HART IN-HEAD TEMPERATURE TRANSMITTER

SEM310

- HART® PROTOCOL
- UNIVERSAL INPUT
- SENSOR BURNOUT DETECTION
- ISOLATION TO 500 VAC
- SPRING MOUNTING
- 10 YEAR WARRANTY
- ATEX VERSION AVAILABLE

INTRODUCTION

The SEM310 is an encapsulated in-head temperature transmitter with an integral spring mounting kit that replaces the standard connecting block in the sensor head. It is also available in DIN rail mount format packaging SEM315 series.

The SEM310 has full HART communications protocol which allows the user to quickly and easily down-load information or interrogate the device enabling the following:

- Simple re-ranging of sensor type and range.
- Easy on site re-calibration.
- Self documentation.
- Operation with proprietary software packages such as AMS Plant Web™ and Cornerstone™.
- Remote configuration on the (4 to 20) mA loop with a hand held communicator or with a PC & HART modem.
- Online Digital communication concurrent with a (4 to 20) mA Analogue signal.

All the standard HART universal and common usage commands are fully implemented, with other device specific commands that enable access to the enhanced performance parameters of the SEM310.

ENHANCED FEATURES

Some of the enhanced SEM310 features are as follows;

SENSOR REFERENCING
The SEM310 sensor referencing via the Windows based M-Config software allows for close matching to a known reference sensor eliminating possible sensor errors.

USER CALIBRATION
In addition to sensor referencing, user offset and current output trimming is possible via the HART commands.

CUSTOM LINEARISATION
The [X]*1 facility allows the SEM310 to be programmed with a custom linearisation to suit non standard sensors or sensors with unusual or unique characteristics. Consult the sales office for details.

SENSOR BURN OUT DETECTION
If any sensor wire is broken or becomes disconnected the SEM310 output will automatically go to its user defined level (upscale or downscale). This happens irrespectively of which wire is broken.

OUTPUT CURRENT PRESET
For ease of system calibration and commissioning the output can be set to a pre-defined level anywhere the (4 to 20) mA range.

Hart® Registered trademark of the HART Communication Foundation.

HART IN-HEAD TEMPERATURE TRANSMITTER

SPECIFICATIONS @20 °C

Input Types	Pt100, Thermocouple, mV or Slidewire. (Ni100, via Custom[X]*1 facility)
Time Constant (Filter off)	0.5 s (to 90 % of final value) Filter Factor Off/selectable between 1 s and 32 s or Adaptive
Warm-up Time	120 s to full accuracy
Input/Output Breakdown Isolation	500 VAC tested to 3000 VAC
Re-calibration Interval	1 year, to maintain accuracy to published specification. 5 years, to maintain accuracy to less than twice published specification.

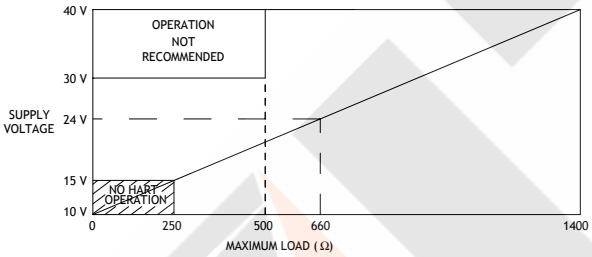
ENVIRONMENTAL

Operating Range	(-40 to 85) °C
Storage Temperature	(-50 to 85) °C
Humidity Range	(0 to 95) % (non condensing)

APPROVALS

EMC		BS EN61326;1998
Hazardous Area	ATEX	II1GEExia IICT4-T6 II3GEExia IICT6
	FM	FM3610-IS/I/1/ABCD/T4

OUTPUT



Maximum Output Load	[(Vsupply-10)/21.5] KΩ, 250 Ω minimum loop load. Supply voltages over 30 V a minimum loop load of 500 Ω is necessary.
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, Min. 3.75 mA, Maximum 21.5 mA
Accuracy	± 5 µA
Thermal Drift	1 µA/ °C
Supply Voltage	(10 to 40) VDC
Supply Voltage Effect	0.2 µA/V

Hart TrimDac function available.

