**Product Technical Information**
DS_TRP-50B_2109_EN

# Series AMBItemp, Model TRP 50B

RTD temperature probe with pointed end tube
Portable. With connection cable

## Application

The model TRP 50B is manufactured with resistance sensor, Pt100, Pt1000 or PTC1000@25ºC insulated and encapsulated in a pointed Aisi 316 protective tube.

Are available a wide range of sensor configuration and types, as well connection cables, conferring TRP 50B a huge versatility for all kind of branches and environmental conditions.

Affordable and reliable, ideal for food processing applications, for temperature inspections in laboratories, across many branches, up to 150°C.

## Your Advantages

| |
|---|
| Class A or better |
| Pointed end tube Aisi 316 |
| Up to 150ºC |
| 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 AMBItemp TRP 50B is a portable resistance temperature probe that features a customized measuring protective sheath with pointed end tube for mostly penetrating foodstuffs and a connection cable, for usage up to 150ºC.
These resistance probes are cable wired through the protective tube.

Are available electrical connectors and different insulation materials and conductor's layup for connection cables to withstand process, environmental and usage conditions.

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.

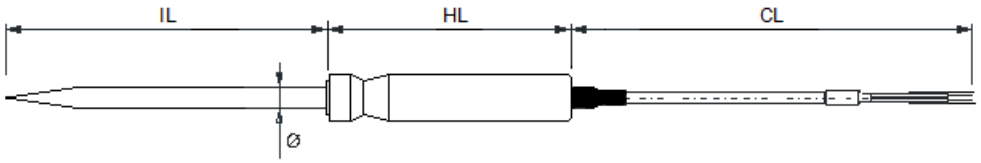
For the range of -200ºC to 0ºC we have: For the range of 0ºC to 850ºC we have:
$R_t = R_0[1 + At + Bt^2 + C(t - 100°C)\ t^3]$ $R_t = R_0(1 + At + Bt^2)$

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

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

## Mechanical Construction

### Generic Configuration




*IL: Immersion length*
*CL: Cable length*

*HL: Handle length, 100 mm*
*Handle Diameter: 19 mm*

The PTC and dual Pt100 sensors versions will be assembled with the sensors above the pointed end tube.

## Connection Cables

These are the most common RTD cables available for this model.
We welcome any other cable not listed here to suit your application. Please contact us!

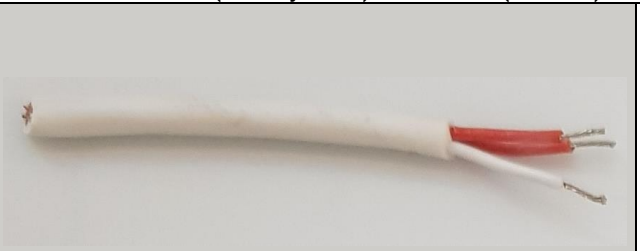
PVC/screen/PVC, max. process/ambient temperature 105ºC (4 wires)

Shape: Round, parallel conductors
Core size: 7 wires/0.2 mm per wire
Cross-section: 0.22 $mm^2$, AWG24
Number of cores; colours: 4; 2-red, 2-white
Core insulation: PVC
Screen: Tinned copper
Overall insulation: PVC
OD: 4.4 mm
Cable maximum temperature: 105ºC
**Order Code Option**
C4

PVC/screen/PVC, max. process/ambient temperature 105ºC (6 wires)

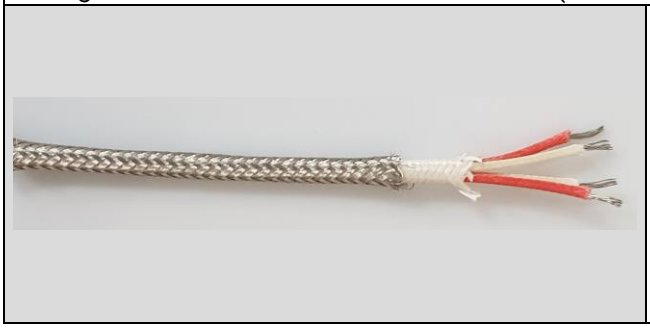
Shape: Round, parallel conductors
Core size: 7 wires/0.2 mm per wire
Cross-section: 0.22 $mm^2$, AWG24
Number of cores; colours: 6; 4-red, 2-white
Core insulation: PVC
Screen: Tinned copper
Overall insulation: PVC
OD: 6.0 mm
Cable maximum temperature: 105ºC
**Order Code Option**
C6

