

# TEMPERATURE TRANSMITTERS

## SEM203 SERIES

- UNIQUE PUSH BUTTON CALIBRATION
- RE-RANGEABLE WITHOUT A PC
- 10 YEAR WARRANTY
- RTD, TC, SLIDEWIRE OR THERMISTOR INPUT
- LED OVER-RANGE INDICATION
- GALVANIC ISOLATION ON TC TYPES
- DRIFT FREE LINEARISATION



### INTRODUCTION

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.

The SEM203 in-head transmitter incorporates the latest digital technology to ensure accurate drift free linearisation. It connects to an appropriate sensor and converts the output to a linear (4 to 20) mA output signal, providing a level of performance at a cost that was not possible with earlier analogue types.

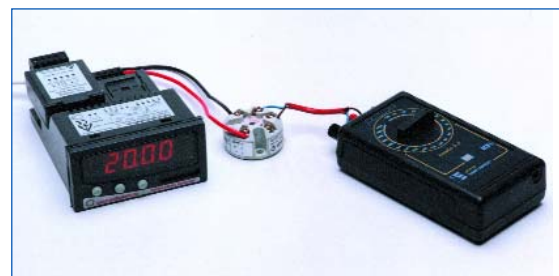
High accuracy and stability coupled with the flexibility of reduced stock holding and the quick and easy way of bench re-ranging makes the SEM203 the ideal choice for the majority of temperature sensing requirements.

The SEM203 is linearised to comply with all common RTD sensor standards i.e. 0.00385, 0.003916 etc. all common thermocouple types and 2252  $\Omega$  and 10 k $\Omega$  YSI Thermistors, and up to 10 k $\Omega$  potentiometers.

An on board LED indicates the successful completion of the range programming and also provides an instant indication of sensor health.

### CALIBRATION PROCEDURE

1. Connect a simulator/calibrator to the input and between 8 & 30 VDC to the output of the SEM203.
2. Set the simulator to the desired temperature at 4 mA. Press and HOLD the calibration button until the LED starts to blink.
3. Set the simulator to the desired temperature at 20 mA. Press the calibration button and release. The LED continues blinking and then shuts off confirming that the unit is calibrated.



#### TYPICAL SET-UP

The above picture shows SEM203TC, DM3420 Indicator, and Thermocouple simulator.

# TEMPERATURE TRANSMITTERS

## SPECIFICATIONS @ 20 °C

### GENERAL

|                    |  |
|--------------------|--|
| Sample Rate        | 500 ms per sample  |
| Sensor Lead Length | Maximum length 3 m to maintain CE compliance                                 |
| Terminals          | Screw terminals  |
| Warm-up Time       | 120 s to full accuracy   |
| Display            | Slow flash indicates programming mode. Full on indicates out of range sensor |
| Switch             | Momentary push button  |
| Calibration Period | 12 months to maintain published specification.                               |
| Warranty           | 5 years to twice specification<br>10 years                                   |

### APPROVALS

|     |             |
|-----|-------------|
| EMC | BS EN 61326 |
|-----|-------------|

### ENVIRONMENTAL

|                       |                            |
|-----------------------|----------------------------|
| Operating Temp. Range | (-20 to 80) °C             |
| Ambient Humidity      | (0 to 95) % non condensing |
| Ambient Storage Temp. | (-40 to 90) °C             |

### ENCLOSURE

|              |   |
|--------------|---|
| Material     | ABS Case<br>(Polyurethane Encapsulated) |
| Flammability | UL 94 HB                                |

### INPUT

|                     |   |
|---------------------|---|
| Sensor & Ranges     | <b>SEM203P</b><br>3 wire Pt100<br>(Pt500 or Pt1000 to order)                              |
| Default Range       | (0 to 100) °C   |
| Accuracy            | ± 0.1 °C ± 0.1 % rdg<br>(-100°C to 500) °C<br>± 0.2 °C ± 0.2 % rdg<br>(-200 °C to 850) °C |
| Linearisation       | BS EN 60751, BS 1904 (DIN 43760)<br>JISC 1604 (0.003916)                                  |
| Input/Out Isolation | N/A   |
| Excitation Current  | 1 mA maximum  |
| Lead Resistance     | 10 Ω per leg  |
| (Max. Effect)       | 0.02 % Full Range output/Ω<br>(plus lead resistance mismatch)                             |
| Thermal Drift       | Zero<br>Span ± 0.01 °C/°C   |
| Minimum Span        | 0.05 %/°C<br>5 °C   |