ENCLOSURE

Material	ABS
Flammability	SEI UL94-V0
Spring Mounting	Free kit with each transmitter

MECHANICAL

Weight	43g

INPUT SENSORS & RANGES

Pt100 (RTD) 2, 3 OR 4 WIRE

Sensor Range		(-200 to -850) °C [18 to 390 Ω]
Minimum Span		25 °C
Linearisation		BS EN 60751/BS 1904/DIN 43760/ JIS1604/CUSTOM [X]*1
Max Lead Resistance		50 Ω per leg (balanced for 3 wire)
Basic Measurement Accuracy*2		0.01 % FRI*3 ± 0.07 % rdg
RTD Excitation Current		(300 to 500) µA
Thermal Drift	Zero	0.008 °C/°C
	Span	0.01 %/°C

THERMOCOUPLE

Type	Range °C	Minimum span °C
Type K	-200 to 1370	50
Type J	-200 to 1200	50
Type T	-210 to 400	25
Type R	-10 to 1760	100
Type S	-10 to 1760	100
Type E	-200 to 1000	50
Type L	-100 to 600	25
Type N	-180 to 1300	50
Others	Custom*1	

Linearisation		BS EN 60584-01/BS 4937/ IEC 584-1
Basic Measurement Accuracy*2		0.04 % FRI*3 ± 0.04 % rdg or 0.5 °C (whichever is greater)
Cold Junction		± 0.5 °C tracking 0.05 °C/°C range (-40 to 85) °C
Thermal Drift	Span	0.01 %/°C

MILLIVOLTS

Input		Voltage source
Range		(-10 to 75) mV
Characterisation		Linear, Custom [X]*1
Minimum Span		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

SLIDEWIRE

Input		3 wire potentiometer
Resistance Range		(10 to 390) Ω end to end (Larger values can be accommodated with an external resistor)
Range		(0 to 100) %
Characterisation		Linear, Custom [X]*1
Minimum Span		5 % of FRI*3
Thermal Drift	Zero	0.005 % of Span/°C
	Span	0.01 %/°C
Basic Measurement Accuracy*2		0.1 % of FRI*3

*NOTES:

1. Customer linearisation is available pre-programmed at the factory, contact sales office for details.
2. Basic Measurement Accuracy includes the effects of calibration, linearisation and repeatability.
3. FRI = Full Range Input

HART IN-HEAD TEMPERATURE TRANSMITTER

M-CONFIG SOFTWARE

COMMUNICATING WITH THE SEM310 HART TRANSMITTERS
The SEM310 can communicate digitally, concurrent with the analogue (4 to 20) mA output signal. This can be achieved in a number of ways namely:

- Proprietary hand held communicator.
- PLC's, DCS's etc with HART interface.
- PC Computers using M-Config and a HART modem.

COMMUNICATING WITH A HAND HELD COMMUNICATOR
The SEM310 will communicate with any proprietary HART communicator and access to all universal commands is available from the communicator. In order to access all the parameters available, the communicator must have the correct HART Device Description (DD) installed.

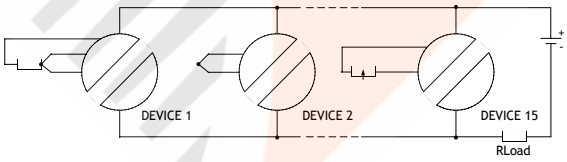
COMMUNICATING WITH PLC'S OR DCS'S
Any system that supports HART field devices using such software packages as AMS-Plant Web™ or Cornerstone™ will communicate with the SEM310 enabling access to advanced system features such as self documentation and diagnostics. The correct DD must be installed for full access to all parameters.

COMMUNICATION WITH A PC
Communication with a PC is easily accomplished by using the HART modem supplied with the communications kit, and M-Config software. M-Config is the menu-driven software product from Status Instruments which runs under Windows 95, 98, Win 2000, Win XP or NT and enables the following functions to be quickly and easily performed:

- Change sensor type, range, select burnout direction, filter(damping), factor.
- Set tag numbers, assembly numbers, calibration details, messages etc.
- Print or save to file all relevant documentary information.
- Read next calibration date.
- Perform basic calibration (TrimDac, user offset).
- Monitor sensor status and read transmitter diagnostics.
- Real-time reading of process variable.
- Supports up to 15 devices in multi-drop mode.