Silicone/Silicone (white jacket), 7/0.2mm (3 wires)

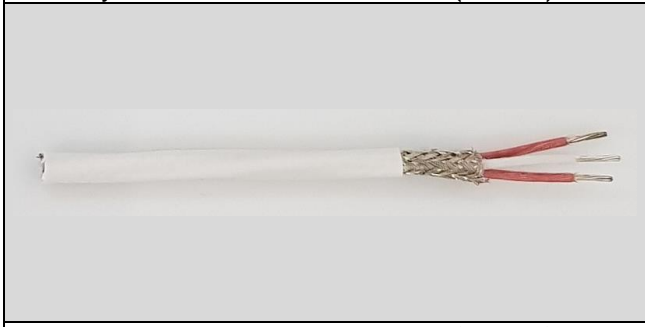
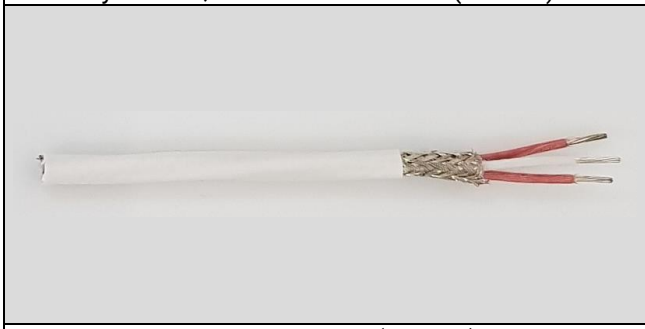
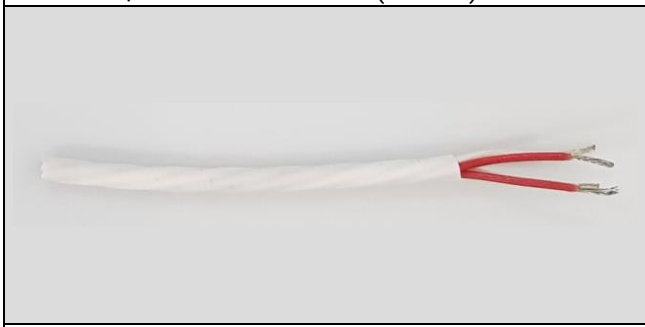
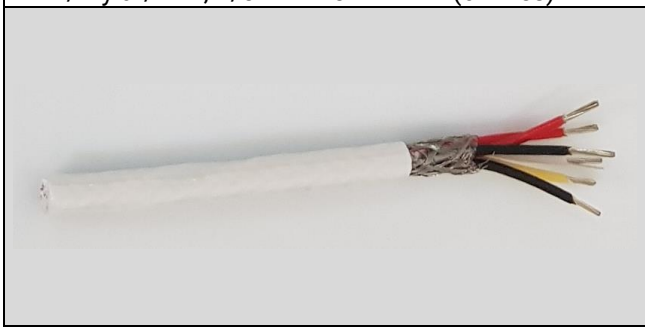


Shape: Round, twisted conductors
Core size: 7 wires/0.2 mm per wire
Cross-section: 0.22 $mm^2$, AWG24
Number of cores; colours: 3; 2-red, 1-white
Core insulation: Silicone
Screen: Without
Overall insulation: Silicone, white
OD: 4.2 mm
Cable maximum temperature: 200ºC
**Order Code Option**
D4

Fibreglass/SS overbraided silicone varnished (4 wires)



Shape: Round, twisted conductors
Core size: 7 wires/0.2 mm per wire
Cross-section: 0.22 mm2, AWG24
Number of cores; colours: 4; 2-red, 2-white
Core insulation: Fibreglass
Overall insulation: Fibreglass, silicone varnished
Armour: stainless steel AISI 304 wire overbraid
OD: 3.7 mm
Cable maximum temperature: 400ºC
**Order Code Option**
F4

| PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (3 wires) | |
|---|---|
|  | Shape: Round, twisted conductors<br>Core size: 7 wires/0.2 mm per wire<br>Cross-section: 0.22 mm2, AWG24<br>Number of cores; colours: 3; 2-red, 1-white<br>Core insulation: PFA<br>Screen: Tin-copper mylar<br>Overall insulation: PFA<br>OD: 3.2 mm<br>Cable maximum temperature: 250°C<br>**Order Code Option**<br>P3 |
| PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (4 wires) | |
|  | Shape: Round, twisted conductors<br>Core size: 7 wires/0.2 mm per wire<br>Cross-section: 0.22 $mm^2$, AWG24<br>Number of cores; colours: 4; 2-red, 2-white<br>Core insulation: PFA<br>Screen: Tin-copper mylar<br>Overall insulation: PFA<br>OD: 3.6 mm<br>Cable maximum temperature: 250°C<br>**Order Code Option**<br>P4 |
| PFA/PFA, 7/0.2mm 0.22mm2 (4 wires) | |
|  | Shape: Round, twisted conductors<br>Core size: 7 wires/0.2 mm per wire<br>Cross-section: 0.22 $mm^2$, AWG24<br>Number of cores; colours: 4; 2-red, 2-white<br>Core insulation: PFA<br>Screen: Without<br>Overall insulation: PFA<br>OD: 3.1 mm<br>Cable maximum temperature: 250°C<br>**Order Code Option**<br>P5 |
| PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (6 wires) | |
|  | Shape: Round, twisted conductors<br>Core size: 7 wires/0.2 mm per wire<br>Cross-section: 0.22 $mm^2$, AWG24<br>Number of cores; colours: 6; 2-red, 1-white; 2-black; 1-yellow<br>Core insulation: PFA<br>Screen: Tin-copper mylar<br>Overall insulation: PFA<br>OD: 4.2 mm<br>Cable maximum temperature: 250°C<br>**Order Code Option**<br>P6 |
| PFA wires, 7/0.2mm 0.22mm2 (3 wires) | |

## Electrical Connectors

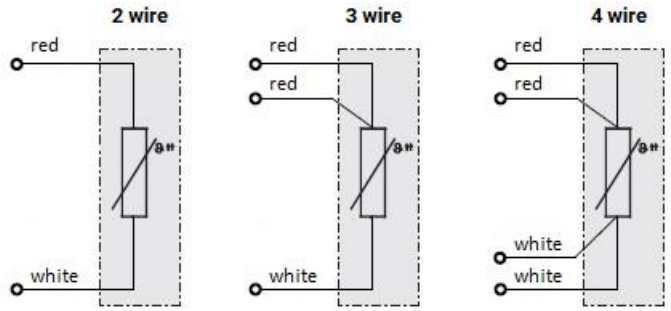
These are our standard electrical connectors available for this model.
We welcome any other connector not listed here to suit your application. Please contact us!

| | |
|---|---|
| | Type of connector: M8x1/M12x1<br>Connector: Plug<br>Number of poles: 4 or 6; M12x1 with 8 poles on demand<br>Standard cable connector: Male<br>Accessory connector: Female<br><br>**Order Code Option**<br>M8x1: I4 (4 poles)<br>M12x1: P4/P6 (4/6 poles) |
| | Type of connector: Circular Push Pull Lemo PCA.XS.30X<br>Connector: Female<br>Number of poles: 4 or 6; 3 poles available<br>Keying: Hermaphroditic keying (half-moon insert)<br>Accessory connector: Lemo FFA.XS.30X<br><br>**Order Code Option**<br>LG/LJ |
| | Type of connector: Circular Push Pull Lemo FFA.XS.30X<br>Connector: Male<br>Number of poles: 4 or 6; 3 poles available<br>Keying: Hermaphroditic keying (half-moon insert)<br>Accessory connector: Lemo PCA.XS.30X<br><br>**Order Code Option**<br>LM |
| | Type of connector: BNC female<br>Connector: Plug<br>Number of poles: 4 poles<br>Accessory connector: Male plug; male socket<br><br>**Order Code Option**<br>MC |
| | Type of connector: BNC male<br>Connector: Plug<br>Number of poles: 4 poles<br>Accessory connector: Female plug<br><br>**Order Code Option**<br>MF |

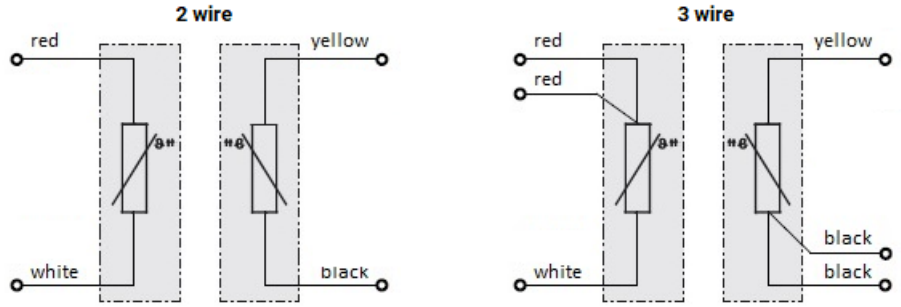
## Wirings

The AMBItemp TRP 50B is available with 1 single Pt100/Pt1000 or double Pt100 sensor or with 2 single Pt100/Pt1000 sensors. The PTC versions are only available with single sensor 2-wire.

