### SEM210 SERIES

>	UNIVERSAL INPUT
>	GALVANICALLY ISOLATED
>	10 YEAR WARRANTY
>	ATEX APPROVED
>	EASILY RE-PROGRAMMED
>	IN LOOP INTERROGATION
>	HIGH ACCURACY AND STABILITY



## INTRODUCTION

The SEM210 is a second generation 'Smart' Universal input 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 to 20) mA transmission signal. The sensor type and range are easily programmed using a PC and a simple Windows based software program. Connection from the PC serial port is made using the same wires that carry the (4 to 20) mA output signal. This simplifies connection and allows for re-programming or interrogation of the SEM210 while it is installed in the loop. Sensors can be changed 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 inventory, greater operational flexibility and, in common with our other products, a low cost of ownership. SEM210X also offers ATEX approved option.

### INTRODUCTION

#### INPUTS

Pt100 Platinum resistance sensors, Thermocouples, millivolts or Slidewire sensors may be connected to the unit. The Type "X" option allows for custom sensor characterisation. This option is factory pre-configured to customers specification.

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.

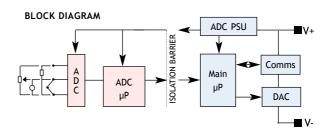
A user programmable offset is available to remove any system errors that may be present and sensor referencing enables the transmitter to be accurately matched to a particular sensor

#### CURRENT OUTPUT

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

#### COMMS OPERATION

The transmitter is accessed via the comms interface adaptor for re-programming or examination of the process variable and status information. The interface adaptor 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 adaptor to the transmitter i.e. using the adaptor's own power supply or using the power from an existing loop.





### SPECIFICATIONS @ 20 °C

7ero

Span

#### INPUT SENSORS AND RANGES

RTD (Pt100) Sensor Range Minimum Span\*1 Linearisation

Basic Measurement Accuracy

Thermal Drift

**Excitation Current** Maximum Lead Resistance Lead Resistance Effect

Basic Measurement Accuracy\*2

Linearisation Cold Junction Error Cold Junction Tracking Cold Junction Range Thermal Drift Zero Span

MILLIVOLTS Input Range Characterisation

Minimum Span\*1 Basic Measurement Accuracy\*2 Input Impedance Thermal Drift Zero Span

#### SLIDEWIRE Input Resistance Range

Characterisation

Minimum Span\*1 Basic Measurement Accuracy\*2 Temperature Drift

#### OUTPUT

**Output Range** Max Output Accuracy Voltage Effect Thermal Drift Supply Voltage Max. Output Load (-200 to 850) °F, (18 to 390 Ω) 25 °C BS-EN60751 BS1904 DIN43760 JISC 1604 CUSTOM [X]\*3 ± 0.01 % FRI ± 0.05 % rdg FRI = Full Range Input 0.008 °C/°C 0.01 %/°C (300 to 550) µA 50  $\Omega/\log$ 0.002 °C/Ω

 $\pm$  0.04 % FRI  $\pm$  0.04 % rdg or 0.5 °C (whichever is greater) BS 4937/EC 584-3 ± 0.5 °C 0.05 °C/°C (-40 to 85) °C 0.1 µV/°C 0.01<sup>°</sup>/°C

Voltage source (-10 to 75) mV Linear Custom [X]\*3 (5th Order Polynomial) 5 mV ±10µV ±0.07% rdg  $10 \ \text{M}\Omega$ 0.1 µV/°C 0.01 %/°C

3 wire potentiometer (10 to 390)  $\Omega$  [End to End] (Larger values can be accommodated by fitting an external resistor) Linear Custom [X]\*3 (5th Order Polynomial) 5 % 0.1 % 0.01 %/°C

< 3.8 to > 20.2 mA 23 mA ± 5 μA 0.2 µA/V 1 uA/°C (10 to 35) V [(V supply -10)/20] KΩ (700 Ω @ 24 V)

#### GENERAL SPECIFICATION

Input/Output Breakdown Isolation Update Time Response Time (Filter OFF) Filter Factor

Warm up Stability

APPROVALS EMC ATEX

ENVIRONMENTAL Ambient Operating Range

Ambient Storage Temperature Ambient Humidity Range I.S. Version

ENCLOSURE Material Flammability

### COMMUNICATIONS

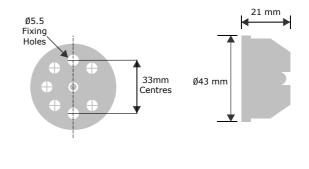
PC Interface Comms Protocol Data Rate Minimum Output load Maximum Cable Length **Configurable Parameters** 

\*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.





