SMART UNIVERSAL TEMPERATURE TRANSMITTER

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

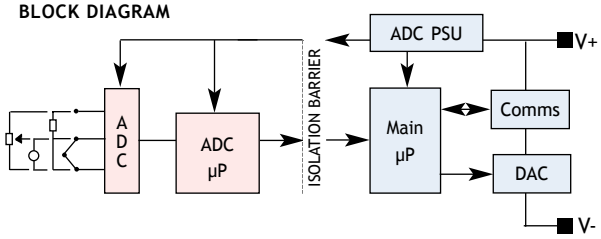
CURRENT OUTPUT

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.

BLOCK DIAGRAM



STATUS INSTRUMENTS

SMART UNIVERSAL TEMPERATURE TRANSMITTER

SPECIFICATIONS @ 20 °C

INPUT SENSORS AND RANGES

RTD (Pt100)

Sensor Range		(-200 to 850) °F, (18 to 390 Ω)
Minimum Span*1		25 °C
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	0.01 %/°C
Excitation Current		(300 to 550) µA
Maximum Lead Resistance		50 Ω/leg
Lead Resistance Effect		0.002 °C/Ω
Basic Measurement Accuracy*2		± 0.04 % FRI ± 0.04 % rdg or 0.5 °C (whichever is greater)
Linearisation		BS 4937/EC 584-3
Cold Junction Error		± 0.5 °C
Cold Junction Tracking		0.05 °C/°C
Cold Junction Range		(-40 to 85) °C
Thermal Drift	Zero	0.1 µV/°C
	Span	0.01 %/°C

MILLIVOLTS

Input		Voltage source
Range		(-10 to 75) mV
Characterisation		Linear Custom [X]*3 (5th Order Polynomial)
Minimum Span*1		5 mV
Basic Measurement Accuracy*2		±10µV ±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 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		0.01 %/°C

OUTPUT

Output Range	< 3.8 to > 20.2 mA
Max Output	23 mA
Accuracy	± 5 µA
Voltage Effect	0.2 µA/V
Thermal Drift	1 µA/°C
Supply Voltage	(10 to 35) V
Max. Output Load	[(V supply -10)/20] KΩ (700 Ω @ 24 V)

GENERAL SPECIFICATION

Input/Output Breakdown Isolation	500 V AC rms
Update Time	250 mS maximum
Response Time (Filter OFF)	< 1 s
Filter Factor	Programmable: Off, 2 s, 10 s or Adaptive
Warm up	120 s to full accuracy
Stability	0.1 % FRI or 0.1 °C/year

APPROVALS

EMC	BS EN61326
ATEX	II 1G EEx ia IIC T4-T6

ENVIRONMENTAL

Ambient Operating Range	(-40 to 85) °C
Ambient Storage Temperature	(-50 to 100) °C
Ambient Humidity Range	(10 to 90) % RH non-condensing
I.S. Version	(0 to 100) % RH

ENCLOSURE

Material	NORYL™
Flammability	SEI UL94-V1

COMMUNICATIONS

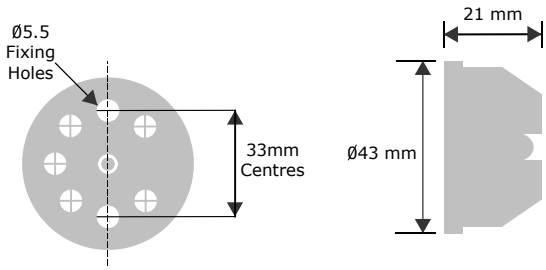
PC Interface	RS 232 via interface adapter
Comms Protocol	ANSI X 3.28 1976
Data Rate	1200 baud
Minimum Output load	100 Ω for 'In loop' programming
Maximum Cable Length	3280 feet (1000 m)
Configurable Parameters	Sensor type: Burnout: °C/°F Output Hi/Lo: Filter: Tag: User offset
Software	RCPW/ Windows based PC tool

*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.

MECHANICAL DETAILS

(All dimensions in mm)



Weight	25 g Standard version 40 g I.S. version

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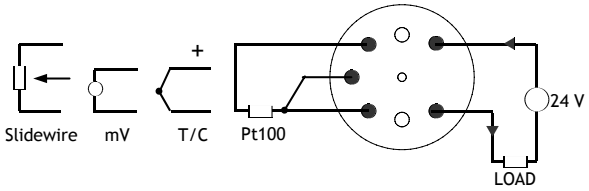
CONNECTIONS

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.

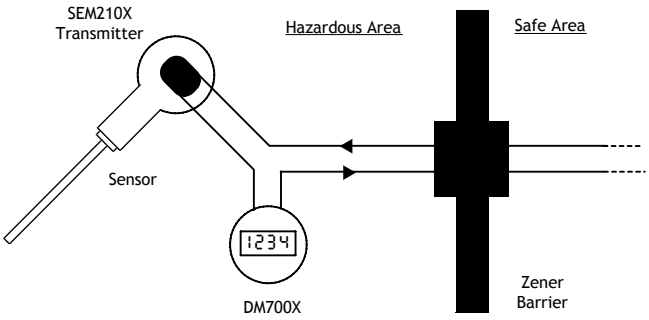
SEM210 CONNECTIONS



HAZARDOUS AREA

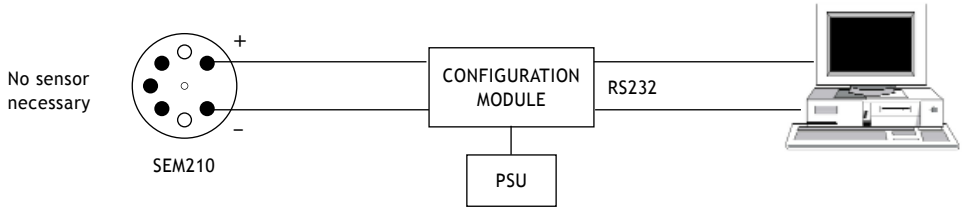
Available for mounting in flammable atmospheres approved to EEx ia IIC T4-T6, FM3610 or Ex NII.

SEM210X TRANSMITTER

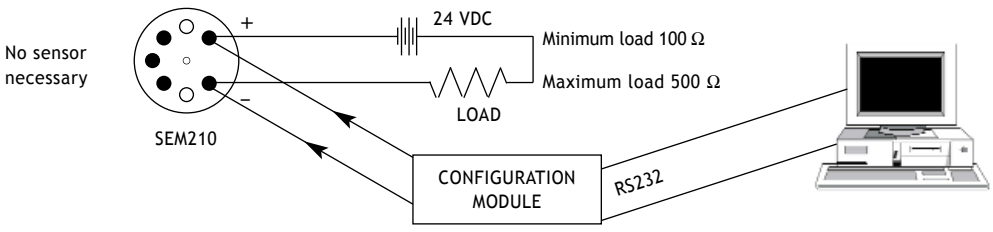


APPLICATIONS

USING THE CONFIGURATOR MODULE WITH POWER SUPPLY



USING EXISTING LOOP POWER



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SEM210 Showing the RCPW-210 configuration kit and computer

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.
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	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
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: • Platinum resistance temperature detectors • Thermocouples • Thermistors
ACCESSORIES	DIN Rail Mounting kits are available in “Top Hat” and “G” profiles.

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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