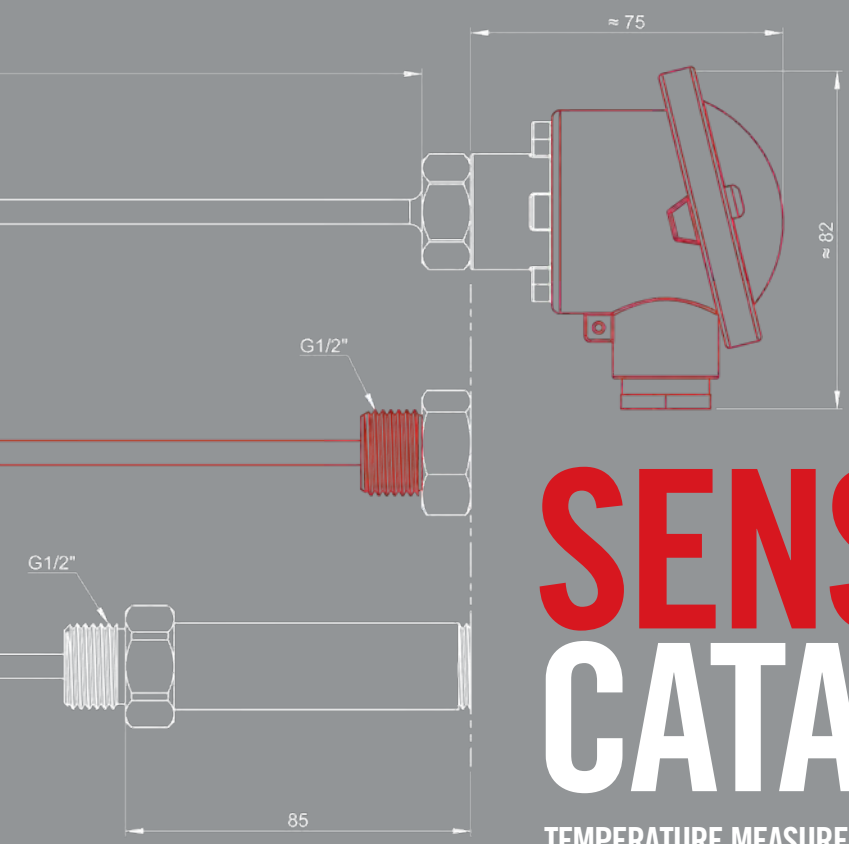
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PYROCONTROLE

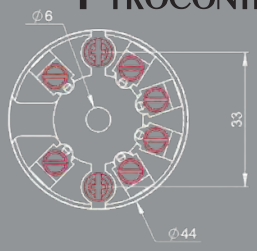
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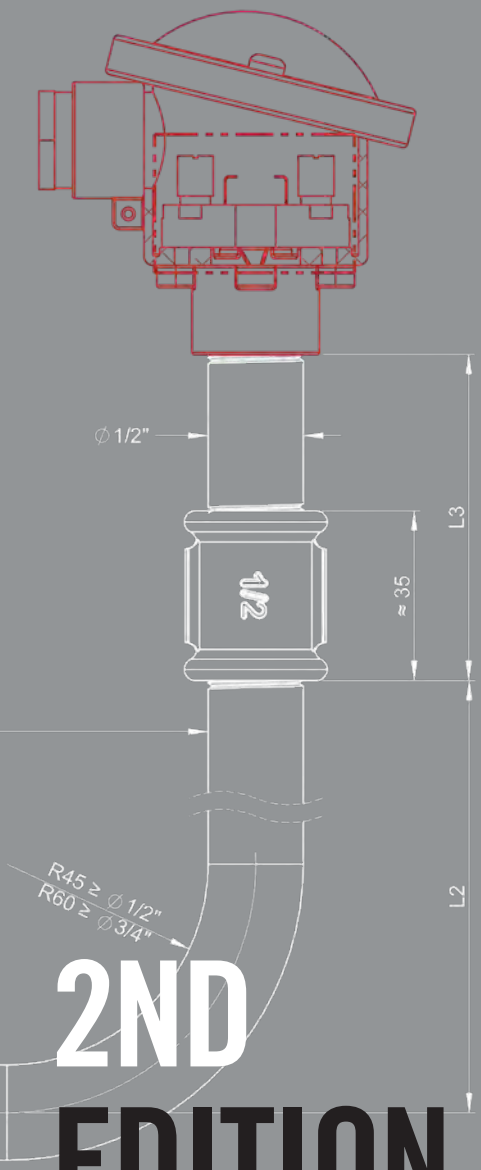
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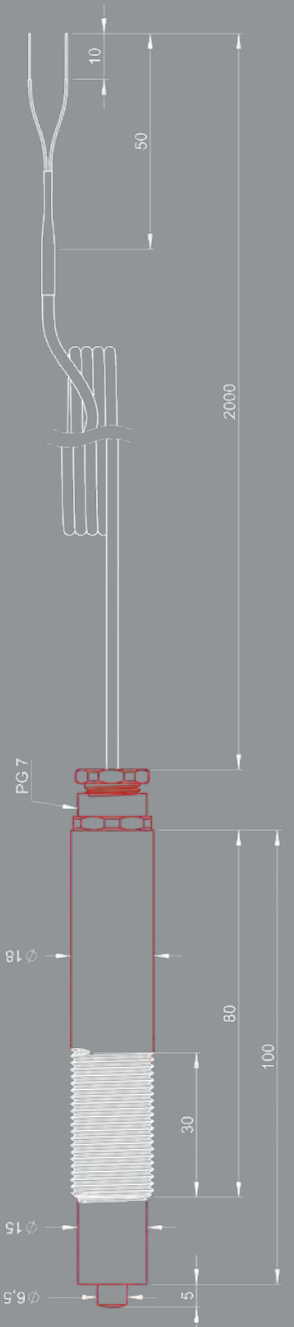
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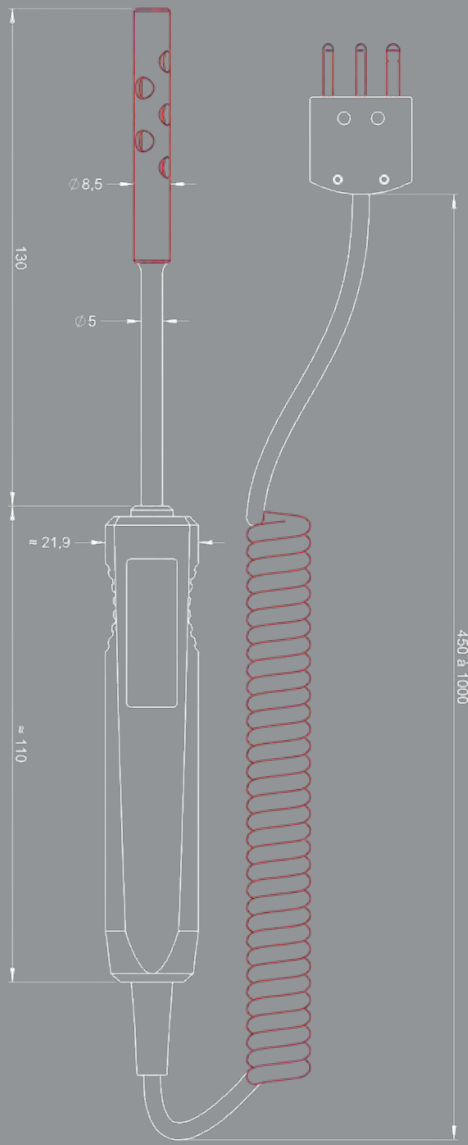
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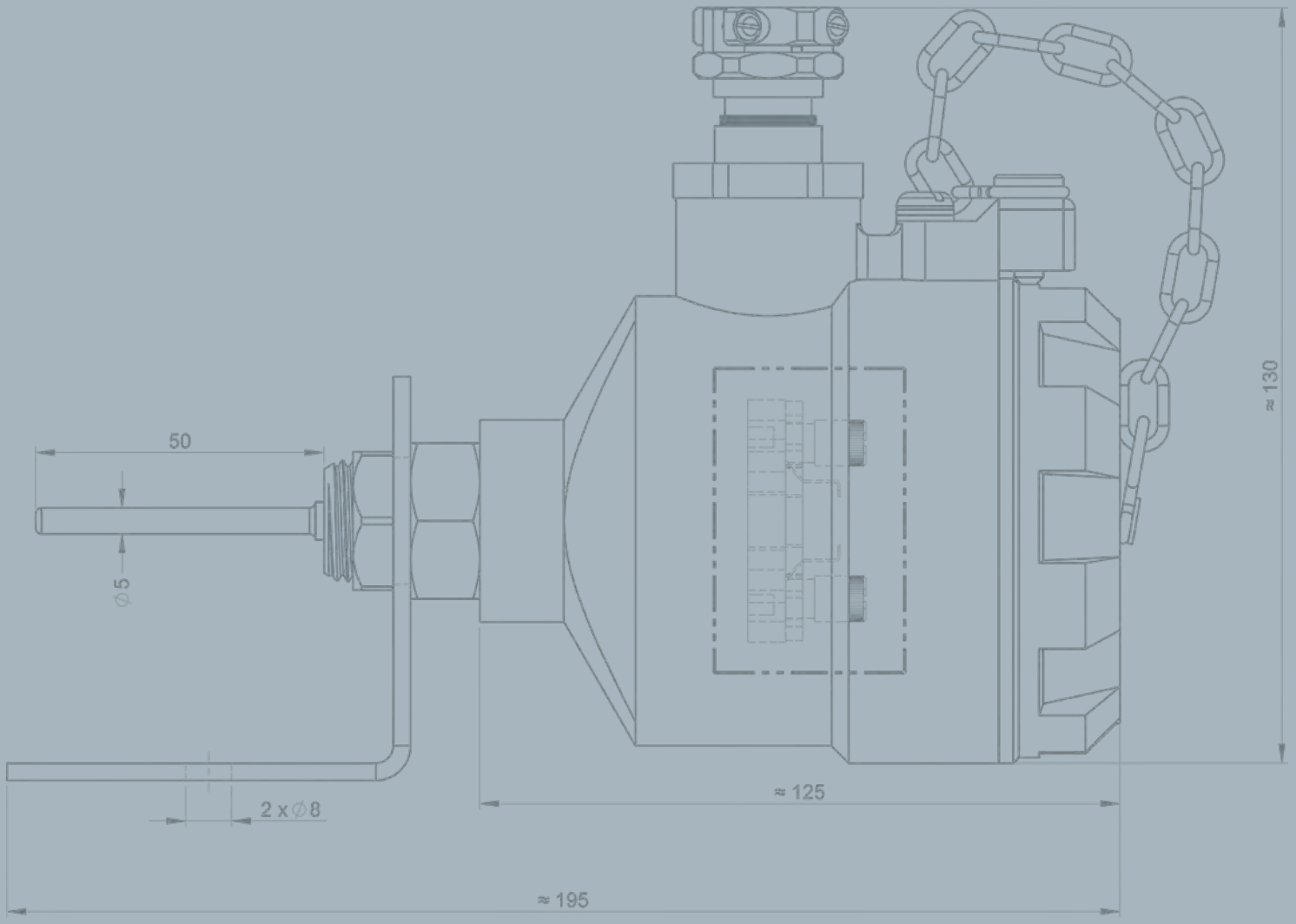