### INPUT

|                  |   |
|------------------|---|
| Sensors & Ranges | <b>SEM203TC</b>   |
| SEM203-1/TC      | K (-200 to 1370) °C<br>J (-200 to 1200) °C<br>T (-200 to 400) °C  |
| SEM203- 2/TC     | R (0 to 1760) °C<br>S (0 to 1760) °C<br>B (0 to 1820) °C          |
| SEM203- 3/TC     | J (-200 to 1200) °C<br>L (-200 to 1200) °C<br>E (-200 to 1000) °C |
| SEM203- 4/TC     | K (-200 to 1370) °C<br>N (0 to 1300) °C<br>R (0 to 1760) °C       |

Other combinations available to special order

|               |   |                |
|---------------|---|----------------|
| Default Range |   |                |
| SEM203-1      | K | (0 to 1000) °C |
| SEM203-2      | R | (0 to 1600) °C |
| SEM203-3      | J | (0 to 1000) °C |
| SEM203-4      | K | (0 to 1000) °C |

|                        |  |                                |
|------------------------|--|--------------------------------|
| Accuracy               | ± 0.04 % FS ± 0.04 % rdg or<br>0.5 °C (whichever is greater) |                                |
| Linearisation          | BS4937/IEC 584-1   |                                |
| Input/ Out Isolation   | 50 VDC (tested to 200 V)                                     |                                |
| Cold Junction Error    | ± 0.2 °C   |                                |
| Cold Junction Tracking | 0.05 °C/°C   |                                |
| Cold Junction Range    | (-20 to 80) °C   |                                |
| Thermal Drift          | Zero<br>Span   | ± 4 mV/°C Typical<br>0.01 %/°C |
| Minimum Span           | 10 °C  |                                |

### INPUT

#### SEM203TH

|                  |            |        |
|------------------|------------|--------|
| Sensors & Ranges |            |        |
| SEM203 -1/TH     | YSI 2252 Ω | Type B |
| SEM203 -2/TH     | YSI 10 kΩ  | Type B |

|                     |  |                         |
|---------------------|--|-------------------------|
| Default Range       | (-25 to 125) °C  |                         |
| Accuracy            | ± 0.15 °C rng (0 to 100) °C<br>± 0.20 °C rng (-25 to 125) °C |                         |
| Input/Out Isolation | N/A  |                         |
| Excitation Current  | 2252 Ω , 240 mA,<br>10 kΩ, 100mA                             |                         |
| Thermal Drift       | Zero<br>Span   | ± 0.0 °C/°C<br>0.05%/°C |
| Minimum Span        | 5 °C   |                         |

### INPUT

#### SEM203W

|                         |                                |
|-------------------------|--------------------------------|
| Sensors & Ranges        |                                |
| Slidewire Potentiometer | 5 kΩ, 10 kΩ                    |
| Span                    | (10 to 100) % Travel           |
| Offset (4 mA o/p)       | (0 to 100) % Travel            |
| Accuracy                | 0.05 % Typical                 |
| Default Range           | (0 to 100) % Offset (4 mA o/p) |

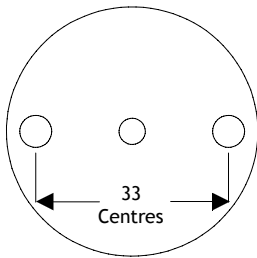
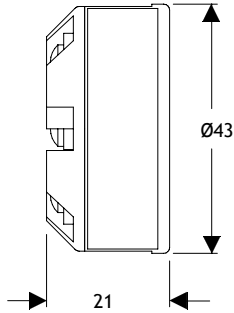
### OUTPUTS

|                   |  |
|-------------------|--|
| Max. Output Range | (4 to 20) mA, 2 wire loop powered<br>(3.8 to 22) mA  |
| Operating Voltage | (8 to 30) DC   |
| Accuracy          | ± 5 mA   |
| Burnout           | Upscale 22 mA (downscale to order) Red programming LED comes on when temperature is outside operating range. |
| Thermal Drift     | 0.3 mA/°C  |
| Response Time     | 500 ms to reach 70 % of final value  |
| Loop Resistance   | Maximum 800 R at 24 VDC  |
| Loop Sensitivity  | 0.4 mA/V   |
| Protection        | Reverse connection protected   |