M-Config software is very 'User-friendly' and can be used immediately without extensive training. The user is guided through a series of simple menu screens where the information is clearly and logically represented. It is available as a free download on www.status.co.uk

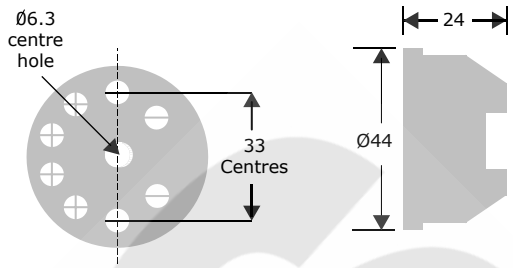
MULTIDROP HART
As well as operating in standard mode the SEM310 supports HART Multidrop mode whereby up to 15 devices can be connected to the same pair of wires enabling full digital functionality with each device.



*In multi-drop mode the current output is set at 4 mA.

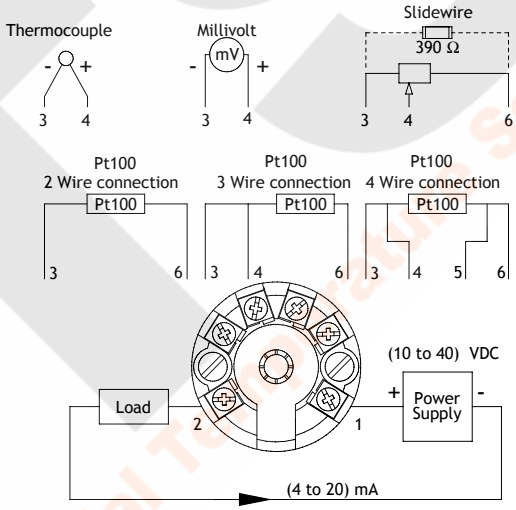
MECHANICAL DETAILS

(All dimensions in mm)



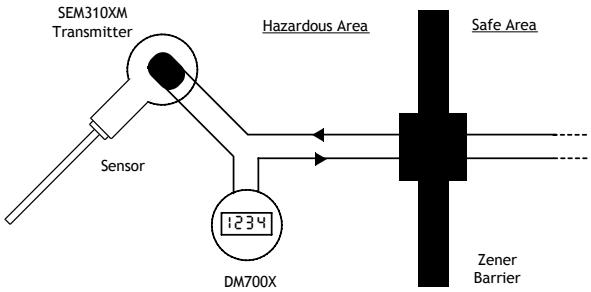
M4 Spring loaded fixing and screws (supplied)

CONNECTIONS



HAZARDOUS AREA

SEM310X TRANSMITTER



HART IN-HEAD TEMPERATURE TRANSMITTER

ASSOCIATED PRODUCTS:

SEM104	The SEM104 is a low cost (4 to 20) mA transmitter for use with standard Pt100 platinum resistance sensors in the size of a standard DIN terminal block.
SEM205P	SEM205P is a second generation "Smart" Head Mount temperature transmitter which accepts Pt100 temperature sensors and generates an industry standard (4 to 20) mA transmission signal.
SEM210	SEM210 is a second generation "Smart" Head Mount temperature transmitter which accepts most commonly used temperature sensors (also slide-wire sensors or mV inputs) and generates an industry standard (4 to 20) mA transmission signal.
SEM1000	Analogue signal Isolator
SEM1020	Loop Booster
SEM1100	Line powered process isolator
SEM1200	Signal Splitter
SEM1300	Power supply unit
SEM1400	Loop powered trip amplifiers
SEM1503/1504	Pt100 transmitters
SEM1500TC	Isolating TC transmitter
DM400 & DM420	Loop, field and panel indicators. Connected in series with the (4 to 20) mA loop current they display the process variable digitally in engineering units.
SENSORS	A complete range of sensors and accessories are available:

- Platinum resistance temperature detectors
- Thermocouples
- Thermistors

ORDER CODE

SEM310	HART transmitter Standard Unit. (Default Pt100 range (0 to 100) °C)
SEM310X	HART transmitter European IS version
RMK/1/G	"G" DIN rail profile mounting kit
RMK/3-T	Top Hat DIN rail profile mounting kit
M-CONFIG	Software and manual for the RCP2 Comms Kit are available free from www.status.co.uk
RCP2-KIT-UK	Kit* for UK use
RCP2-KIT-EUR	Kit* for European use
RCP2-KIT-USA	Kit* for use in USA/Canada
RCP2-KIT-AUS	Kit* for use in Australia

*Kit comprising; M-CONFIG, PSU, CONFIG-03, HART modem