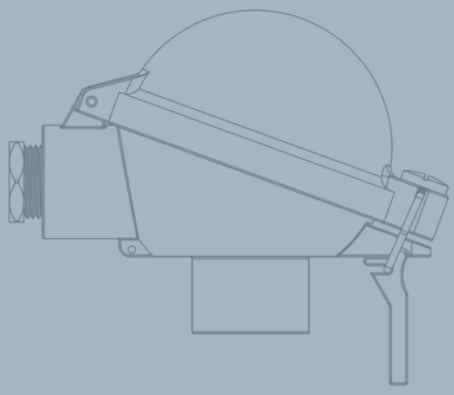


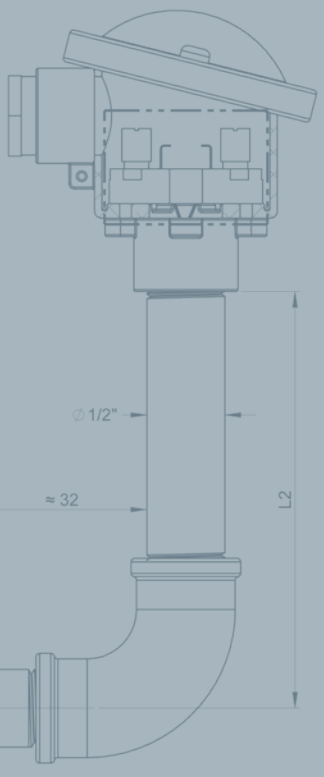







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Founded in 1893 by **Raphaël CHAUVIN** and **René ARNOUX**, **CHAUVIN ARNOUX** is an expert in the measurement of electrical and physical quantities in the industrial and tertiary sectors.

Total mastery of product design and manufacturing in-house enables the Group to innovate constantly, proposing a very broad product and service offering to meet all its customers' needs.

The **Group's quality policy** means it supplies customers with products which fulfil its commitments and comply with both the international and national standards in the metrological, environmental and user safety sectors.



A FEW FIGURES

- Sales revenues of **100** million d'euros
- **10** subsidiaries all over the world
- **1,000** staff
- **6** R&D teams worldwide
- **8** production sites
- **11%** of revenues invested in R&D

PYROCONTROLE

PYROCONTROLE joined the Chauvin Arnoux Group in 1997, benefiting since then from the Group's six Research and Development centres and its international sales network backed by ten subsidiaries in Europe, the USA and China.

Based near Lyon in the Auvergne-Rhône-Alpes region of France, PYROCONTROLE's industrial site designs highly accurate sensors for severe environments in all thermal process industries and solutions to deal with their temperature measurement and control requirements.

A wide range of sensors and expertise built up over many years in the industrial process chain make PYROCONTROLE an essential partner for sectors such as the nuclear, petrochemicals, glass and metallurgy industries. PYROCONTROLE also offers control equipment such as temperature controllers, electrical power controllers, paperless recorders and Human-Machine Interfaces associated with I/O Modules.

From tailored products to standardized, mass-produced models, PYROCONTROLE is capable of adapting to each customer's specific requirements and handling any temperature measurement issues thanks to its comprehensive mastery of the thermal process chain.

OUR BUSINESS SECTORS

MEASUREMENT

With more than 70 years' expertise, PYROCONTROLE's core business is the measurement of very high temperatures. The company designs temperature sensors, probes, pyrometric sensors and thermocouples for cutting-edge industries: nuclear, chemicals, petrochemicals, cement manufacturing, metallurgy and transport.

