Delta Sensor
Produção e Comercialização
de Sistemas Industriais, Lda

Product Technical Information
DS_TRC-58B_2109_EN

Series AMBItemp, Model TRC 58B

RTD temperature probe for general purpose applications
Bayonet process connection. With connection cable

Application

The model TRC 58B is manufactured with resistance sensor, Pt100, Pt1000 or PTC1000@25ºC insulated and encapsulated in a Aisi 316 protective tube.

As process connection, the TRC 58B is manufactured with stainless steel bayonet to suit bayonet adaptor M10/12x1 or ¼" G to process, supplied as accessory.

Are available a wide range of sensor configuration and types, as well connection cables, conferring TRC 58B a huge versatility for a wide industrial branches and environmental conditions.

Affordable, reliable and easy to install, ideal for process machinery and auxiliary processes in steel and cement branches, as well as in other industries, at process temperatures from -55°C up to 240°C.

Your Advantages

✓	Class A
✓	Full stainless steel construction
✓	Up to 240ºC
✓	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 TRC 58B is a resistance temperature probe that features a flexicouple bayonet connection, a customized measuring protective sheath and a connection cable, for usage up to 240ºC.
The cable can be simply crimped and/or epoxy sealed to achieve maximum ingress protection.
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 bayonet adaptor is an accessory not included in the basic scope of supply but can be ordered with the probe trough the order code selection.

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:
$A = 3.9083 \cdot 10^{-3}$ ºC^{-1} $B = -5.775 \cdot 10^{-7}$ ºC^{-2} $C = -4.183 \cdot 10^{-12}$ ºC^{-4}

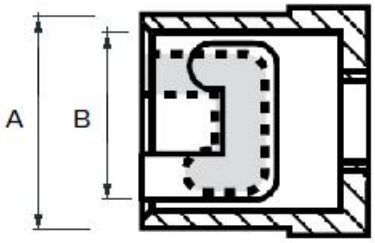
Installation

The probes AMBItemp TRC 58B are suitable for process machinery or other parts of the process if required. Are easy to install by adjusting the 2-slot bayonet cap in the spring and connecting to the threaded adaptor, see also page 4.

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 sump, 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.

Is shown below our standard bayonet caps. Please contact us if any of these do not match existing bayonet adaptor.



Order Code Option	Bayonet Cap OD [A]	Bayonet Cap ID [B]	To Suit Spring OD	Number of Slots	Bayonet Cap Material
B2	14.0	12.2	6	2	Aisi 303
C2	14.0	12.2	8	2	Aisi 303
C4	15.5	14.2	8	2	Aisi 303

All dimensions in millimetres (mm)

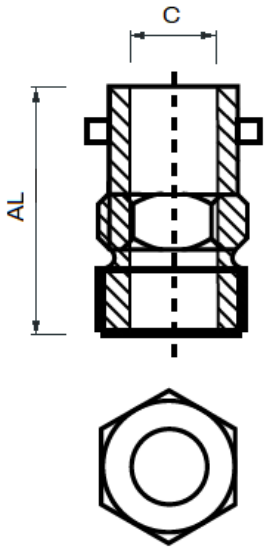
This product is not intended to be used in oxygen service or in classified zones under ATEX directive.

Please note ambient temperature cannot be greater than epoxy sealing and cable maximum temperature.

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

Process/Bayonet Adaptors

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



Process Connection: M12x1
Length AL: 30 mm
Diameter C (ID): 8.5 mm
Material: Aisi 316

Order Code Option
B01

Process Connection: M10x1
Length AL: 23 mm
Diameter C (ID): 8 mm
Material: Aisi 316

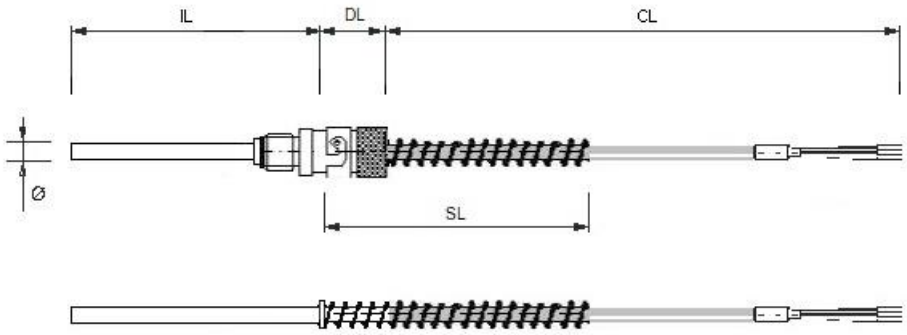
Order Code Option
B06

Process Connection: G ¼" M
Length AL: 25 mm
Diameter C (ID): 8 mm
Material: Aisi 304