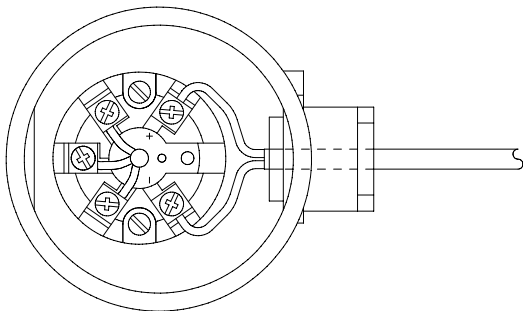
# TEMPERATURE TRANSMITTERS

## MECHANICAL DETAILS

(All dimensions in mm)

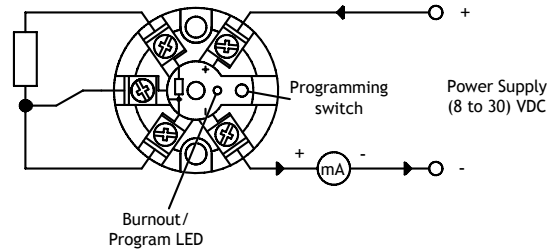


Fixing holes 2 x  $\text{Ø}5.5$   
Centre hole  $\text{Ø}4.0$

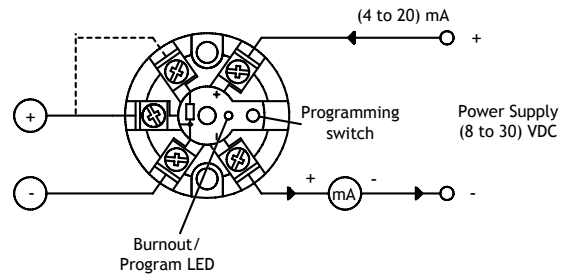


## WIRING CONNECTIONS

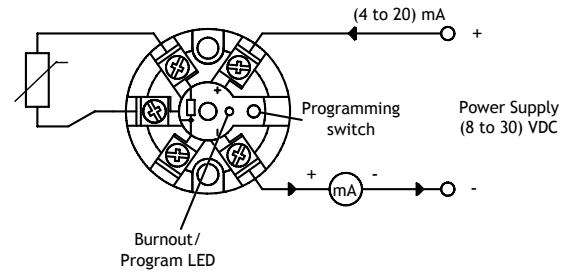
SEM203P



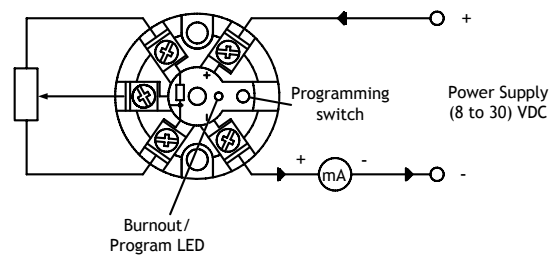
SEM203TC



SEM203TH



SEM203W



# TEMPERATURE TRANSMITTERS

## 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  |
| 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 style="list-style-type: none"><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.   |

## ORDER CODE

|                             |         |  |
|-----------------------------|---------|--|
| SERIES                      | SEM203  |  |
| Pt100                       | P       |  |
| Pt500                       | P-500   |  |
| Pt1000                      | P-1000  |  |
| Thermocouple K, J & T       | -1/TC*1 |  |
| Thermocouple R, S & B       | -2/TC*1 |  |
| Thermocouple J, F & E       | -3/TC*1 |  |
| Thermocouple K, N & R       | -4/TC*1 |  |
| YSI 2252 $\Omega$ Type B    | -1/TH   |  |
| YSI 10 K $\Omega$ Type B    | -2/TC   |  |
| Slidewire 5 $\Omega$ NOM    | -1/W    |  |
| Slidewire 10 K $\Omega$ NOM | -2/W    |  |
| CONFIG203*2                 |         |  |

### \*NOTES:

1. T/C Type selectable between three options by push buttons.
2. For special configuration, please contact the sales office.

Upscale burnout is standard, for downscale please contact the sales office