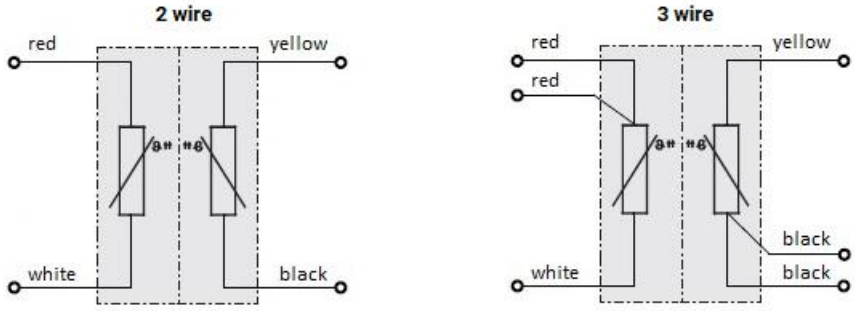
### Single Sensor Pt100/Pt1000/PTC1000-2W




### 2x Single Sensors Pt100/Pt1000




### 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.

| | |
|---|---|
| | This device assembled with PTC/KTY81 is sensitive to Electro Static Discharge (ESD). |
| | For protective tubes of 6 mm and over the version with two Pt100 sensors are available. |
| | The PTC version can only be assembled with protective tube of 6 mm. |

## Technical Data

| Device | | | | | |
|---|---|---|---|---|---|
| Application | Temperature measurement | | | | |
| Principle | Resistance | | | | |
| Types | Pt100, Pt1000; PTC1000@25ºC | | | | |
| Accuracy | Class A IEC60751; Class AA on demand (RTD's only) | | | | |
| Configuration | Single 2, 3 and 4 wires; Double 2 and 3 wires | | | | |
| Operating temperature | Min | -10ºC | | | |
| | Max | 150ºC | | | |

| Electrical Specifications | | | | | |
|---|---|---|---|---|---|
| Output signal | Resistance | 96,09…157,31 Ω | | | |
| | PTC KTY81/110 | 747 (733) …2211 (2277) Ω | | | |
| Sensor insulation Resistance | >100 MΩ/250 Vdc @room temp. or according to IEC 60751, whichever is greater | | | | |

| Mechanical Characteristics | | | | | |
|---|---|---|---|---|---|
| Materials | Measuring element | Aisi 316L | | | |
| | Handle | Black nylon | | | |
| | Connection cable | PVC/Mylar/PVC | Max. 6 core, not IEC, 0.22mm$^2$, 7/0.2mm | | |
| | | Silicone/Silicone | Max. 3 core, 0.22mm$^2$, 7/0.2mm | | |
| | | PTFE/PU (curly) | Max. 4 core, 0.22mm$^2$, 7/0.2mm | | |
| | | PFA/PFA | 4 Core, 0.22mm$^2$, 7/0.2mm | | |
| | | PFA/Mylar/PFA | Max. 6 core, 0.22mm$^2$, 7/0.2mm | | |
| | | FG/FG/SSOB | 4 Core, 0.22mm$^2$, 7/0.2mm | | |
| Protective Tube Dimensions | Immersion length | 50 to 150 mm, customized | | | |
| | Cable length | Standard | 0.5 m to 10 m, customized; over 10 m on request | | |
| | | Curly | 2.0 m and 3.0 m | | |
| | Handle | Length | 100 mm | OD | 19 mm |
| | Diameter | 3.0 mm, 4.0 mm and 6.0 mm | | | |
| | RTD Wall thickness | OD 3 mm | 0.25 mm | | |
| | | OD 4 mm | Min 0.35 mm | | |
| | | OD 6 mm | Min 0.5 mm | | |
| | PTC Wall thickness | OD 6 mm | Min 0.5 mm | | |

| Environmental Conditions | |
|---|---|
| Ambient temperature | 80ºC |
| Storage temperature | 0 to 60ºC; Contact us for storage conditions out of this range |
| Relative humidity | 0 to 95 %RH, non-condensing |
| Calibration units | ºC, ºF, K |
| Weight | Depending on configuration; standard configurations from 100 g to 500 g |
| Protection class (complying with EN 60529) | IP67 |
| Approvals, Certifications | RoHS 2, CE |

## 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 assemblies of AMBItemp 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.

