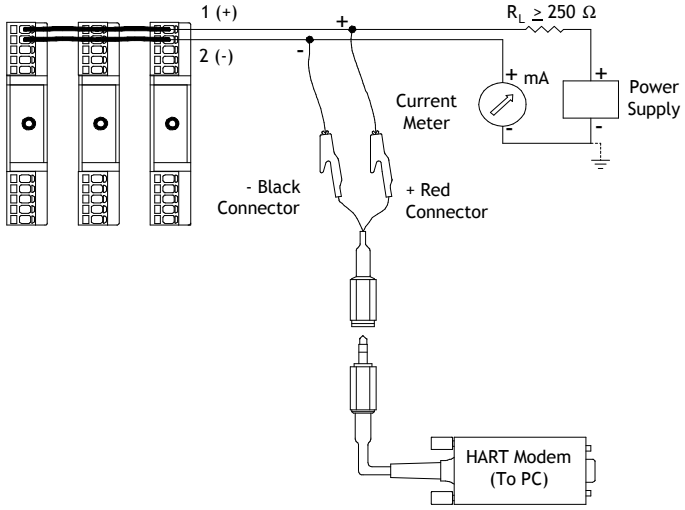
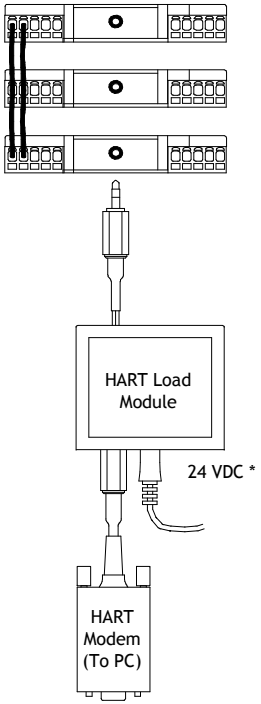


Figure 3.2b




NOTE: Transmitters must be configured individually for Multidrop mode, by setting the Device Number between 1 and 15. This cannot be done while the transmitters are connected together. The SEM315 can also be configured by connecting the Communicator or HART modem across the load in Figure 3.1a and 3.2a respectively



**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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