**Product Technical Information**
DS_EIR-10_2109_EN

# Series EItemp, Model EIR 10

Mineral insulated RTD insert
Single or double sensor configurations. Customized versions up to 660ºC

## Application

The RTD insert EItemp EIR 10 is manufactured with Pt100 or Pt1000 sensor, embedded in mineral insulated cable MgO.

The EItemp EIR 10 is spare part for threaded or flanged temperature assemblies PROtemp TRH 1xP or hygienic type HIGItemp TRH 30H.

If requested, can be supplied with temperature transmitter, PC or HART programmable 4...20mA 2 wires technology, according to customer requested range.

Making use of industry standards for instrumentation, it could be used as spare part of other manufacturer's temperature assemblies.

## Your Advantages

| | |
|---|---|
| ✓ | Class A or better |
| ✓ | Manufactured with M.I. cable |
| ✓ | Up to 500ºC, special up to 660ºC |
| ✓ | Standard single or double sensor |
| ✓ | OEM customization |

## Overview

### Informative Signs

| | | |
|---|---|---|
| | Information | This symbol contains device-oriented information which does not result in personal injury. |
| | Checking | This symbol contains procedures and other facts to get the most of the device and which do not result in personal injury. |
| | Caution | This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in damaged device and which do not result in personal injury. |
| | Warning | This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury. |
| | Danger | This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury. |

### Product Overview

The measurement principle of an RTD (Resistance Temperature Detector) consists of the sensor element with an electrical resistance that varies with temperature. In the case of the Pt100 sensor, it has a resistance of 100 Ω at 0ºC, increasing this value with increasing temperature, due to the characteristic of the platinum coefficient used in this type of sensor. Extremely linear, it makes temperature assemblies based on this measurement principle the most used in the industry, by complying with IEC 60751 with a coefficient α = 3.85 * 10-3 ºC-1, calculated between 0 and 100ºC.

The sensor element is available in two versions, Thin-film (TF) or ceramic (Wire Wound), the second with a wider measurement range, greater long-term stability and better accuracy.
If there are vibrations, the Thin-film (TF) sensor can offer advantages, but its behaviour depends on the intensity, direction and frequency of the main harmonic of the vibration. This type of sensor also presents a faster response time when assembled in a similar way to the ceramic sensor.

The most used configurations are for single elements with 2, 3 and 4 wires and with redundancy, double elements with 4 and 6 wires. The 4-wire configuration guarantees the best accuracy, due to impedance full compensation introduced by the signal transmission cables, or even by the connections within an extended length immersion sheath, which in the case of the configuration single to two wires or double to 4 wires adds to the resistive value of the Pt100, contributing to the loss of accuracy. In single 3-wire or double 6-wire configurations, the associated error is practically null.

For the range of -200ºC to 0ºC we have:
$R_t = R_0[1 + At + Bt^2 + C(t - 100°C)\, t^3]$

For the range of 0ºC to 850ºC we have:
$R_t = R_0(1 + At + Bt^2)$

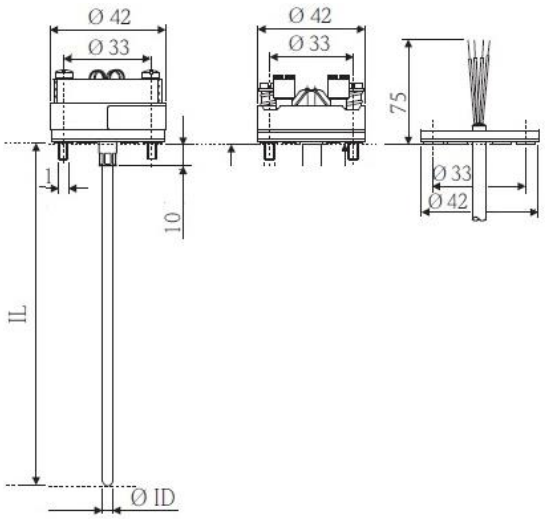
where:
$R_t$ is the resistance to a temperature $t$; $R_0$ is resistance with $t$ = 0ºC