### Accessories

As accessory or spare part, we have available a comprehensive set of compression fittings.
You can also order a stainless-steel TAG plate.

### Delivery Time

For small quantities, less than 10 pieces with basic options, the delivery times are likely 8 to 10 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 |
|---|---|---|
| | | |
| TRP 50B- | | Temperature Probe Series AMBItemp Model TRP 50B |
| | | |
| 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 |
| 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 |
| D2 | | 2xPt100 single/TF, Cl. A IEC60751, 2x3 wires |
| K3 | | 1xPt100 single/TF, Cl. A IEC60751, 2 wires |
| M2 | | 1xPt1000 single/TF, Cl. A IEC60751, 2 wires |
| P2 | | 1xPTC 1000@25 ºC, 2 wires, -55... 150 ºC |
| Y9 | | Special version on request |
| | | |
| 020 | ✓ | Process Immersion Length IL |
| 1 | | 50 mm |
| 2 | | 100 mm |
| 3 | | 150 mm |
| X | | Customized length |
| 9 | | Special version on request |
| | | |
| 030 | ✓ | Protective Tube Diameter and Material |
| F3 | | 3 mm, Aisi 316L |
| F4 | | 4 mm, Aisi 316L |
| F6 | | 6 mm, Aisi 316L |
| | | |
| 040 | ✓ | Cable Length |
| 0 | | 1000 mm |
| 1 | | 1500 mm |
| 2 | | 2000 mm |
| 3 | | 2500 mm |
| 4 | | 3000 mm |
| 5 | | 5000 mm |
| 6 | | 10000 mm |
| X | | Customized length |
| 9 | | Special version on request |

## How to Order (continuation)

| | | |
|---|---|---|
| 050 | ✓ | Type of Connection Cable |
| C1 | | PTFE/PU, 0.14 mm2, Curly (4 wires) |
| C4 | | PVC/screen/PVC, max. ambient temperature 105ºC (4 wires) |
| C6 | | PVC/screen/PVC, max. ambient temperature 105ºC (6 wires) |
| D4 | | Silicone/Silicone (white jacket), 7/0.2mm (3 wires) |
| F4 | | Fibreglass/SS overbraided silicone varnished (4 wires) |
| P3 | | PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (3 wires) |
| P4 | | PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (4 wires) |
| P5 | | PFA/PFA, 7/0.2mm 0.22mm2 (4 wires) |
| P6 | | PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (6 wires) |
| Y9 | | Special version on request |
| Not all options are listed here. Please contact us know current production plan for this device | | |
| | | |
| 060 | ✓ | Electrical Connector |
| AA | | Not selected, standard cable lead |
| I4 | | Plug M8x1, 4 poles, IEC61076-2-104 |
| P4 | | Plug M12x1, 4 poles, IEC61076-2-101 |
| LG | | Lemo socket PCA.1S.304, 4 poles, PEEK isolators |
| LJ | | Lemo socket PCA.1S.306, 6 poles, PEEK isolators |
| MC | | BNC Connector, 4 poles |
| Y9 | | Special version on request |
| Not all options are listed here. Please contact us know current production plan for this device | | |
| | | |
| ⊕ 070 | ✓ | Label and Product Documentation Language |
| EN | | English |
| FR | | French |
| PT | | Portuguese |
| | | |
| ⊕ 080 | ✓✓ | Quality Assurance Documentation |
| C2 | | Factory calibration certificate, 2-point customer specification |
| C3 | | Factory calibration certificate, 3-point customer specification |
| Y9 | | Other on request, according to specification |
| | | |
| ⊕ 090 | ✓ | Additional Specifications |
| Y9 | | Special version on request |

### Selection Example

Portable temperature probe up to 150ºC with class A sensor, 4-wire configuration, immersion length with 100mm, diameter 6mm. Curly cable with 2.0 m. Condensation tight.

| | |
|---|---|
| Order code | TRP 50B-B32F62C1AA+EN |

## Contact


| | | | |
|---|---|---|---|
| | Parque Empresarial Baía do Tejo, Rua 48 Nº11<br>Apartado 5056<br>2830-571 Barreiro, Portugal | | +351 212 070 802<br>+351 212 070 803<br>+351 210 900 148 |
| | 38.663817, -9.066176 | | +351 212 070 804 |
| | www.deltasensor.pt | | commercial@deltasensor.pt |



Subject to modification. All rights reserved to Delta Sensor, Lda

Antes de imprimir este documento pense bem se é mesmo necessário fazê-lo: O meio ambiente é de todos.
Please consider the environment before printing this document.