SEM110

TEMPERATURE TRANSMITTER

Designed, manufactured and supported by:

STATUS INSTRUMENTS

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1.0 GENERAL

The SEM110 series are high performance two wire (4 to 20) mA transmitters designed to accept most standard industrial temperature, thermocouple, slide wire and variable resistance sensors which operate over most common ranges. Automatic thermocouple cold junction compensation is provided on thermocouple versions where the output is directly referenced to the mV input, allowing linearisation to be carried out by the loop monitoring instrumentation, if required. The device is potted inside a plastic enclosure, suitable for head mounting into any DIN style enclosure. Screw terminals are provided for wire connections. Trim potentiometers are provided to allow calibration adjustments.

2.0 SEM110 SPECIFICATION @ 20 ºC

Part Number	**Input Type**
SEM110TC	Isolated (Un-grounded) Thermocouple types K,T,J,R,S,N
SEM110P	PT100, PT10, PT1000
SEM110W	Slide Wire
SEM110Z	Variable resistance
SEM110D	Differential PT100
OUTPUT	(4 to 20) mA two wire (Max 30 mA)
SUPPLY VOLTAGE	(10 to 45) V DC reverse connection protected. 30 VDC Max **I.S. version**
AMBIENT TEMP	(0 to 70) ºC operation (-40 to 100) ºC storage
AMBIENT HUMIDITY	(0 to 95) % (non condensing)
CONNECTION	Screw Terminal Recommended cable size 2.5 mm sq.

ZERO DRIFT	±2 µA/ºC
SPAN DRIFT	±0.01 %/ºC
LOOP RESISTANCE	700 R Max (24 V)
EMC	Conforms to BS EN 61326

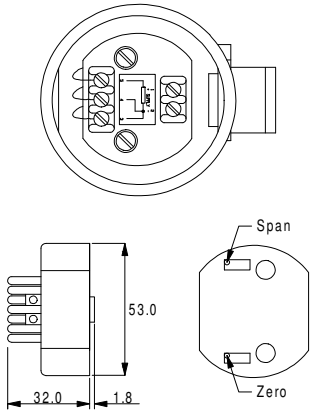
3.0 INSTALLATION

3.1 Mechanical

The transmitter is mounted using two 4.5 mm diameter holes, on standard 33 mm fixing centres. This transmitter has been specifically designed to be mounted inside a DIN standard probe head, which must provide adequate protection to moisture, corrosive atmospheres etc. All cable entries should be sealed using the correct size cable gland.

Care must be taken when locating the transmitter to ensure the ambient temperature remains inside the specified range of (0 to 70) ºC. The diagram shows the mechanical layout with a typical application of the transmitter mounted inside a probe head enclosure.

Mounting Holes: 2 Holes 4.5 mm Diameter, 33 mm Centres



3.2 Electrical

Connections to the transmitter are made to the screw terminals provided on the top face.

The SEM110 conforms to BS EN 61326 and as such, the radiated electromagnetic susceptibility is tested to 3 v/m. It is therefore recommend that during the installation process, the instrument should be mounted away from any high powered radio transmitters and away from any heavy switching gear.

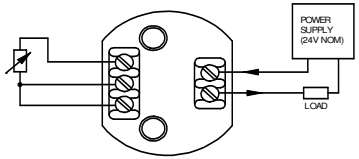
To maintain EMC compliance input/sensor wires must be less than 3 metres long and output wiring must use screened twisted pair cable with the screen earthed at one end only.

All three input wires must have the same core diameter to maintain equal lead resistance in each wire. T/C sensors must be ungrounded.

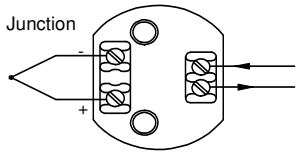
The transmitter is protected against reverse connection by means of a series diode, therefore incorrect connection of the output wires will result in near zero current flow in the loop. Incorrect connection or failure of the sensor wires will result in the transmitter saturating, T/C versions go upscale, whilst resistance sensor inputs go either upscale or downscale dependant upon which wire breaks. The most common failure would be a total sensor burnout, in which case the transmitter will go upscale.

3.3 connections

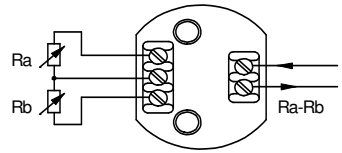
Pt 100, 3 Wire



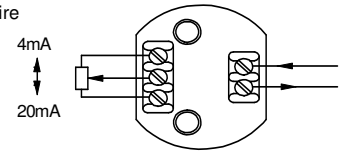
Only TC with Isolated Junction



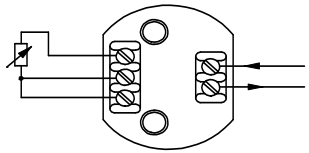
Type D, Differential Temperature



Type W, Slide wire



Type Z, Variable Resistor



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

The Pt100 sensor shown as an example would normally take the form of a probe assembly with a three wire output. Refer to connection drawing for other connection types. The output loop shows a 24 V DC power supply used to provide loop excitation, the transmitter and a load all connected in series. The load symbol represents other equipment in the loop e.g. indicators, controllers, loggers etc. Sometimes these instruments come with the 24 V supply built in as standard, this simplifies wiring and reduces cost. Care must be taken when designing the (4 to 20) mA circuit to ensure that the total burden of the loop, that is 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 result in shorting out part of the loop and therefore any instruments in that part of the loop will not operate.