CONTROL

Any industrial manufacturing process requires the use of instruments and solutions for controlling the temperature and power. PYROCONTROLE's ranges of temperature and power controllers guarantee that your processes operate correctly.

SUPERVISION

Because it is essential to keep an eye on all your manufacturing processes, PYROCONTROLE has developed a range of paperless data recorders and supervision equipment which are crucial for validating a process, testing in real time, analysing and understanding afterwards what happened on an installation. It also guarantees reliable, unfalsifiable recordings.

METROLOGY

Equipped with a COFRAC-accredited metrology laboratory; PYROCONTROLE provides calibration services (which may be performed in situ) for temperature sensors and measuring instruments.

ACKNOWLEDGED KNOW-HOW IN KEY SECTORS



Nuclear



Chemicals & petrochemicals



Cement, glass, ceramics, metallurgy, agri-food



Rail, aviation

A COMPREHENSIVE OFFERING WITH A

Drawing on its total mastery of the thermal process chain, PYROCONTROLE proposes appropriate, reliable solutions to meet each customer's needs, with a unique offering constantly expanded by new product launches.

TEMPERATURE MEASUREMENT

- From standardized sensors to tailored sensors from -268 °C to +1 800 °C.
- Temperature sensors: industrial thermocouples, sensor assemblies, specific sensors, Pt100…



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METROLOGY

- Cofrac Metrology Laboratory
- Calibration range from -40 °C to +1,500 °C
- Calibration systems and equipment

HEATING ELEMENTS

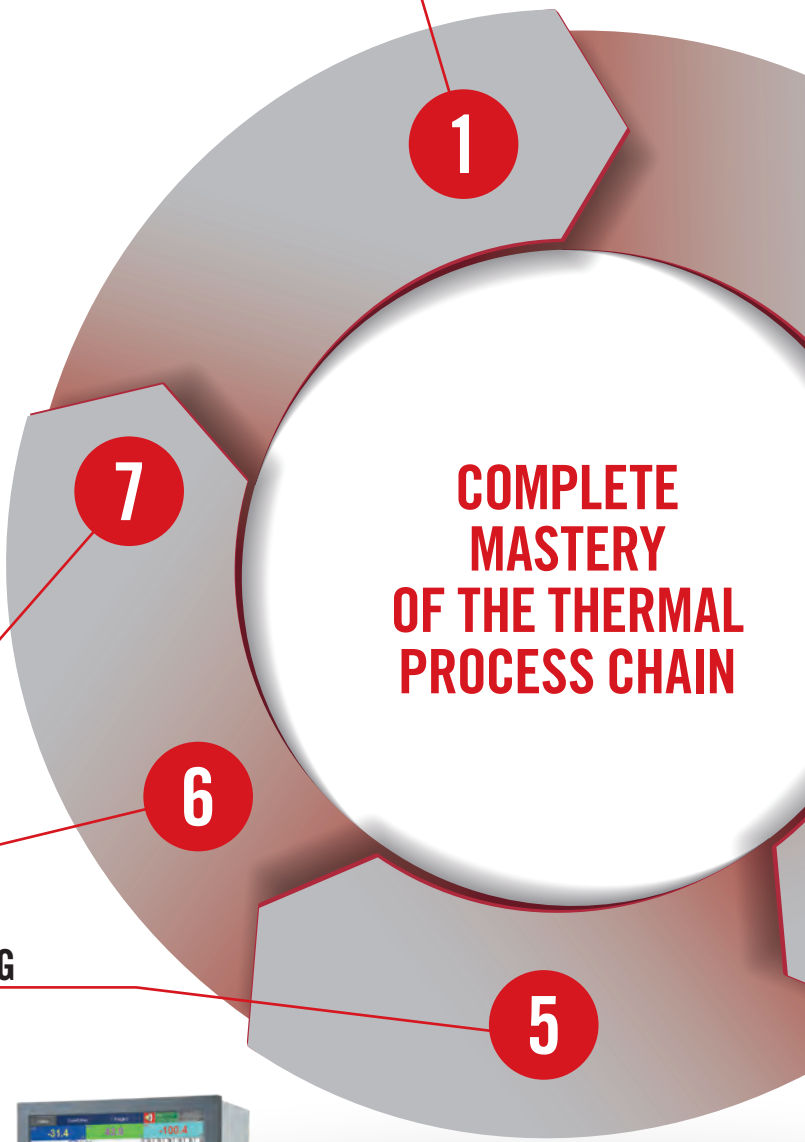
- PHR range



PROCESS RECORDING

- PYROtracer video recorders with touch screen®





SOLUTION FOR EACH REQUIREMENT

SIGNAL PROCESSING

- C.A 3420 universal transmitter for conditioning all the temperature and process signals.



2

TEMPERATURE CONTROL

- STATOP® temperature controllers: analogue or digital, in different formats, with fixed or universal inputs, etc. For further information on our range of temperature controllers (product datasheets, sales literature, etc.), please contact us.



3

POWER CONTROL

- Thyritop range of single-phase, bi-phase or three-phase thyristor power controllers from 15 A to 600 A for resistive and inductive loads.
- Training and commissioning services: “Control process”.

