








Series AMBItemp, Model TRC 50B

RTD temperature probe

Optional threaded process connection. With connection cable



	Application
<p>The model TRC 50B is manufactured with resistance sensor, Pt100, Pt1000 or PTC1000@25°C insulated and encapsulated in a Aisi 316 protective tube.</p>	
<p>As standard process connection, the TRC 50B can also be manufactured with a BSPP, NPT and metric in all thread sizes.</p>	
<p>Are available a wide range of sensor configuration and types, as well connection cables, conferring TRC 50B a huge versatility for a wide industrial branches and environmental conditions.</p>	
<p>Affordable and reliable, ideal for HVAC systems, refrigeration units and for general purpose in applications in the pulp and paper, cement, steel industry, as well as in other industries and laboratories, at such low process temperatures as -196°C and up to 240°C.</p>	

	Your Advantages
	Class A or better
	Fully Aisi 316 construction
	Up to 240°C
	Standard single or double sensor
	OEM customization



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	
<p>The AMBItemp TRC 50B is a resistance temperature probe that features a customized measuring protective sheath and a connection cable, for usage up to 240°C. The cable can be simply crimped, epoxy sealed to achieve maximum ingress protection and/or mechanically protected by use of heat shrink sleeve or spring. These resistance probes are cable wired through the protective tube.</p> <p>Are available electrical connectors and different insulation materials and conductor's layout for connection cables to withstand process, environmental and usage conditions.</p> <p>The process connection can be welded or adjustable, by use of high-quality compression fitting.</p> <p>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 0°C, 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 $\alpha = 3.85 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$, calculated between 0 and 100°C.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>For the range of -200°C to 0°C we have: For the range of 0°C to 850°C we have: $R_t = R_0[1 + At + Bt^2 + C(t - 100^\circ\text{C}) t^3]$ $R_t = R_0(1 + At + Bt^2)$</p> <p>where: R_t is the resistance to a temperature t; R_0 is resistance with $t = 0^\circ\text{C}$</p> <p>The constants in these equations are: $A = 3.9083 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$ $B = -5.775 \cdot 10^{-7} \text{ }^\circ\text{C}^{-2}$ $C = -4.183 \cdot 10^{-12} \text{ }^\circ\text{C}^{-4}$</p>	



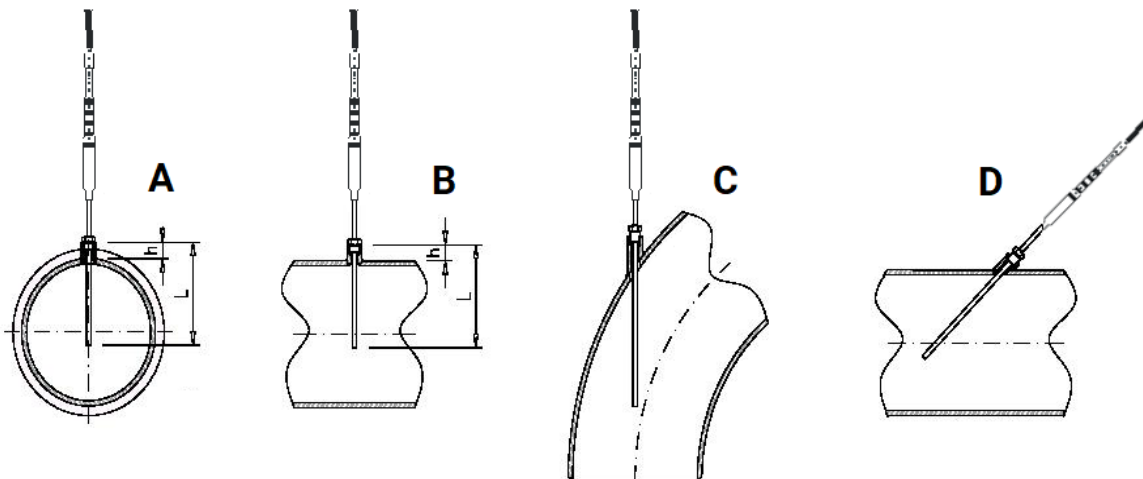
Installation

The thermometers AMBItemp TRC 50B are suitable for pipes, tanks, process machinery or other parts of the process if required.