4.0 Calibration

Calibration is only recommended when the user has access to suitable equipment, together with a reasonable knowledge of instrumentation calibration techniques. The following instructions act as a guideline to calibration.

4.1 A precision calibrator will be required, to simulate the type of sensor the transmitter is designed for, together with a set of tables giving the sensor output against process variable, (e.g. resistance against temperature for a PT100 sensor). A precision digital current meter together with a 24 V DC supply will also be needed. Read the SEM110 label to establish the transmitter range i.e. the process variable input for 4 mA and 20 mA. The side label also indicates the location of the span and zero pots.

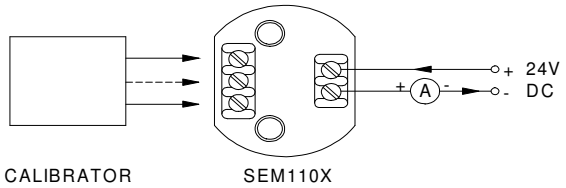
4.2 Connect calibrator to input terminals, using the correct compensation wire for thermocouples inputs and three wire connection for RTD inputs. Connect the output positive to +24 V, negative to 0 V via current meter. Turn power on.

4.3 Set simulator to 4 mA process variable and adjust ZERO trimmer for 4.000 mA output. ±0.002mA

4.4 Set simulator to 20 mA process variable and adjust SPAN trimmer for 20.000 mA output ±0.002 mA.

4.5 Repeat steps 4.3 and 4.4 until both points are in calibration.

4.6 Turn power off and remove calibration equipment.



5.0 SEM110X* VERSIONS - FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES

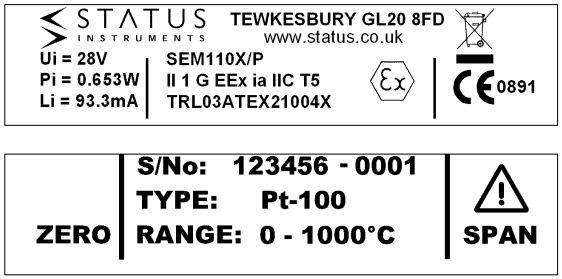
5.1 ATEX Certificate

The SEM110X/* models has been issued with a EC-type examination certificate, confirming compliance with the European ATEX directive 94/9/EC for :-

Intrinsic safety II 1 G EEx ia IIC T5.

The equipment bears the Community Mark and subject to local codes of practice, may be installed in any of the European Economic Area (EEA) member countries. The SEM110X housing is coloured light blue to identify the equipment as suitable for Hazardous area use. The equipment must be installed and maintained in accordance with local requirements for electrical equipment for use in potentially explosive atmospheres, eg EN60079-14 & EN60079-17. This instruction sheet describes installation which conforms with BS EN60079-14 & BS EN60079-17 Electrical Installation in Hazardous Areas. When designing systems outside the UK, the local Code of Practice should be consulted.

5.2 Atex marking



Common Information

Manufacturer	Status Instruments Ltd
Type Number	SEM110X/P SEM110X/TC SEM110X/W
CE Marking	CE 0891
Explosive Protection Marking	Ex

(Type ia) Intrinsic Safety

II 1	Equipment Group and category
G	Type of explosive atmosphere (Gas)
EEx ia IIC T5	Intrinsic safety information
TRL03ATEX21004X	Certificate reference

5.3 Special Conditions for Safe Use

As indicated by the Certificate Reference "X" suffix, special conditions apply for safe use for both intrinsic safety and energy limitation applications. They are as follows:-

5.4 Zones, Gas Groups, and T rating.

When connected to a approved system the SEM110X/* may be installed in:-

Zone 0	explosive gas air mixture continuously present
Zone 1	explosive gas air mixture likely to occur in normal use
Zone 2	explosive gas air mixture not likely to occur and if it does, it will only occur for a short time.

Be used in gas groups;-

Group A	propane
Group B	ethylene
Group C	hydrogen

Allowable Temperature classification / ambient temperature:-

Intrinsic safety (Type ia)

Class

T5 100°C : Ta = -20°C to +40°C
T4 135°C : Ta = -25°C to +55°C
T3 200°C : Ta = -25°C to +55°C
T2 300°C : Ta = -25°C to +55°C
T1 450°C : Ta = -25°C to +55°C

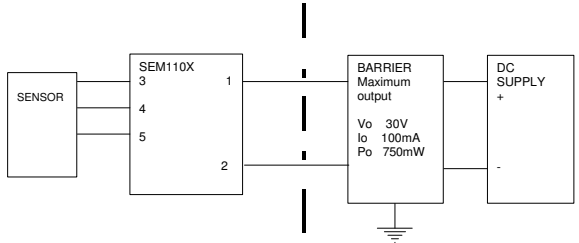
5.5 Environmental Protection

This equipment must be housed in an enclosure which provides a degree of protection of at least IP54. The enclosure must be suitable for the atmosphere and environment in which it is installed (eg If of plastic material, must be resistant to chemical corrosion, UV light, temperature, humidity etc.)

5.6 Maintenance

This intrinsically safe equipment contains no user serviceable, adjustable or replaceable parts. No attempt should be made to repair a faulty SEM110X/* transmitter, all units must be returned to the manufacture for repair or replacement. Attempt service or replacement of parts may invalidate the explosive protection features of the equipment.

5.7 Connection Diagram



They equipment must be electrically connected as shown below:-

SEM110X* Working Parameters

Ui	28 V
I i	93.3 mA
Pi	0.653 W
Ci	0 nF
Li	0 uH