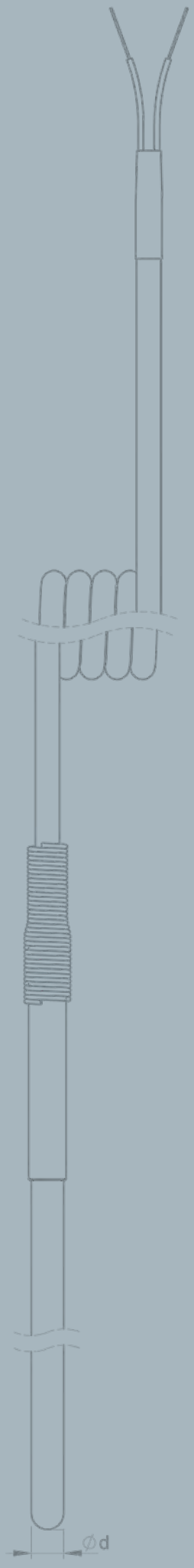


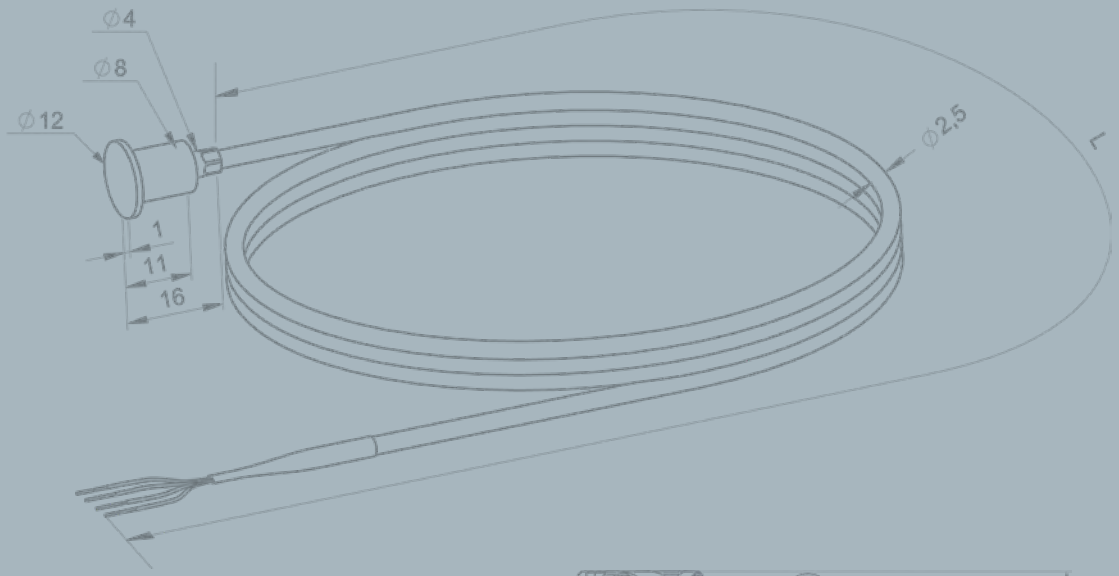
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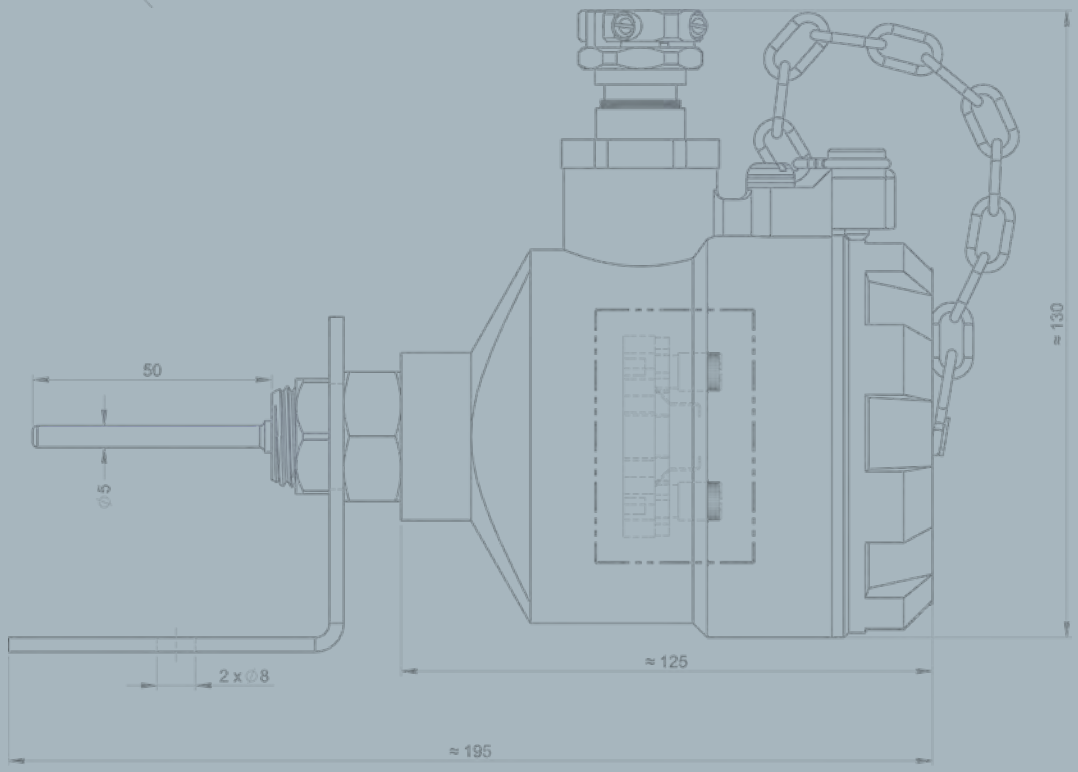
SUPERVISION

- CPS Touch© range of 4.3 to 15-inch touch-sensitive Human-Machine Interfaces for high-performance, intuitive industrial supervision.
- PDM input/output modules: a comprehensive range of economical, modulatable transmitters.
- Pyrotracer© “plug and play” paperless recorders, providing the data instantaneously for immediate processing.

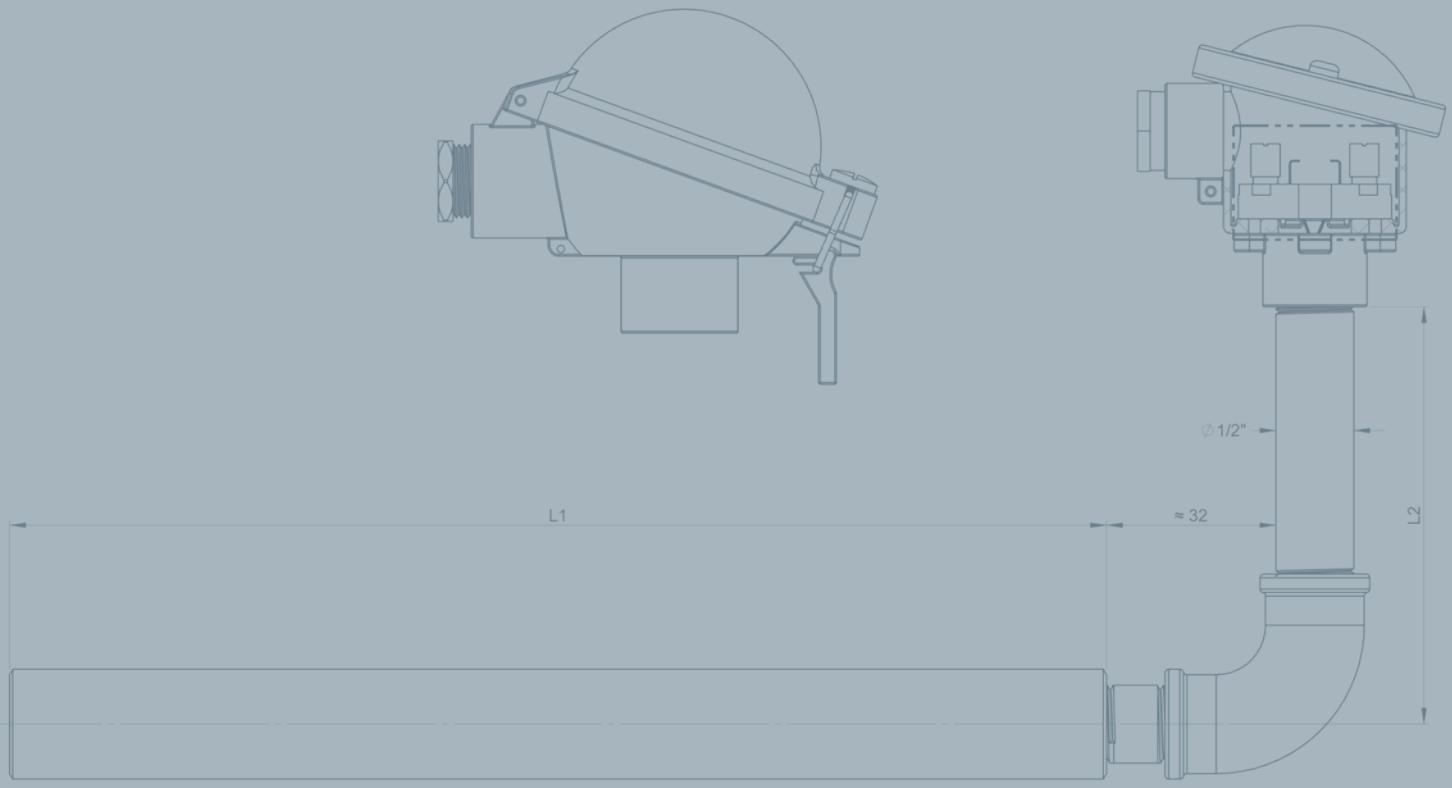








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A - TEMPERATURE

There are several definitions of temperature, depending on the field to which it refers. For example:

Physics: Physical phenomenon occurring as a manifestation of the kinetic energy which indicates the degree of thermal agitation of the molecules in a body or a substance; arbitrary parameter used to measure this phenomenon.