Order Code Option
B08

Mechanical Construction

Generic Configuration



IL: Immersion length (mm)
DL: Support tube length (mm)
SL: Spring length (mm)
CL: Cable length (mm)

!	The pictured bayonet adaptor is not included in the basic order code.
!	Stop ring OD will have same spring OD and is silver brazed to protective 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

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

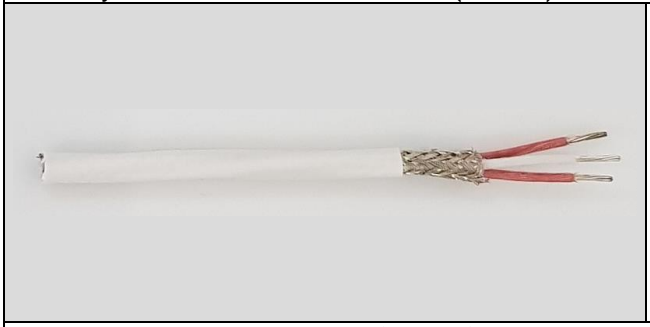
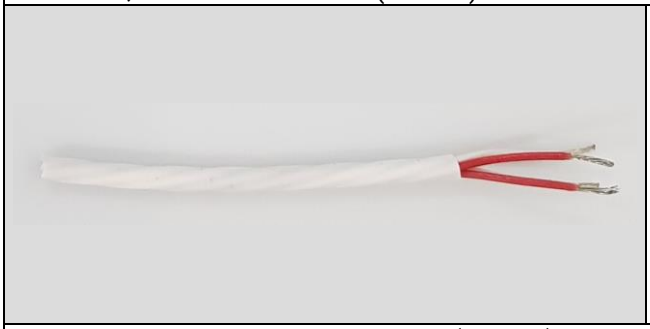
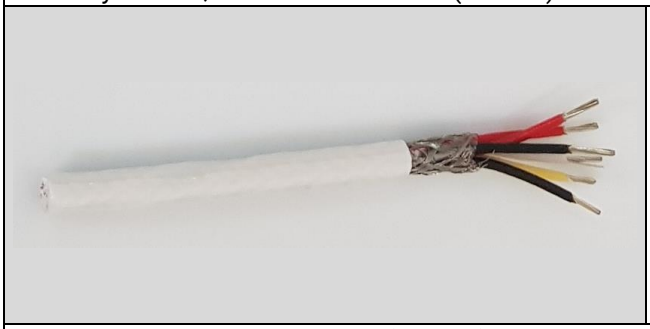
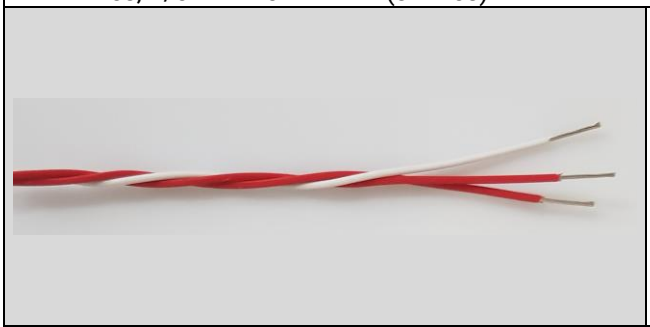
Shape: Round, twisted conductors
Core size: 7 wires/0.2 mm per wire
Cross-section: 0.22 mm^2, AWG24
Number of cores; colours: 3; 2-red, 1-white
Core insulation: Silicone
Screen: Without
Overall insulation: Silicone, white
OD: 4.2 mm
Cable maximum temperature: 200ºC
Order Code Option
D4

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
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: PFA
Screen: Tin-copper mylar
Overall insulation: PFA
OD: 3.2 mm
Cable maximum temperature: 250ºC
Order Code Option
P3

PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (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: 250ºC **Order Code Option** P4
PFA/PFA, 7/0.2mm 0.22mm2 (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: 250ºC **Order Code Option** P5
PFA/Mylar/PFA, 7/0.2mm 0.22mm2 (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: 250ºC **Order Code Option** P6
PFA wires, 7/0.2mm 0.22mm2 (3 wires)	
	Shape: Stranded 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: PFA Screen: Not applied Overall insulation: Not applied OD: 3x 1.0 mm Wire maximum temperature: 250ºC **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 90ºC.

