UNIVERSAL INPUT X
GALVANICALLY ISOLATED X
HIGH ACCURACY AND STABILITY X
SMALL SIZE X
EASILY RE-PROGRAMMED X
IN LOOP INTERROGATION X

NEW

TRANSMITTERS

SMART UNIVERSAL TEMPERATURE TRANSMITTER
SEM210

INTRODUCTION

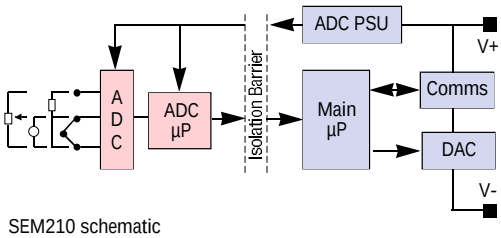
The **SEM210** is a second generation 'Smart' in head temperature transmitter that accepts any commonly used temperature sensor, Slidewire transducer or Millivolt signal and converts the output to the industry standard 4-20 mA transmission signal.

The sensor type and range are easily programmed using a software package running under 'Windows™' on a PC which communicates, via an interface adapter, down the same pair of wires that carry the 4-20 mA output signal. This method simplifies connections and enables re-programming or interrogation whilst the transmitter is connected in an existing loop. Sensor and span can be freely selected without the need for re-calibration.

Isolation is a standard feature, removing all ground loop effects as the input is electrically and physically isolated from the loop power supply (see the schematic below). The use of two micro-processors results in error-free data transmission across the isolation barrier.

The very small size coupled with the versatility of this universal transmitter make it the ideal choice for every temperature measurement application, resulting in lower stock holdings, greater operational flexibility and, in common with our other products, a **low cost of ownership**.

Block diagram



SEM210 schematic

INPUTS

Pt100 Platinum resistance sensors, Thermocouples, millivolts or Slidewire sensors may be connected to the unit, plus a 'type X' linearisation option which may be pre-configured at the factory to satisfy any custom characterisation requirements.

The Process Variable may be filtered to remove incoming signal noise using one of four settings. If the 'Adaptive' function is selected the filter continuously adjusts to the incoming signal to noise ratio in order to choose an appropriate level of filtering. In this way a slowly changing input can be heavily filtered but if the signal goes through a sudden change the filter quickly reduces allowing a rapid response, other settings are; off, 2 seconds, 10 seconds.

A user programmable offset is available to remove any system errors that may be present and sensor referencing enables the transmitter to be accurately matched to a particular sensor.

CURRENT OUTPUT

In normal operation the current output varies between 4 and 20mA. If the input sensor develops a fault, or the software in either of the two microprocessors detects an error, then the current output is driven either upscale (greater than 20mA) or downscale (less than 4mA) depending upon the sense of the burnout parameter selected.

COMMS OPERATION

The transmitter is accessed via the comms interface adapter for reprogramming or examination of the process variable and status information. The interface adapter converts the special communications signals on the transmitter power connection cables to the standard RS232 in order to connect directly to a PC serial port. There are two methods of connecting the interface adapter to the transmitter i.e. using the adapter's own power supply or using the power from an existing loop.

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SPECIFICATION @ 20°C INPUT SENSORS AND RANGES

RTD (Pt100)

Sensor Range		-200 to +850°C [18-390ohm]
Minimum Span[1]		25ºC
Linearisation		BS-EN60751 / BS1904 / DIN43760 / JISC 1604 / CUSTOM [X]³
Basic measurement accuracy		±0.01%FRI ±0.05% Rdg FRI = Full Range Input
Thermal Drift	**Zero**	0.008°C/°C
	Span	100 ppm/°C
Excitation current		300µA to 550µA
Maximum lead resistance		50 Ohms/leg
Lead Resistance effect		0.002°C/Ohm