Climatology: Energy state of the air leading to varying degrees of heating.

Physiology: Heat level of a human or animal body.

Temperature is therefore an intensive quantity (quantity used to describe the state of a system whose numeric value does not depend on the amount of material constituting the system), which makes it difficult to measure and encourages the use of a practical scale based on repeatable, easily identifiable physical phenomena which enables it to be monitored.

Today, the applicable scale is the **1990 international temperature scale (ITS-90).** It is the result of improved knowledge of thermometry from the first scale, dating from 1927, through to the present. It is based on fixed temperature points (themselves based on the phase transitions of pure substances), instruments (thermometers) and formulae for interpolation between the fixed points or for extrapolation. This scale necessarily evolves over time due to the improved accuracy of the fixed-point temperatures, bringing the scale value closer to the thermodynamic temperature.

It is possible to identify two categories of temperature measurement units: absolute and relative.

- **Absolute** units start from absolute zero, theoretically the lowest temperature possible. It corresponds to the point where the molecules and atoms in a system have the lowest possible thermal energy.

- **Kelvin (international system)** : represented by the letter K without any "°" degree symbol. It was created by William Thomson. This unit was included in the international system of units in 1954. The thermodynamic temperature unit (the Kelvin) is defined on the basis of the triple point of water , 273.16 K (or 0.01 °C).

- **Relative** units because they are compared with a physical and chemical process which always produces the same temperature.

- **Degrees Celsius (international system)**: also called degrees centigrade and represented by the symbol °C. This measurement unit is defined by assigning the value 0° to the freezing point of water and the value 100° to the boiling point of water when both measurements are taken at a pressure of one atmosphere. The scale is then divided into 100 equal portions in which each corresponds to 1 degree. This scale was proposed by the Swedish physicist and astronomer Anders Celsius in 1742.

- **Degrees Fahrenheit (international system)**: this measurement unit is based on divisions between the freezing and evaporation points of ammonium chloride solutions. In this way, Daniel Gabriel Fahrenheit's proposal in 1724 established the zero and hundred for the freezing and evaporation temperatures of ammonium chloride in water. He used a portable mercury thermometer into which he introduced a mixture of equal measures of crushed ice and ammonium chloride. This concentrated saline solution gave the lowest temperature possible in the laboratory at the time. He then made another mixture of crushed ice and pure water which determined the point 30 °F, later set at 32 °F (melting point of ice), and exposed the portable thermometer to the steam from boiling water to obtain the point 212 °F (boiling point of water). The difference between the two points is 180 °F which, divided into 180 equal portions, determines the degree Fahrenheit. .

ITS-90 is defined for temperatures above 0.65 K and up to the highest temperature measurable according to Planck's law for monochromatic radiation. The temperature measured with this scale (T90) is the closest to the thermodynamic temperature. This means it is universal..

ITS-90 covers several temperature ranges. For each temperature range, it therefore defines fixed temperature points and a specific instrument for measurement and interpolation between these fixed points. The fixed temperature points correspond to phase transitions in pure substances. For example, the freezing points of zinc, tin or silver, the melting point of gallium or the triple points of oxygen, mercury or water.

FIXED-POINT TEMPERATURE (IN K)	SUBSTANCE	TYPE OF POINT
3 to 5	helium	saturation vapour pressure
13.8033	hydrogen	triple
approx. 17	hydrogen (or helium)	saturation vapour pressure (or gas thermometer)
approx. 20.3	hydrogen (or helium)	saturation vapour pressure (or gas thermometer)
24.5561	neon	triple
54.3584	oxygen	triple
83.8058	argon	triple
234.3156	mercury	triple
273.16	water	triple
302.9146	gallium	melting
429.7485	indium	freezing
505.078	tin	freezing
692.677	zinc	freezing
933.473	aluminium	freezing
1,234.93	silver	freezing
1,337.33	gold	freezing
1,357.77	copper	freezing

In particular, for the most widely-encountered temperatures, ITS-90 defines :

- 14 fixed points between 13.803 K (-259.346 °C) and 1,234.93 K (+961.78 °C) and the interpolation instrument is a standard platinum resistance thermometer;
- 3 fixed points above 1,234.93 K (961.78 °C) and the temperature is measured by optical pyrometry, using Planck's radiation law by extrapolation at one of these three fixed points.

Today, temperature is the most widely-measured quantity apart from time. In industry, this quantity is particularly important. Indeed, it often conditions the quality of manufactured products. In addition, it is measured and controlled (by controllers, PLCs or other devices) to ensure safe processes and keep energy spending in check.

This means you must use sensors suited to the processes and enabling the most accurate measurement possible according to the conditions of use. There are two types of sensors widely used to perform this function.

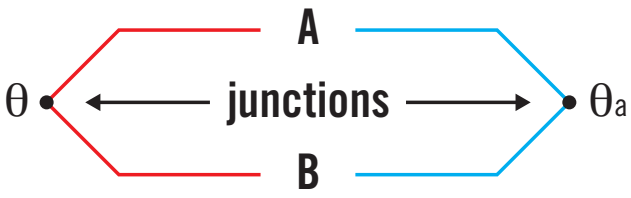
B - THERMOCOUPLES

1 - TECHNICAL OVERVIEW

The Seebeck effect (or thermo-electric effect):

The German physicist Thomas Johann Seebeck gave his name to the phenomenon which he discovered in 1821. It corresponds to the appearance of an electromotive force (emf) caused by a temperature difference between the junctions of two conductors of different types (A and B below). The emf depends on the temperature difference and the nature of the conductors used.

This is the phenomenon which is used for temperature measurement. A thermocouple is therefore composed of two wires of different metals, welded at one of their extremities. This junction is called the "hot junction" and is set up in the milieu whose temperature we are seeking to measure. The other two extremities are connected to the instrument measuring the emf produced by the thermocouple. This junction is called the "cold junction". The reference temperature of this cold junction is usually 0°C.



The thermocouple defined above is characterized by:

Its operating range

Its resolution limit, in mV/°C. This corresponds to the emf caused by a temperature difference between the two junctions.

The emf generated by this temperature difference can be calculated using the following formula:

$$\Delta V = \int_{T_{ref}}^{T_c} S_{ab}(\theta)\, d\theta$$

Tc : temperature of the milieu to be measured in which the hot junction is immersed.

Tref : temperature of the cold junction

Sab : Seebeck coefficient depending on the nature of the conductors A and B

In practice, this emf is often indicated by forcing the cold junction temperature to 0°C. For a cold junction maintained at 0 °C, the evolution of the emf as a function of the hot junction temperature is not linear. A thermocouple whose emf varies significantly can be used to perform measurements with greater sensitivity. This means the measurement is more accurate.