The constants in these equations are:
$A = 3.9083 \cdot 10^{-3}$ ºC$^{-1}$ $B = -5.775 \cdot 10^{-7}$ ºC$^{-2}$ $C = -4.183 \cdot 10^{-12}$ ºC$^{-4}$

| | |
|---|---|
| | This device is intended to be installed inside a RTD assembly and cannot be installed directly in the process. |
| | Please note ambient temperature cannot be greater than measuring insert sealing. |
| | Make sure the measuring insert has the correct immersion length and load springs are compressing the insert against the bottom of the thermowell/protective tube. |

## Mechanical Construction

### Generic Configuration



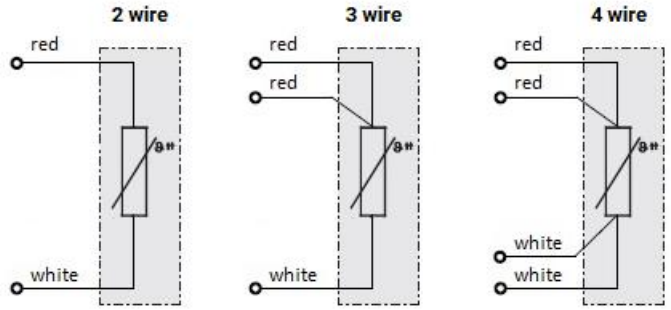

All dimensions in millimetres (mm)

Left: Device with temperature transmitter.
Middle: Device with standard ceramic terminal block
Right: Device with soft free end wires

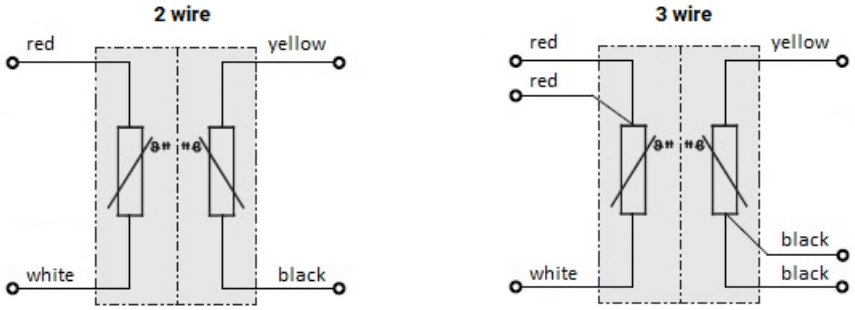
## Wirings

The Eltemp EIR 10 is available with 1 single Pt100/Pt1000 or double Pt100 sensor.

### Single Sensor Pt100/Pt1000-2W




### Double Sensor Pt100




Are available different temperature transmitters, with 4-20mA analogue output or with digital communication. Please refer to specific product datasheet to check wiring configurations.

| | |
|---|---|
| | With temperature transmitter assembled, make sure power supply is switched off during wiring procedures. |
| | With temperature transmitter assembled, make sure power supply is according to specification on device label. |
| | Check if maximum load resistance is according device specifications. |
| | Check if connection cable is according device connector requirements. |
| | The versions with double sensor are only available with insert OD above or equal to 4.5 mm. |

# Technical Data

| Device | | | | |
|---|---|---|---|---|
| | | | | |
| Application | Temperature measurement | | | |
| Principle | Resistance | | | |
| Types | Pt100 thin-film (TF) / wire-wound (WW), Pt1000 thin-film | | | |
| Accuracy | Class A, AA IEC60751 | | | |
| Configuration | Single | | Thin-film (TF) wire-wound (WW) 2, 3 and 4 wires | |
| | Double | | Wire-wound (WW) 2 and 3wires | |
| Operating temperature | Mineral insulated cable | Pt100 | Absolute Min | -196ºC |
| | | | Absolute Max | 660ºC |
| | | Pt1000 | Min | -50ºC |
| | | | Max | 400ºC |