The immersion length has big influence in the instrument accuracy. If the immersion length is small, an additional error may occur and might not be negligible, if there is a big difference between process temperature and ambient temperature. The temperature dissipation happens between process connection and immersed length.

To minimize this error is recommendable as a rule of thumb, the immersion length should be at least 10 times the thermowell diameter. Considering the AMBItemp probes, the sensor element is installed in 5-10 mm at end of the tip. According that is recommendable to select an immersion length of 100 mm for a temperature thermowell of 6 mm. If this is not possible, should be selected a diameter or immersion length to comply with the rule.

If possible, the immersion length must be slightly greater than pipe radius (see fig. A and B). In the other side, an appropriate thermal insulation can compensate a reduced immersion length or simply mount the assembly on a pipe curve (see fig. C). Other possibility to grant a correct measurement is the assembly mounting with appropriate angle (see fig. D). Be advised if the assembly is to be mounted according fig. C or fig. D, the assembly should be installed against fluid flow.



This product is not intended to be used in oxygen service or in classified zones under ATEX directive.



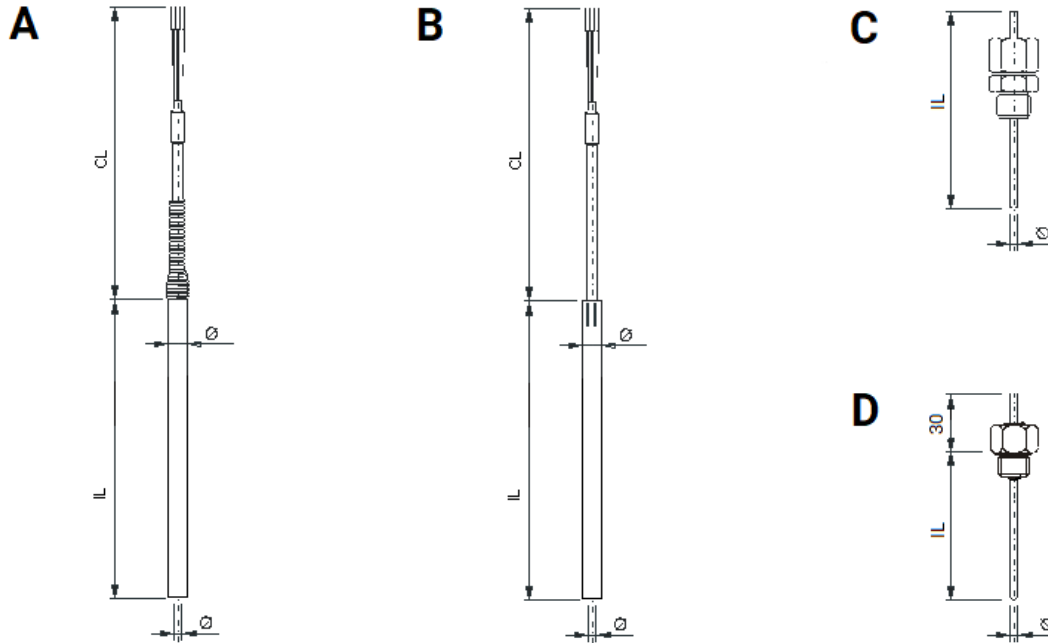
Please note ambient temperature cannot be greater than epoxy sealing, cable maximum temperature or heat-shrinkable sleeve temperature limit (125°C).



Please pay attention to measuring point if you are measuring a two phased fluid.



Generic Configuration











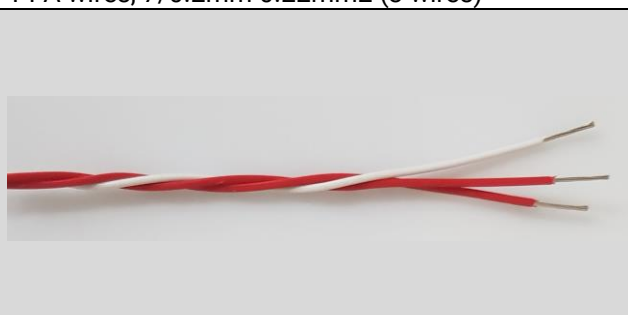


All dimensions in millimetres (mm)

- A: Standard probe with cable relief (spring/heat shrink sleeve)
- B: Standard probe with crimped cable
- C: Probe with welded process thread
- D: Probe with threaded compression fitting



The swagged versions are available as standard for protective sheath OD of 6.0 mm and above for RTD's and 8.0 mm for PTC.