2 - LAWS GOVERNING THE USE OF THERMOCOUPLES

3 fundamental principles govern the thermo-electric phenomenon:

- The Seebeck effect (see above)
- The Peltier effect
- The Thompson effect

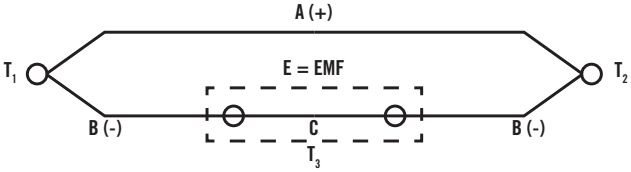
The following 3 laws are derived from these 3 principles

- Law of intermediate metals (or conductors)
- Law of homogeneous metals (or circuits)
- Law of intermediate (or successive) temperatures

Law of intermediate metals:

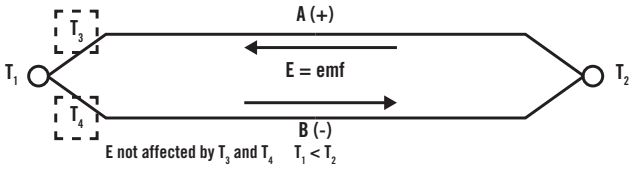
This law stipulates that a metal (a conductor of a different type) added to the thermocouple circuit has no effect on the emf produced, as long as the junctions of the metal added to the other metals are at the same temperature.

This situation is very frequent. It is the case when a voltmeter or other instrument (equivalent of a single conductor) is used: it will not modify the emf to be measured.



Law of homogeneous metals:

This law stipulates that "an electric current cannot be maintained in a circuit composed of a single homogeneous metal, whatever the variations in terms of cross-section, simply by applying heat". If a junction of two different metals is maintained at temperature T1, while the other is kept at T2, the emf effect produced is independent and not affected by the temperature distribution along the wires T3 and T4.



Law of intermediate temperatures:

In industrial installations, it is not easy to keep a thermocouple's reference junction at a constant temperature (0°C). Indeed, systems need to be implemented so that the emf produced at the level of the reference junction is equivalent to the emf which would be generated if the reference junction was kept at a standard temperature, usually 0°C.

The law of intermediate temperatures provides a means of linking the emf produced by a thermocouple in ordinary conditions to a constant standardized temperature. This law stipulates that the sum of the emf values produced by two thermocouples (one with its junctions at 0°C and at a standard reference temperature, the other with its junctions at the reference temperature and at the temperature measured) is equivalent to the emf produced by a single thermocouple with its junctions at 0°C and at the temperature measured.

Conclusion:

By combining these three fundamental laws, we can use the thermocouple to measure a temperature:

- The algebraic sum of the thermo-electric emf generated in any circuit containing homogeneous metals of different natures only varies as a function of the temperature at the level of the junction.
- If all the junctions of a circuit except one are kept at a given reference temperature, the emf generated only varies as a function of the temperature of that junction and can therefore be used to measure the temperature.

3 - THERMOCOUPLE PRODUCTION MODES

In general terms, thermocouples are very widely used in industry due to their versatility: they can be used over a very wide temperature range (up to 2,000 °C) while offering a quick response time and a long life span. They are also rugged, because they are relatively simple to build and resist shocks and vibrations. They are easy to integrate because they do not take up much space.

Nevertheless, no thermocouple is designed to meet all requirements. Many types of thermocouples are now available on the market. Each type offers advantages and drawbacks which you need to be familiar with to determine whether it is suitable for the environment in which it will be used. It is a question of finding the best compromise.

There are several production modes. They most widespread are:

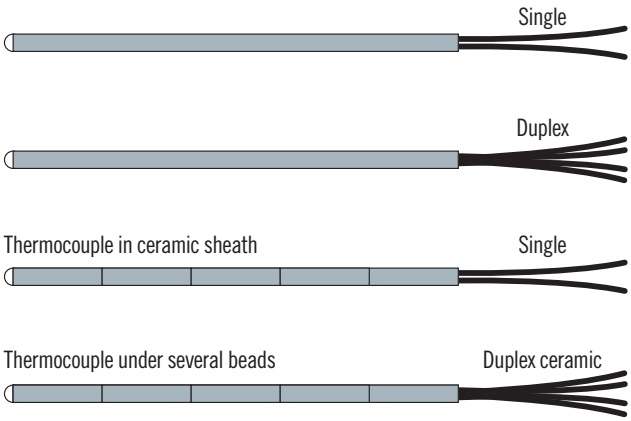
- Bare-wire thermocouples
- Thermocouples with mineral insulation

3.1 BARE-WIRE THERMOCOUPLES:

The wire thermocouple is the most basic type. It is composed of two metals of different types connected at one end in order to create a measurement junction (hot junction). The common feature shared by this type of thermocouples is that they all have one measurement junction exposed.

For most of them, the advantages are: quick response time, rugged design and use at high temperatures. The fact that the junction is exposed is nevertheless a disadvantage, as this exposure makes it sensitive to the environment (particularly in oxidizing and reducing environments). As a result, they need to be protected.

The illustration below shows the different mounting options for bare-wire thermocouples.



3.2 THERMOCOUPLES WITH MINERAL INSULATION:

To overcome the disadvantages of the wire models, thermocouples with mineral insulation can be used. The thermocouple's two wires are incorporated in a ceramic insulator and protected by a metal sheath. To ensure a long life span for the thermocouple, sheaths which protect against contamination by chemical products and known physical compounds are used.

The two main components are:

A : The material of the mineral insulation:

The table below shows the four most widely-used materials for this type of thermocouple.

					STABILITY				
INSULATION	FORMULA	MELTING POINT	MAX. TEMP. IN OXIDIZING ENVIRONMENT	RES. TO THERMAL SHOCKS	REDUCING ATM.	CARBON	ACIDIC SLAG	BASIC SLAG	METAL
Alumina	Al 2 O 3	2037°C	1954°C	Good	Good	Satisfactory	Good	Good	Good
Magnesium	MgO	2760°C	2395°C	Satisfactory	Low	Good	Low	Good	Satisfactory
Thorium dioxide	ThO 2	3315°C	2700°C	Low	Good	Satisfactory	Low	Good	Excellent
Zirconium dioxide	ZrO 2	2590°C	2510°C	Satisfactory	Good	Satisfactory	Good	Low	Good

The most important parameters to be taken into consideration when choosing mineral insulation are the maximum temperature limit and the performance levels at that temperature. Obviously, other parameters may also be taken into account, such as the resistivity, purity and fragmentation. These parameters remain secondary to the temperature, however. For example: MgO, which is the most widely-used insulator, has a maximum temperature limit of 2.395 °C, high resistivity, excellent purity and is very rugged.

B : The metal sheath

The table below shows some of the numerous materials which may be used to protect thermocouples with mineral insulation. The two most important parameters for choosing the sheath are: the operating temperature and the environment. The environment may be oxidizing, reducing, neutral or in a vacuum. For example, the stainless-steel 304 sheath can be used in any type of environment with a maximum operating temperature of 890 °C.