| Electrical Specifications | | | | |
|---|---|---|---|---|
| | | | | |
| Output signal | Resistance | | 20,22…280,90 Ω (x 10) / 332.66 Ω | |
| | 4-20 mA | | Loop power 2 wires | |
| | 4-20mA HART | | Loop power 2 wires | Version 7 |
| | Digital communication | | Profibus PA | Version 3.02 |
| | | | Fieldbus Foundation H1 | Profiles 31PS,32L/113 |
| Temperature Transmitter | Mounting | | Housings with Ø 33mm fixing 2 x M4 threads | |
| | Power supply | | Analogue | 11 to 35 Vdc |
| | | | HART/PA/FF | 9 to 32 Vdc |
| | Input | | Pt100/Pt1000 | Universal |
| | Minimum span | | 25 K | |
| | Load [RL] | | RL ≤ (UB – 8V) / 0.025 A | |
| | Galvanic insulation | | Min 500 VAC | |
| Sensor insulation Resistance | >100 MΩ/250 Vdc @room temp. or according to IEC 60751, whichever is greater | | | |

| Mechanical Characteristics | | | | |
|---|---|---|---|---|
| | | | | |
| Materials | Protective sheath | | Aisi 316 | |
| | Terminal block | | Type B | 45% Al2O3 |
| | | | Type Mignon | Steatite C 220 |
| | | | Type B ATEX (G) Ex e | Steatite C 220 |
| Measuring Insert Dimensions | Length | | 50 to 2000 mm, customized; over 2000 mm on request | |
| | MI cable sheath OD | | 3.0 mm, 4.5 mm, 6.0 mm; 8.0 mm on request | |
| | Sheath wall thickness | | OD 3.0 mm | Min 0.25 mm |
| | | | OD 4.5 mm | Min 0.38 mm |
| | | | OD 6.0 mm | Min 0.51 mm |
| | | | OD 8.0 mm | Min 0.69 mm |
| Terminal Block, Spring Loaded | Mignon, up to 4 poles, non-Ex | | Ceramic, posts nickel plated brass, bush SS 316 | |
| | Type B, up to 6 poles, non-Ex | | Ceramic, posts nickel plated brass, bush SS 316 | |
| | Type B, up to 6 poles, ATEX Ex e | | Ceramic, posts nickel plated brass, bush SS 316, SS bracket | |
| | Type of pole | | Post type, screwed, nickel plated brass | |

| Environmental Conditions | |
|---|---|
| | |
| Storage temperature | -30 to 80ºC |
| Relative humidity | 0 to 95 %RH, non-condensing |
| Calibration units | ºC, ºF, K |
| Weight | Depending on configuration; standard versions from 100 g to 500 g |
| Protection class (complying with EN 60529) | Refer to assembly housing |
| Approvals, Certifications | RoHS 2, CE, ATEX Zone 2 |

## Tolerance Classes

The validity temperature ranges of the tolerance classes are classified in the following table.
These tolerances apply to RTD thermometers, according to IEC60751and for any value of $R_0$.

| Tolerance Class | Validity Temperature Range [°C] | | Tolerance Values 1) [°C] |
|---|---|---|---|
| | Ceramic Sensors WW (Wire Wound) | TF (Thin-Film) | |
| AA | -50 to +250 | 0 to +150 | ±(0.10 + 0.0017 \|t\|) |
| A | -100 to +450 | -30 to +300 | ±(0.15 + 0.0020 \|t\|) |
| B | -196 to +600 | -50 to +500 | ±(0.30 + 0.0050 \|t\|) |
| C | -196 to +600 | -50 to +600 | ±(0.60 + 0.0100 \|t\|) |

1) |t| Temperature modulus in ºC.

## Additional Information

### Maintenance

The RTD inserts of EItemp series do not require a specific maintenance. The only recommendation is to check periodically the sensor integrity and perform an annual recalibration.

### Factory Calibration Protocol

This factory quality protocol is supplied with every unit. This acts as an inspection report that shows compliance with DIN/EN 60751 essential points. One measurement point is issued for the effect.

### Factory Calibration Certificate

The factory calibration certificate must be ordered with the device. The measurement points according to customer specifications and inside device operating temperature range.

### Materials Certificate

A certificate according to EN10204-3.1 is available as option and if necessary, has to be ordered with the device.

### Accessories

As accessories or spare parts, we have available PC programming temperature transmitters and interface kit with software.

### Delivery Time

For small quantities, less than 10 pieces with basic options, the delivery times are likely 4 to 5 working days or express manufacturing (48h) with feasibility according configuration and required quantities.