THERMOCOUPLE

THERMOCOUPLE TYPE	MEASURING RANGE*4 ºC	MINIMUM SPAN[1] ºC
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 **F (L)**	-100 to 600	25
TC Type **N**	-180 to 1300	50
TC Type [**X**]³	±9999	Custom

Basic Measurement Accuracy[2]		±0.04% FRI ±0.04% Rdg or 0.5ºC (whichever is greater)
Linearisation		BS 4937 / IEC 584-3
Cold Junction Error		±0.5°C
Cold Junction Tracking		0.05°C/°C
Cold Junction Range		-40 to +85ºC
Thermal drift	**Zero**	0.1µV/°C
	Span	100 ppm/°C

MILLIVOLTS

Input		Voltage Source
Range		-10 to +75mV
Characterisation		Linear Custom [X]³ (5th Order Polynomial)
Minimum Span[1]		5 mV
Basic Measurement Accuracy[2]		±10µV ±0.07% rdg
Input Impedance		10 M Ohm
Thermal Drift	**Zero**	0.1µV/°C
	Span	100 ppm/°C

SLIDEWIRE

Input	3 wire potentiometer
Resistance range	10 Ohm to 390 Ohm [End to End] (Larger values can be accommodated by fitting an external resistor)
Characterisation	Linear Custom [X]³ (5th Order Polynomial)
Minimum Span[1]	5%
Basic Measurement Accuracy[2]	0.1%
Temperature Drift	100 ppm/ºC

OUTPUT

Output Range	<3.8 to >20.2 mA
Max Output	23mA
Accuracy	±5µA
Voltage effect	0.2µA/V
Thermal drift	1µA/°C
Supply voltage	10 to 35V
Max. output load	[(V supply -10)/20] Kohms (700 ohms @ 24V)

GENERAL SPECIFICATION

Input/Output Isolation	500 V AC rms
Update time	250 mS Maximum
Response time (Filter OFF)	< 1 second
Filter Factor Programmable:	Off, 2 seconds, 10 seconds or Adaptive
Warm up	2 minutes to full accuracy
Stability	0.1% FRI or 0.1°C / year

APPROVALS

EMC	**Emissions**	BS EN50081
	Immunity	BS EN50082
	Hazardous Area	Approvals pending

ENVIRONMENTAL

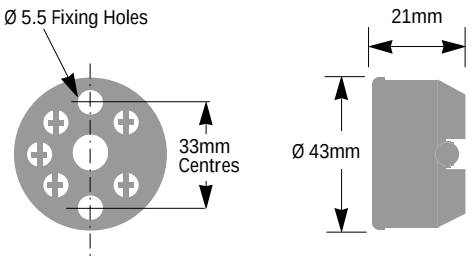
Ambient operating range	-40 to 85ºC
Ambient storage temperature	-50 to 100ºC
Ambient humidity range	10 to 90% RH non-condensing

ENCLOSURE

Material	NORYL™
Flammability	SEI UL94-V1

Mechanical Details

Weight 25g Standard version
40g I.S version



Notes

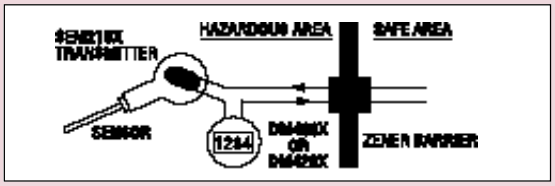
1. Any span may be selected but full accuracy is only guaranteed for spans greater than the minimum recommended.
2. Basic Measurement Accuracy includes the effects of calibration, linearisation and repeatability.
3. Customer linearisation is available pre-programmed at the factory, contact sales office for details.
4. Consult Thermocouple reference standards for practical temperature spans.