MATERIAL OF THE SHEATH WITH MINERAL INSULATION				
SHEATH	MELTING POINT IN °C	MAX. AIR TEMP. IN °C	TYPE OF ENVIRONMENT	MAX. CONTINUOUS TEMPERATURE
304 SS	1400°C	1048°C	O,R,N,V	895°C
310 SS	1400°C	1071°C	O,R,N,V	1145°C
316 SS	1250°C	960°C	O,R,N,V	930°C
321 SS	1415°C	815°C	O,R,N,V	871°C
347 SS	1425°C	915°C	O,R,N,V	871°C
Inconel	1398°C	1095°C	O,N,V (*)	1145°C
Copper	1082°C	315°C	O,R,N,V (**)	315°C
Aluminium	660°C	425°C	O,R,N,V	371°C
Platinum	1770°C	1648°C	O,N (*)	1648°C
Molybdenum	2620°C	535°C	V,N,R	2626°C
Tantalum	3004°C	400°C	V	2760°C
Titanium	1815°C	315°C	V,N	1090°C

O = Oxidizing R=Reducing. N = Neutral. V = Vacuum
(*) = Sensitive to sulphuric corrosion
(**) = Deteriorates quickly in oxidizing environments

4 - TECHNICAL SPECIFICATIONS OF THERMOCOUPLES

4-1 : THE DIFFERENT TYPES OF HOT JUNCTIONS:

The part where the hot junction is made is exposed to the temperature to be measured. There are three main types of assembly:

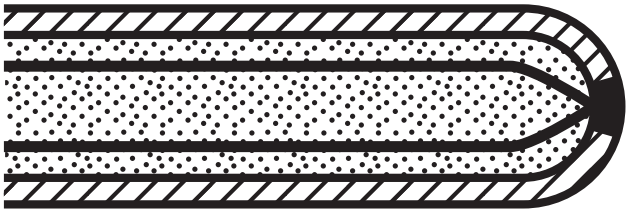
- Exposed hot junction
- Earthed hot junction
- Insulated hot junction

Exposed hot junction:

This type of junction provides a very quick response time. However, the thermocouple must be used in environments where the conditions are mild (neutral atmosphere, at atmospheric pressure, without any mechanical shocks or abrasions, etc.). In more severe conditions, the thermocouple may be designed for single use (in metallurgy for example).

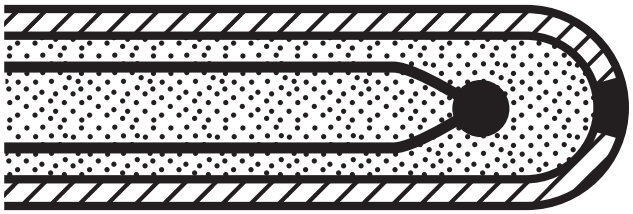
Earthed hot junction:

For this type of assembly, sheathed thermocouples are used. The hot junction is itself welded to the sheath to ensure a quick response time. In this way, the thermocouple is protected from the environmental conditions in which it is set up. With this production mode, thermocouples with small diameters may have a response time identical to or even better than the exposed junctions. Indeed, thanks to the sheath, the operational capability (better resistance to reducing or oxidizing atmospheres, for example) and the maximum temperature withstand are improved.



Insulated hot junction:

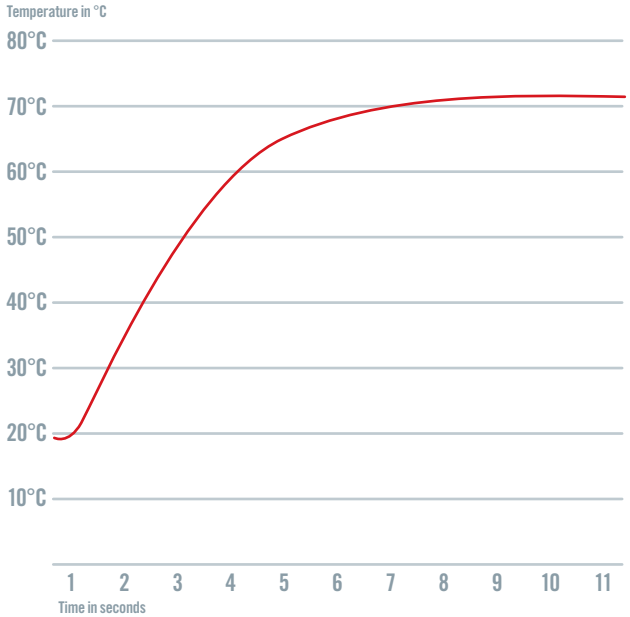
In this assembly, the hot junction and the sheath of the sheathed thermocouple are insulated by mineral insulation. This type of junction will be chosen if the thermocouple is used in an industrial environment. Indeed, without insulation, there may be electrical disturbances which interfere with the measurement. They may also damage or even destroy the instruments to which the sensors are connected. The drawback is a longer response time than the two previous types of assembly with an equivalent external diameter.



4-2 – RESPONSE TIME:

The value of the response time in seconds can be used to characterize the rapidity of the thermocouple's response after a thermal stress. This value represents the time necessary to reach 63% of the final value.

(below: graph showing a response time measurement)
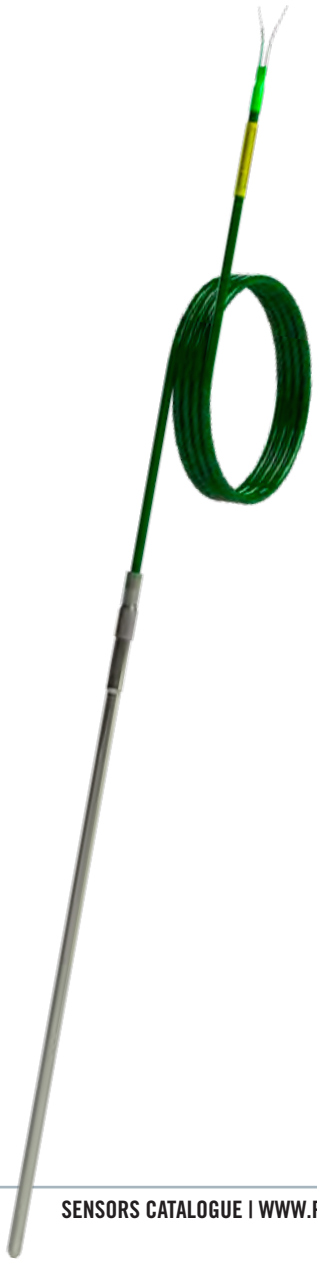


Depending on the type of hot junction used, the characteristic response times which can be obtained are indicated below:

- Exposed: 0.1 seconds
- Earthed: 2.1 seconds
- Insulated: 4.5 seconds

The values in the table below are valid for thermocouples made with a sheathed cable and mineral insulation. They are given for information purposes.

DIAMETER	HOT JUNCTION	RESPONSE TIME (S)
0.5 mm	Insulated	0.3
0.5 mm	Earthed	0.05
1.0 mm	Insulated	0.4
1.0 mm	Earthed	0.1
3.0 mm	Insulated	1.5
3.0 mm	Earthed	0.7
4.5 mm	Insulated	2.0
4.5 mm	Earthed	1.1
6.0 mm	Insulated	4.0
6.0 mm	Earthed	2.1
6.0 mm	Exposed	0.1

Generally, the larger the diameter of the thermocouple, the longer the response time and the longer the life span of the sensor.