Connection Cables	
<p>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!</p>	
<p>PVC/screen/PVC, max. process/ambient temperature 105°C (4 wires)</p>	
	<p>Shape: Round, parallel 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: PVC Screen: Tinned copper Overall insulation: PVC OD: 4.4 mm Cable maximum temperature: 105°C Order Code Option C4</p>
<p>PVC/screen/PVC, max. process/ambient temperature 105°C (6 wires)</p>	
	<p>Shape: Round, parallel conductors Core size: 7 wires/0.2 mm per wire Cross-section: 0.22 mm², 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: 105°C Order Code Option C6</p>
<p>Silicone/Silicone (white jacket), 7/0.2mm (3 wires)</p>	
	<p>Shape: Round, twisted conductors Core size: 7 wires/0.2 mm per wire Cross-section: 0.22 mm², 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: 200°C Order Code Option D4</p>
<p>Fibreglass/SS overbraided silicone varnished (4 wires)</p>	
	<p>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: 400°C Order Code Option F4</p>

PFA/Mylar/PFA, 7/0.2mm 0.22mm ² (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: PFA Screen: Tin-copper mylar Overall insulation: PFA OD: 3.2 mm Cable maximum temperature: 250°C Order Code Option P3
PFA/Mylar/PFA, 7/0.2mm 0.22mm ² (4 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: 4; 2-red, 2-white Core insulation: PFA Screen: Tin-copper mylar Overall insulation: PFA OD: 3.6 mm Cable maximum temperature: 250°C Order Code Option P4
PFA/PFA, 7/0.2mm 0.22mm ² (4 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: 4; 2-red, 2-white Core insulation: PFA Screen: Without Overall insulation: PFA OD: 3.1 mm Cable maximum temperature: 250°C Order Code Option P5
PFA/Mylar/PFA, 7/0.2mm 0.22mm ² (6 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: 6; 2-red, 1-white; 2-black; 1-yellow Core insulation: PFA Screen: Tin-copper mylar Overall insulation: PFA OD: 4.2 mm Cable maximum temperature: 250°C Order Code Option P6
PFA wires, 7/0.2mm 0.22mm ² (3 wires)	
	Shape: Stranded 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: PFA Screen: Not applied Overall insulation: Not applied OD: 3x 1.0 mm Wire maximum temperature: 250°C Order Code Option S3
	When using fibreglass cable, take in consideration probe maximum temperature will be limited to seal temperature.
	We do not recommend the usage of PVC cables with process temperature above 90°C.

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!

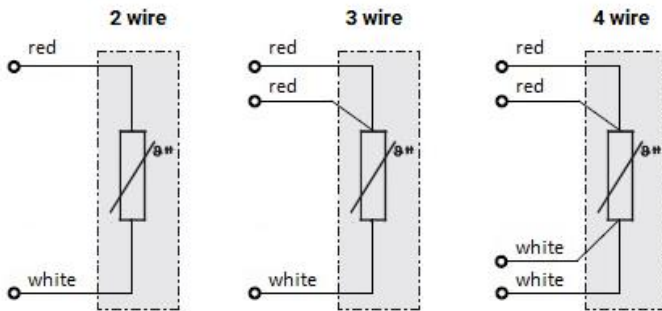
	<p>Type of connector: M8x1/M12x1 Connector: Plug Number of poles: 4 or 6; M12x1 with 8 poles on demand Standard cable connector: Male Accessory connector: Female</p> <p>Order Code Option M8x1: I4 (4 poles) M12x1: P4/P6 (4/6 poles)</p>
	<p>Type of connector: Circular Push Pull Lemo PCA.XS.30X Connector: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