COMMUNICATIONS

PC Interface	RS 232 via interface adapter
Comms protocol	ANSI X3.28 1976
Data Rate	1200 baud
Minimum output load	100 ohms for 'In loop' programming
Maximum cable length	1000m
Configurable Parameters	Sensor type: Burnout: °C /°F Output Hi/Lo: Filter: Tag: User offset

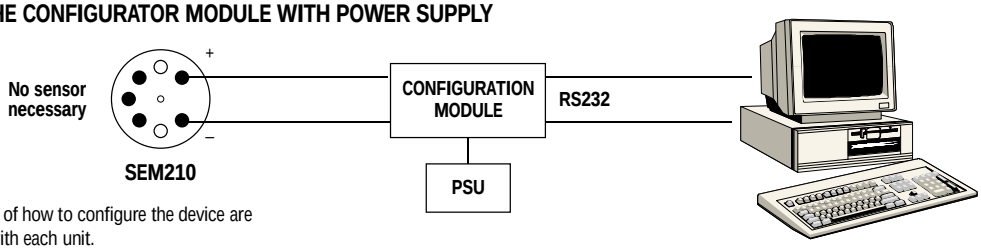
HAZARDOUS AREA

Available for mounting in flammable atmospheres approved to EEx ia IIc T5, FM3610 or Ex NII.



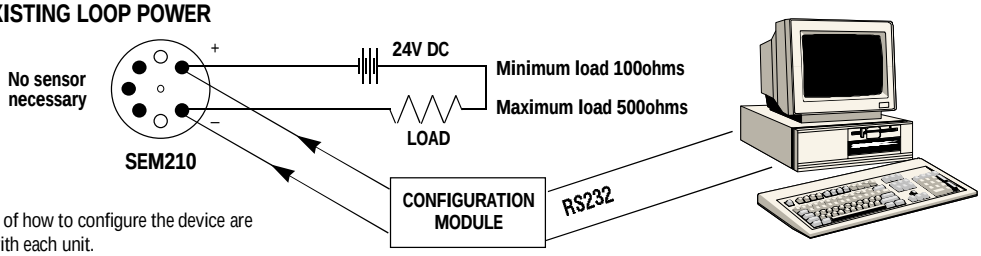
CONFIGURATION DIAGRAM

USING THE CONFIGURATOR MODULE WITH POWER SUPPLY



Full details of how to configure the device are supplied with each unit.

USING EXISTING LOOP POWER

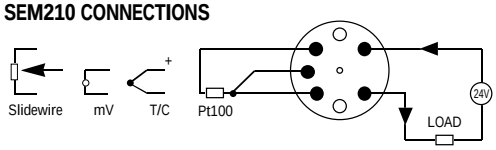


Full details of how to configure the device are supplied with each unit.

ELECTRICAL CONNECTIONS

Connections to the transmitter are made via the screw terminals provided on the top face. The transmitter is protected against reverse connection so that incorrect connection of the output wires results in near zero current flow in the loop.

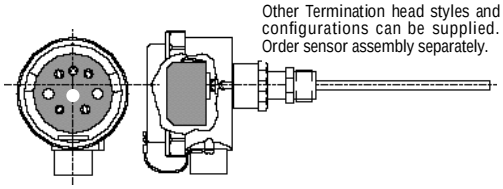
SEM210 CONNECTIONS



SEM210 Showing the RCPW-210 configuration kit and computer

TYPICAL SENSOR ASSEMBLY

Other Termination head styles and configurations can be supplied. Order sensor assembly separately.



TYPICAL SENSOR
A typical assembly of a Sensor fitted with an SCH4 Connecting Head and containing an SEM210 Series Transmitter.

ORDER CODE

SEM210	Standard Unit
SEM210X	Approved for Hazardous Area Use to EEx ia IIC T5
SEM210XM	Approved for Hazardous Area Use to FM3610
SEM210N	Approved to ExN II
CONFIG 210	Pre Configured to Specified Range (State Range)
RCPW-210-UK	Programming kit for SEM210. UK use comprising I/F adapter box, RCPW* software, PSU and carry case. *Free updates from website
RCPW-210-EUR	Kit for European use
RCPW-210-USA	Kit for use in USA/Canada
RCPW-210-AUS	Kit for use in Australia