Weight

25 g Standard version 40 g I.S. version



500 V AC rms 250 mS maximum < 1 s Programmable: Off, 2 s, 10 s or Adaptive 120 s to full accuracy 0.1 % FRI or 0.1 °C/year

BS EN61326 II 1G EEx ia IIC T4-T6

(-40 to 85) °C (-50 to 100) °C (10 to 90) % RH non-condensing (0 to 100) % RH

NORYLTM SEI UL94-V1

RS 232 via interface adapter 100  $\Omega$  for 'In loop' programming 3280 feet (1000 m) Sensor type: Burnout: °C/°F Output Hi/Lo: Filter: Tag: User offset RCPW/ Windows based PC tool

ANSI X 3.28 1976 1200 baud

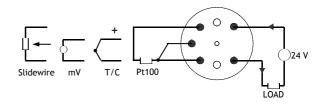
Software



#### 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.

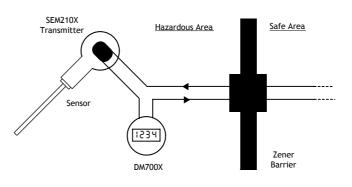




## HAZARDOUS AREA

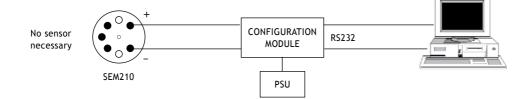
Available for mounting in flammable atmospheres approved to EEx ia IIC T4-T6, FM3610 or Ex NII.

#### SEM210X TRANSMITTER

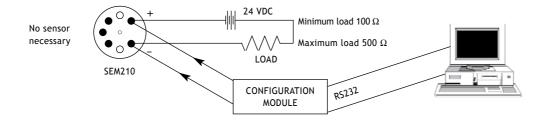


APPLICATIONS

#### USING THE CONFIGURATOR MODULE WITH POWER SUPPLY



USING EXISTING LOOP POWER







SEM210 Showing the RCPW-210 configuration kit and computer

ASSOCIATED TRODUCTS.				
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.			
SEM203	A simple push button operation ranges and calibrates the SEM203 (4 to 20) mA temperature transmitter, eliminating the need for soldering links, potentiometers or PC's.			
SEM1000 SEM1020 SEM1100 SEM1200 SEM1300 SEM1400 SEM1503/1504 SEM1500TC	Analogue signal Isolator Loop Booster Line powered process isolator Signal Splitter Power supply unit Loop powered trip amplifiers Pt100 transmitters Isolating TC transmitter			
DM600	The DM600 series of Battery Powered Field Indicators accept either a RTD sensor or a thermocouple sensor, depending upon the model, and displays the temperature on a 4 digit LCD display.			
DM700	The DM700 series is a 4 Digit LED Loop Powered Field Indicator. It is available with a choice of (4 to 20) mA, RTD or Thermocouple input.			
SENSORS	A complete range of sensors and accessories are available:			
	<ul><li>Platinum resistance temperature detectors</li><li>Thermocouples</li><li>Thermistors</li></ul>			
ACCESSORIES	DIN Rail Mounting kits are available in "Top Hat" and "G" profiles.			

ASSOCIATED PRODUCTS:

ORDER CODE			
SEM210	Standard Unit		
SEM210X	Intrinsically Safe Version ATEX, ExN and FM approved		
SEM210N	Approved to ExN II		
RCPW-210-UK	Programming kit for SEM210 comprising I.F adaptor box, RCPW* software, PSU and carry case. UK use.		
RCPW-210-EUR	For European use		
RCPW-210-USA	For use in USA/Canada		
RCPW-210-AUS	For use in Australia		
*Free updates and demo software available from our website.			

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