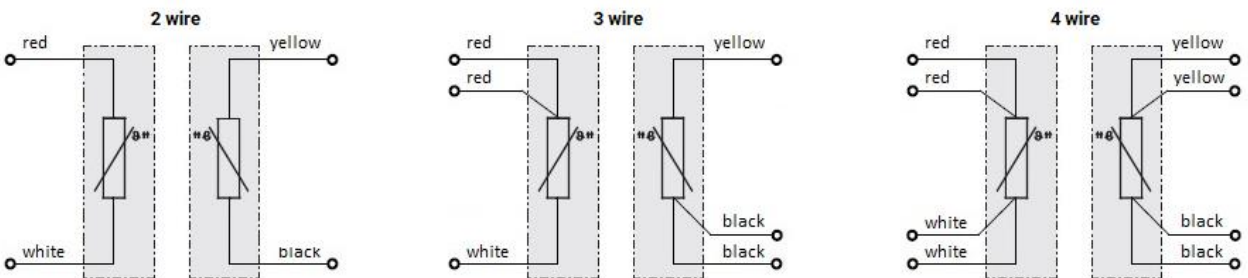
Wirings

The AMBtemp TRC 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.

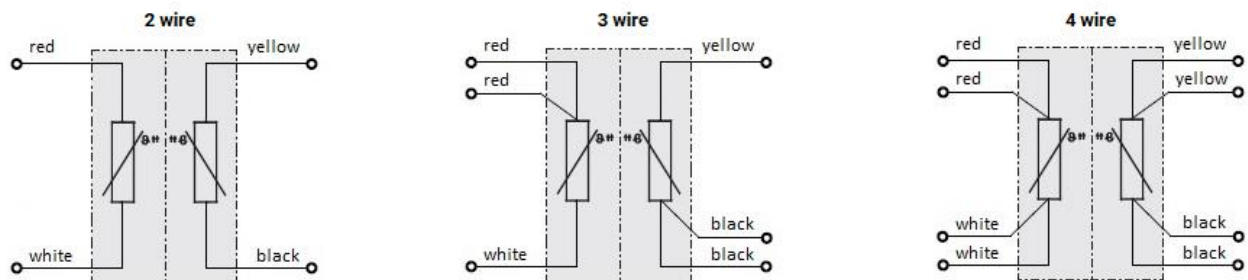
Single Sensor Pt100/Pt1000/PTC1000-2W



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 6mm and over the version with two Pt100 sensors are available.

	Technical Data
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Device			
Application	Temperature measurement		
Principle	Resistance		
Types	Pt100, Pt1000; PTC1000@25°C		
Accuracy	Class A IEC60751; Class AA on demand (RTD's only)		
Configuration	Single or double; 2, 3 and 4 wires		
Operating temperature	Pt100 and Pt1000	Absolute Min	-196°C
		Absolute Max	240°C
	PTC1000	Absolute Min	-55°C
		Absolute Max	150°C

Electrical Specifications			
Output signal	Resistance	18,49...190,45 (390,26) Ω	
	PTC KTY81/110	490 (475) ...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		
	Process connection	Welded	Aisi 316(L)	
		Compression fitting	Body	Aisi 316, on request PTFE
			Olive	Aisi 316, PTFE
	Spring cable relief	Nickel plated brass, Aisi 302 on request		
	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	
		PFA	Max. 6 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 2000 mm, customized; over 2000 mm on request		
	Cable length	0.5 m to 20 m, customized; over 20 m on request		
	Diameter	From 3 mm to 12 mm; over 12 mm on request		
	RTD Wall thickness	OD 3 mm	0.25 mm	
		OD 4 mm	Min 0.35 mm	
		OD 6 mm	Min 0.5 mm	
		OD > 6 mm	Min 1.0 mm	
PTC Wall thickness	OD ≥ 6 mm	Min 0.5 mm		
Compression fitting length	Depending on process connection; ½" BSPP: ~50mm			