## How to Order

| Sign | | Instruction |
|---|---|---|
| Tick | ✓ | Single option selection field necessary |
| Double tick | ✓✓ | Multiple option selection field available |
| Added extra | ⊕ | Not mandatory selection field |

| Order Code | | Description |
|---|---|---|
| | | |
| EIR 10- | | Mineral Insulated RTD Insert Series EItemp Model EIR 10 |
| | | |
| 010 | ✓ | Type of RTD Sensor, Class, Wiring |
| A2 | | 1xPt100 single/WW, Cl. A IEC60751, 3 wires |
| A3 | | 1xPt100 single/TF, Cl. A IEC60751, 3 wires |
| AA | | 1xPt100 single/TF, Cl. AA IEC60751, 4 wires |
| B2 | | 1xPt100 single/WW, Cl. A IEC60751, 4 wires |
| B3 | | 1xPt100 single/TF, Cl. A IEC60751, 4 wires |
| C1 | | 1xPt100 double/WW, Cl. A IEC60751, 2x2 wires |
| C2 | | 1xPt100 double/WW, Cl. A IEC60751, 2x3 wires |
| K3 | | 1xPt100 single/TF, Cl. A IEC60751, 2 wires |
| H3 | | 1xPt100 single/WW, Cl. A IEC60751, 3 wires, for high temp. applications |
| L3 | | 1xPt100 single/TF, Cl. A IEC60751, 3 wires, for cryogenic applications |
| L4 | | 1xPt100 single/TF, Cl. A IEC60751, 4 wires, for cryogenic applications |
| M2 | | 1xPt1000 single/TF, Cl. A IEC60751, 2 wires |
| Y9 | | Special version on request |
| | | |
| 020 | ✓ | Shape of the Tip |
| S | | Straight, standard response |
| Y | | Special version on request |
| | | |
| 030 | ✓ | Process Immersion (Sheath) Length IL |
| 1 | | 50 mm |
| 2 | | 100 mm |
| 3 | | 150 mm |
| 4 | | 200 mm |
| 5 | | 250 mm |
| 6 | | 300 mm |
| 7 | | 350 mm |
| 8 | | 400 mm |
| X | | Customized length |
| 9 | | Special version on request |
| | | |
| 040 | ✓ | MI Cable, Sheath Diameter and Material |
| A3 | | MgO cable 3.0 mm, Aisi 316 |
| A4 | | MgO cable 4.5 mm, Aisi 316 |
| A6 | | MgO cable 6.0 mm, Aisi 316 |
| A8 | | MgO cable 8.0 mm, Aisi 316 |
| Y9 | | Special version on request |

## How to Order (continuation)

| | | |
|---|---|---|
| 050 | ✓ | Terminal Block |
| B | | Installed, type B, without grounding post |
| M | | Installed, type mignon |
| P | | Spring loaded disk with bushing prepared for temperature transmitter (33 mm) |
| S | | Without terminal block; free end wires |
| Y | | Special version on request |
| | | |
| 060 | ✓ | Temperature Transmitter |
| A0 | | Without, standard leads |
| A1 | | Without, leads with 150 mm |
| W5 | | Universal input, output 4-20mA |
| S2 | | Universal input, output 4-20mA HART |
| Y9 | | Special version on request |
| | | |
| ⊕ 070 | ✓ | Label and Product Documentation Language |
| EN | | English |
| FR | | French |
| PT | | Portuguese |
| | | |
| ⊕ 080 | ✓ | Approval |
| AEM | | Zone 2 ATEX II 3G/D Ex ec mc IIC Gc |
| AIA | | Zone 2 ATEX II 3G/D Ex ic IIC Gc IIIC Dc |
| AYY | | Other on request, according to specification |
| | | |
| ⊕ 090 | ✓✓ | Quality Assurance Documentation |
| C2 | | Factory calibration certificate, 2-point customer specification |
| C3 | | Factory calibration certificate, 3-point customer specification |
| M2 | | Materials certificate according to EN10204-3.1 |

| Selection Example | |
|---|---|
| RTD insert type Pt100 class A 3-wire, sheath with diameter of 6mm and length of 310 mm. With temperature transmitter set to range 0°C to 300°C. | |
| Order code | EIR 10-A3SXA6SW5/310 mm/0…300°C |

## Contact


| | | | |
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