

Working Standard Secondary Reference

216x and 218x Series



MULTIFUNCTION CALIBRATORS

- ▶ Thermocouple Type S, and K.
- ▶ Resistance Thermometer Pt100
- ▶ Rugged, Accurate and Reliable Working Standard
- ▶ Excellent Stability and Repeatability
- ▶ High Purity Homogenous Wires and Insulating Material
- ▶ Tc Temperature Range up to 1400°C
- ▶ Metal Base Thermocouples Available on Request
- ▶ Strain-free Reference Grade Platinum Element
- ▶ RTD Temperature Range up to 600°C
- ▶ 3 or 4-wires Construction



General

Resistance Thermometers

Resistance element

The resistance element is of pure platinum, coiled and mounted in a strain-free construction. The former is of pure alumina material to avoid wire contamination. All joints are welded to minimize resistance changes.

The leads are brought to a handle assembly where they are connected to a low loss 2 meters cable.

Sensor annealing

Before final inspection and certification the sensor is pre-aged through temperature cycles to remove mechanical stress and therefore to improve long term stability.

Construction

Two models are available using respectively Inconel 600 (model 2180) and high purity alumina Ker710 (model 2182). The model 2182 uses platinum internal connection wires instead of silver alloy that, in combination with the high purity alumina external protective tube (Ker710), avoid sensor contamination and therefore improve the long term stability of the sensor.

Thermocouples

Construction

The thermocouple is made of two homogenous wires, in type S thermocouple are one in Platinum and the other one in Platinum 10% Rhodium alloy. Both are of the highest purity presently available.

The measuring junction is soldered with a clean oxygen-hydrogen torch and the wire is carefully annealed through a direct electrical heating process.

These wires are placed in a twin bore insulator and in an external protecting tube both of high purity alumina (99.9%). The two wires are insulated from the head with glass braid sleeving.

Base metal Tc

Base metal thermocouples can be supplied, on request, to be used in applications requiring a lower accuracy and where a direct comparison with a sensor of the same composition of the actually used. The recommended temperature range relevant to each specific thermocouple is indicated.

Specifications

218x Series

Resistance element: Platinum 100 ±0.05°C at 0°C

Temperature coefficient: $\alpha = 0,003850$

Temperature range:

Model 2180: -80°C to +450°C

Model 2182: -80°C to +600°C

Nominal length: 500 mm

Insulation resistance: >1000 M 100 Vdc at 25°C

Self heating coefficient: in air in motion at V = 1 m/s 0.03°C/m

Time constant:

in air in motion at V = 1 m/s

t50 = 30 s t90 = 95 s

in water in motion at V=0,4 m/s

t50 = 3 s t90 = 8 s

Stability: Drift less than ±0.05% of its initial Ro value after ten temperature cycles from 0°C to maximum temperature and from -80° to 0°C

Length of sensor winding: 25 mm

External protecting tube: 6 mm external diameter Inconel 600 for model 2180. High purity alumina Ker 710 for model 2182

Connecting cable: 2 meter Teflon cable with additional shield

Immersion length: recommended 120 mm at uniform temperature

Wire insulation: MgO

Handle: Aluminium with serial number indication

216x Series

Sensor element:

Tc type S: Pt-Pt 10% Rhodium

Tc type K: NiCr - NiAl

Wire diameter: 0.5 mm (Tc type S)

Temperature range:

Tc type S: from 0°C to +1400°C

Tc type K: from 0°C to +1100°C

Nominal length: 500 mm

Outside diameter:

Type S: 7 mm

Type K: 6 mm

Standard extension wires:

Type S: 1 meter length

Type K: 2 meters length

Annealing: wires electrically annealed

Insulations: extension wire insulated with teflon and glass braid sleeves.