Electrical Connectors

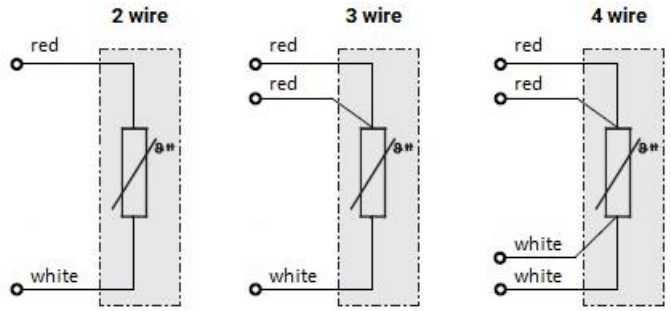
These are our standard electrical connectors available for this model.
We welcome any other connector not listed here to suit your application. Please contact us!

	Type of connector: M8x1/M12x1 Connector: Plug Number of poles: 4 or 6; M12x1 with 8 poles on demand Standard cable connector: Male Accessory connector: Female **Order Code Option** M8x1: I4 (4 poles) M12x1: P4/P6 (4/6 poles)
	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 **Order Code Option** LG/LJ
	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 **Order Code Option** LM
	Type of connector: BNC female Connector: Plug Number of poles: 4 poles Accessory connector: Male plug; male socket **Order Code Option** MC
	Type of connector: BNC male Connector: Plug Number of poles: 4 poles Accessory connector: Female plug **Order Code Option** MF

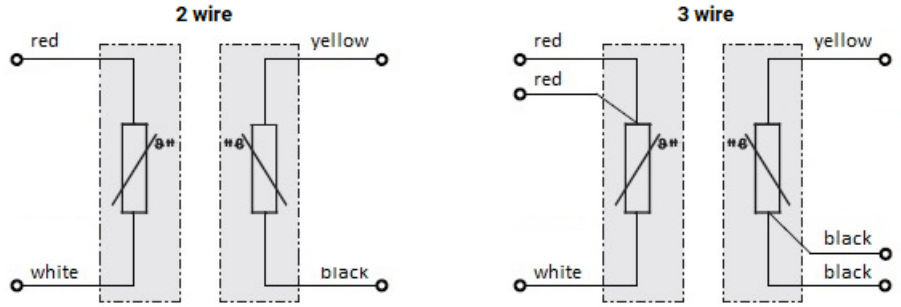
Wirings

The AMBItemp TRC 58B 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.

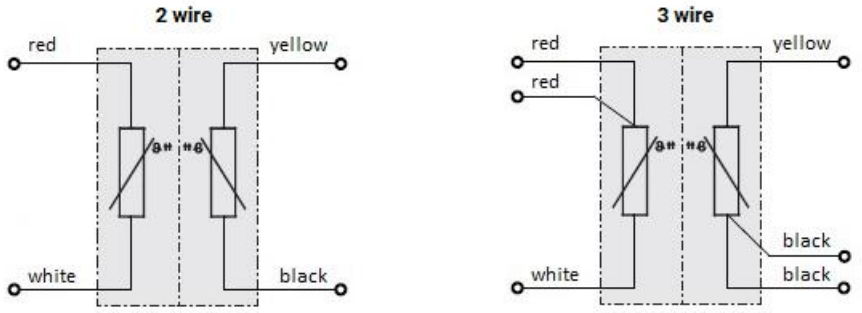
Single Sensor Pt100/Pt1000/PTC1000-2W



2x Single Sensors Pt100/Pt1000



Double Sensor Pt100



	This device assembled with PTC/KTY81 is sensitive to Electro Static Discharge (ESD).
	The versions with double Pt100 output and PTC1000 are only available with protective tube of 6 mm OD.