Environmental Conditions	
Ambient temperature	Absolute max. 220°C, limited to cable sealing and type
Storage temperature	0 to 60°C; Contact us for storage conditions out of this range
Relative humidity	0 to 95 %RH, non-condensing
Calibration units	°C, °F, K
Weight	Depending on configuration; standard configurations from 100 g to 1.5 kg
Protection class (complying with EN 60529)	IP66 IP68 epoxy sealed
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 IEC60751 and 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	$\pm(0.10 + 0.0017 t)$
A	-100 to +450	-30 to +300	$\pm(0.15 + 0.0020 t)$
B	-196 to +600	-50 to +500	$\pm(0.30 + 0.0050 t)$
C	-196 to +600	-50 to +600	$\pm(0.60 + 0.0100 t)$

1) |t| Temperature modulus in °C.



Additional Information

Maintenance

The RTD assemblies of AMBtemp 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
TRC 50B-		Temperature Probe Series AMBitemp Model TRC 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
D3		2xPt100 single/TF, Cl. A IEC60751, 2x4 wires
K3		1xPt100 single/TF, Cl. A IEC60751, 2 wires
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
P2		1xPTC 1000@25 °C, 2 wires, -55... 150 °C
Y9		Special version on request
020	✓	Shape of the Tip
S		Straight, standard response
D		Swagged tip, length with 50 mm
R		Swagged tip, length with 30 mm
Y		Special version on request
030	✓	Process Immersion 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



How to Order (continuation)

040	✓	Protective Tube Diameter and Material
F3		3 mm, Aisi 316L
F4		4 mm, Aisi 316L
F6		6 mm, Aisi 316L
F8		8 mm, Aisi 316L
F0		9 mm, Aisi 316L
FA		10 mm, Aisi 316L
FC		12 mm, Aisi 316L
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
050	✓	Process Connection
00		Without process connection
A1		Welded G 1/2", SS316L
A2		Welded G 3/4", SS316L
A3		Welded G 1", SS316L
A4		Welded 1/2" NPT, SS316L
A5		Welded 3/4" NPT, SS316L
A6		Welded 1" NPT, SS316L
B1		Compression fitting G 1/2" SS316
B2		Compression fitting NPT 1/2" in SS316
B3		Compression fitting G 1/4" SS316
B4		Compression fitting NPT 1/4" in SS316
B5		Compression fitting G 1/8" SS316
B6		Compression fitting NPT 1/8" in SS316
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
060	✓	Cable Sealing and Relief
A		Heat shrink sleeve, max ambient temperature 125°C
B		SS302 spring with 50 mm
C		Cable crimped, no relief
D		Heat shrink sleeve, max ambient temperature 125°C + Epoxy seal, process temperature up to 180°C
E		Epoxy seal, max. 220°C, no relief
H		High temperature epoxy seal max. 250°C, short-term 350°C, no relief
L		Epoxy seal, max. 125°C, no relief
M		SS302 spring with 200 mm
Y		Special version on request



How to Order (continuation)







070	✓	Cable Length
0		1000 mm
1		1500 mm
2		2000 mm
3		2500 mm
4		3000 mm
5		5000 mm
6		10000 mm
7		15000 mm
8		20000 mm
X		Customized length
9		Special version on request
080	✓	Type of Connection Cable
C4		PVC/screen/PVC, max. ambient temperature 105°C (4 wires)
C6		PVC/screen/PVC, max. ambient temperature 105°C (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 0.22mm ² (3 wires)
P4		PFA/Mylar/PFA, 7/0.2mm 0.22mm ² (4 wires)
P5		PFA/PFA, 7/0.2mm 0.22mm ² (4 wires)
P6		PFA/Mylar/PFA, 7/0.2mm 0.22mm ² (6 wires)
S3		PFA wires, 7/0.2mm 0.22mm ² (3 wires)
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
090	✓	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		
⊕ 100	✓	Label and Product Documentation Language
EN		English
FR		French
PT		Portuguese

Selection Example



Temperature probe up to 150°C with class A sensor, 3-wire configuration, immersion length with 200mm, diameter 6mm. Process connection through compression fitting ½" BSPP.
Connection cable with 5.0 m, PFA sheath. Condensation tight.

Order code	TRC 50B-A3S4F6B1D5P3AA
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	Contact
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