Tc wire insulation: MgO

External tube material:

Tc S: High purity alumina Ker 710

Tc K: Inconel 600

Immersion length: recommended 125 mm at uniform temperature

Ordering Codes

| Code | Model | | | | | | | | | | |
|---------|---|---------|-------------------|---|---------------------------------|---|--|---|--------------------------|---|---|
| 218 | Working Reference Secondary Standard | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Table A</th> <th>Temperature Range</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Pt100 Inconel 600: -80 to 450°C</td> </tr> <tr> <td>2</td> <td>Pt100 Ker710: -80 to 600°C</td> </tr> </tbody> </table> | Table A | Temperature Range | 0 | Pt100 Inconel 600: -80 to 450°C | 2 | Pt100 Ker710: -80 to 600°C | | | | |
| Table A | Temperature Range | | | | | | | | | | |
| 0 | Pt100 Inconel 600: -80 to 450°C | | | | | | | | | | |
| 2 | Pt100 Ker710: -80 to 600°C | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Table B</th> <th>Model</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>3 wires connection cable</td> </tr> <tr> <td>4</td> <td>4 wires connection cable</td> </tr> </tbody> </table> | Table B | Model | 3 | 3 wires connection cable | 4 | 4 wires connection cable | | | | |
| Table B | Model | | | | | | | | | | |
| 3 | 3 wires connection cable | | | | | | | | | | |
| 4 | 4 wires connection cable | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Table C</th> <th>Options</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>None</td> </tr> <tr> <td>1</td> <td>SIT report on 5 points (from 0°C to 450/600°C)</td> </tr> <tr> <td>2</td> <td>SIT Tabulation each 1°C.</td> </tr> <tr> <td>3</td> <td>EE880001 Wooden protecting case (see note below)</td> </tr> </tbody> </table> | Table C | Options | 0 | None | 1 | SIT report on 5 points (from 0°C to 450/600°C) | 2 | SIT Tabulation each 1°C. | 3 | EE880001 Wooden protecting case (see note below) |
| Table C | Options | | | | | | | | | | |
| 0 | None | | | | | | | | | | |
| 1 | SIT report on 5 points (from 0°C to 450/600°C) | | | | | | | | | | |
| 2 | SIT Tabulation each 1°C. | | | | | | | | | | |
| 3 | EE880001 Wooden protecting case (see note below) | | | | | | | | | | |
| 218 | 2 - 3 - 1 Typical ordering code | | | | | | | | | | |

Note: The wooden protecting case is strongly recommended for a suitable protection during transport and storage. It is mandatory for cat. 2182.

| Code | Model | | | | | | | | | | |
|---------|--|---------|---------|---|-------------------------|---|---------------------------------------|---|--------------------------|---|---|
| 216 | Working Reference Secondary Standard | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Table A</th> <th>Model</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Tc S from 0 to +1400 °C</td> </tr> <tr> <td>3</td> <td>Tc K from 0 to +1100°C</td> </tr> </tbody> </table> | Table A | Model | 0 | Tc S from 0 to +1400 °C | 3 | Tc K from 0 to +1100°C | | | | |
| Table A | Model | | | | | | | | | | |
| 0 | Tc S from 0 to +1400 °C | | | | | | | | | | |
| 3 | Tc K from 0 to +1100°C | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Table B</th> <th>Options</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>None</td> </tr> <tr> <td>1</td> <td>SIT report on 6 points (up to 1100°C)</td> </tr> <tr> <td>2</td> <td>SIT Tabulation each 1°C.</td> </tr> <tr> <td>3</td> <td>EE880001 Wooden protecting case (see note below)</td> </tr> </tbody> </table> | Table B | Options | 0 | None | 1 | SIT report on 6 points (up to 1100°C) | 2 | SIT Tabulation each 1°C. | 3 | EE880001 Wooden protecting case (see note below) |
| Table B | Options | | | | | | | | | | |
| 0 | None | | | | | | | | | | |
| 1 | SIT report on 6 points (up to 1100°C) | | | | | | | | | | |
| 2 | SIT Tabulation each 1°C. | | | | | | | | | | |
| 3 | EE880001 Wooden protecting case (see note below) | | | | | | | | | | |
| 216 | 0 - 1 Typical ordering code | | | | | | | | | | |

Note: The wooden protecting case is strongly recommended for a suitable protection during transport and storage. It is mandatory for cat. 2160.