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	Thin-film (TF) 2, 3 and 4 wires		
	Dual/Double	Thin-film (TF) and wire-wound (WW) 2 and 3 wires		
Operating temperature	Pt100 and Pt1000	Absolute Min	-50ºC	
		Absolute Max	240ºC	
	PTC1000	Absolute Min	-55ºC	
		Absolute Max	150ºC	

Electrical Specifications			
Output signal	Resistance	80,31…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		
	Stop ring	Aisi 316L		
	Bayonet cap	Aisi 303		
	Bayonet spring	Type bell	Carbon steel	
		Straight	Aisi 302	
	Bayonet adaptor HEX	G ¼"	Aisi 304	
		M10x1 / M12x1	Aisi 316	
	Connection cable	PVC/Mylar/PVC	Max. 4 core, 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	20 to 200 mm, customized; over 200 mm on request		
	Stop ring	OD 6.0 mm, 8 mm	Length	2 mm
	Support tube	15 mm to 30 mm; over 30 mm customized		
	Cable length	0.5 m to 20 m, customized; over 20 m on request		
	Diameter	4 mm, 6 mm		
	RTD Wall thickness	OD 4 mm	Min 0.35 mm	
		OD 6 mm	Min 0.5 mm	
	PTC Wall thickness	OD 6 mm	0.5 mm	
Bayonet Adaptor	Process Connection	G ¼ M	Length AL	25 mm
		M10x1		23 mm
		M12X1		30 mm

Environmental Conditions	
Ambient temperature	Absolute max. 220ºC, limited to cable sealing and type
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 1.0 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 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 set of bayonet adaptors and matching electrical connectors. 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 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
TRC 58B-		Temperature Probe Series AMBItemp Model TRC 58B
010	✓	Type of RTD Sensor, Class, Wiring
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
4		200 mm
X		Customized length
9		Special version on request
030	✓	Support Tube Length DL
C		15 mm
D		20 mm
E		25 mm
F		30 mm
X		Customized length
040	✓	Protective Tube Diameter and Material
F4		4 mm, Aisi 316L
F6		6 mm, Aisi 316L
Y9		Special version on request

How to Order (continuation)

050	✓	Bayonet Cap Design and Material
B2		2-Slot, OD 14.0 mm/ ID 12.2 mm (A/B) to suit 6 mm OD spring, SS303
C2		2-Slot, OD 14.0 mm/ ID 12.2 mm (A/B) to suit 8 mm OD spring, SS303
C4		2-Slot, OD 15.5 mm/ ID 14.2 mm (A/B) to suit 8 mm OD spring, SS303
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
060	✓	Bayonet Spring Design and Material
B2		Type bell with 100 mm, carbon steel
B4		Type bell with 200 mm, carbon steel
S1		Straight with 50 mm, Aisi 302
S2		Straight with 100 mm, Aisi 302
S3		Straight with 150 mm, Aisi 302
S4		Straight with 200 mm, Aisi 302
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
070	✓	Sealing; Ingress Protection
C		Cable crimped, PTFE; IP66
E		Epoxy seal, max. 220°C; IP68
S		Cable crimped, epoxy seal, max. 220°C; IP68
Y		Special version on request
080	✓	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
090	✓	Type of Connection Cable
C4		PVC/screen/PVC, max. ambient temperature 105°C (4 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)
S3		PFA wires, 7/0.2mm 0.22mm2 (3 wires)
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		

How to Order (continuation)

100	✓	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		
⊕ 110	✓	Accessory Mounted
B01		Bayonet Adaptor M12x1, 2-pins, HEX, ID 8.5 mm x L 30 mm, SS316
B06		Bayonet Adaptor M10x1, 2-pins, HEX, ID 8.0 mm x L 23 mm, SS316
B08		Bayonet Adaptor G ¼" M, 2-pins, HEX, ID 8.0 mm x L 25 mm, SS304
Not all options are listed here. Please contact us know current production plan for this device		
⊕ 120	✓	Label and Product Documentation Language
EN		English
FR		French
PT		Portuguese
⊕ 130	✓	Additional Specifications
Y9		Special version on request

Selection Example

Bayonet temperature probe up to 200ºC with class A sensor, 3-wire configuration, immersion length with 50mm, diameter 6mm. With stainless steel bayonet adaptor G ¼".
Connection cable with 2.5 m, Fiberglass sheath, stainless steel overbraided.

Order code	TRC 58B-A31DF6C2B4C3F4AA+B08EN

Contact

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	www.deltasensor.pt		commercial@deltasensor.pt