4-3 – REFERENCE STANDARD:

The IEC 584 standard and its French version NF EN 60584 cover thermo-electric couples

Part 1: Specifications and tolerances regarding emf
Part 3: Extension and compensation cables

Table of the correspondence between temperature and emf according to the type of thermocouple (extract from the NF EN 60584-1 standard):

TEMP.	TYPE OF THERMOCOUPLE							
	IEC 584							ASTM E988
	T	J	K	N	R	S	B	WRe 3 % -25 %
-40°C	-1.475	-1.960	-1.527	-1.023	-0.188	-0.194		
0°C	0	0	0	0	0	0	0	0
50°C	2.036	2.585	2.023	1.340	0.296	0.299	0.002	0.528
100°C	4.279	5.269	4.096	2.774	0.647	0.646	0.033	1.145
150°C	6.704	8.010	6.138	4.302	1.041	1.029	0.092	1.841
200°C	9.288	10.779	8.138	5.913	1.469	1.441	0.178	2.603
300°C	14.862	16.327	12.209	9.341	2.401	2.323	0.431	4.287
400°C	20.872	21.848	16.397	12.974	3.408	3.259	0.787	6.130
500°C		27.393	20.644	16.784	4.471	4.233	1.242	8.078
600°C		33.102	24.905	20.613	5.583	5.239	1.792	10.088
800°C			33.275	28.455	7.980	7.345	3.154	14.170
1000°C			41.276	36.256	10.506	9.587	4.834	18.230
1200°C			48.838	43.846	13.228	11.951	6.786	22.149
1400°C					16.040	14.373	8.956	25.882
1600°C					18.843	16.777	11.263	29.412
1800°C							13.591	32.712
2000°C								35.717

TYPE OF THERMOCOUPLE	TOLERANCE VALUES (±°C) AND TEMPERATURE LIMITS FOR VALIDITY		
	CLASS 1	CLASS 2	CLASS 3
Type T	0.5 or 0.004 x [t] -40°C to +350°C	1 or 0.0075 x [t] -40°C to +350°C	1 or 0.015 x [t] -200°C to +40°C
Type E Type J Type K Type N	1.5 or 0.004 x [t] -40°C to +800°C -40°C to +750°C -40°C to +1,000°C -40°C to +1,000°C	2.5 or 0.0075 x [t] -40°C to +900°C -40°C to +750°C -40°C to + 1,200°C -40°C to +1,200°C	2.5 ou 0.015 x [t] -200°C to 40°C - -200°C to 40°C -200°C to 40°C
	1 for t < 1,100°C. [1 + 0.003 x (t= 1,100)] for t > 1,100°C	1.5 or 0.0025 x [t]	4 or 0.005 x [t]
Type R or S Type B	0°C to +1,600°C -	0°C to +1,600°C +600°C to +1,700°C	- - 600°C to +1,700°C
	-	0.01 x [t]	-
Type C Type A	- -	+426°C to +2.315°C +1,000°C to +2,500°C	- -

EXTENSION OR COMPENSATION CABLES

TC TYPE	EXTENSION CODE	COMPENSATION CODE	IEC 584-3 JULY 90
T	TX	TC	
J	JX	JC	
E	EX	EC	
K	KX	KC	
N	NX	NC	
R-S	-	KC / SCA	
B	-	BC	

5 -THERMOCOUPLE SELECTION CRITERIA FOR DEFINING A THERMOCOUPLE-BASED TEMPERATURE SENSOR

The thermocouples defined in the standard have different temperature ranges according to the atmosphere in which they are immersed. It is essential to know these parameters when choosing the type of thermocouple to use.

The table below indicates the theoretical temperature range for use of the thermocouples and the acceptable atmospheres:

TYPE OF THERMOCOUPLE	CODE	TEMPERATURE RANGE	ATMOSPHERE
Cu - CuNi	T	-20 °C / +350 °C	Moderately oxidizing or reducing
Fe - CuNi	J	-20 °C / +760 °C	Reducing, limited use in oxidizing atmospheres
NiCr - Ni alloy	K	-40 °C / +1100 °C	Oxidizing when clean or inert
Nicrosil - Nisil	N	0 °C / 1100 °C	Oxidizing when clean, limited use in reducing atmospheres
Pt - PtRh13%	R	0 °C / 1600 °C	Oxidizing
Pt - PtRh10%	S	0 °C / 1550 °C	Oxidizing
PtRh6 % - PtRh30%	B	100 °C / 1600 °C	Oxidizing
Tungsten W) Rhenium (Re)	C, A	0 °C / 2300 °C	Reducing, inert, hydrogen

5-1 BARE-WIRE THERMOCOUPLE

In many applications, type-K thermocouples can be used (temperature less than 1100°C).

We recommend the beaded types for platinum/rhodium thermocouples which can be used at higher temperatures.

For R, S and B thermocouples, we use a nominal wire size of 0.5 mm. The insulant used for this type of thermocouple is 99.7 %-pure alumina.

5-2 CHOOSING THERMOCOUPLES WITH MINERAL INSULATION

The behaviour of sheathed thermocouples is closely linked to their diameter in relation to the operating temperature.

Max. operating temperature for sheathed thermocouples:

TC	SHEATH		TEMP. MAXI. (°C)
	Ø (MM)	TYPE	
T	1	Stainless steel 304L	260
	1.5		260
	2		260
	3		315
	4.5		350
	6		350
	8		350
J	1	Stainless steel 304L	260
	1.5		440
	2		440
	3		520
	4.5		620
	6		720
	8		720
K	1	AISI 310	650
	1.5		650
	2		700
	3		750
	4.5		800
	6		800
	8		800
	1	AISI 446	700
	1.5		920
	2		920
	3		1070
	4.5		1100
	6		1100
	8		1100
	0.5	Inconel 600	600
	1		650
	1.5		650
	2		700
	3		750
	4.5		800
	6		1000
	8		1050
N	1.5	Inconel 600	650
	2		700
	3		750
	4.5		800
	6		1000
	3	Pyrosil	1070
	4.5		1150
	6		1150
	8		1150
S	1.5	Inconel 600	800
	2		800
	1.5	PtRh10%	1300

These max. operating temperatures are provided as an indication. The operating conditions (oxidizing or reducing atmosphere, thermal cycling, etc.) may alter these characteristics.

Particular attention should be paid to drift, which may be significant with thermocouples (pollution, metallurgical diffusion at the hot spot, etc.).

Periodic calibration may be appropriate or even necessary to detect this drift.

The table below shows the most widely-used thermocouples.

OUR STANDARD DIAMETERS FOR OUR MI CABLES (CABLES OF THERMOCOUPLES WITH MINERAL INSULATION)		
DIAMETER	TC TYPE	SHEATH
0.5 mm	K,N,J and T	Inconel 600 or SS 316
1.0 mm	K,N,J and T	Inconel 600 or SS 316
1.5 mm	K,N,J and T	Inconel 600 or SS 316
3.0 mm	K,N,J,R,S and T	Inconel 600 or SS 316
6.0 mm	K,N,J,R,S and T	Inconel 600 or SS 316

Notes: Other diameters and sheaths are available on request. For example: type-N thermocouples are available with several Nicrobel and/or Pyrosil sheaths.

C - RESISTANCE SENSORS

1 - TECHNICAL OVERVIEW

A resistance sensor, also called an RTD (Resistance Temperature Detector) works by taking advantage of the fact that the electrical resistance of certain metals increases or decreases when the temperature changes and these variations are reproducible and predictable.

RTD temperature ranges are smaller than those of some thermocouples and their response times are longer, but they are more stable and offer better repeatability over long periods of time.

Compared with thermocouples, they have the following advantages:

1. Large temperature range from -200 °C to +650 °C (theoretical, see below)
2. Characteristic quasi-linear curve
3. High accuracy
4. Good interchangeability

In industry, the most widely-used RTD is the Pt100 sensor. It is made of platinum (Pt) and has a resistance of 100 ohms at 0°C. Other variants also exist: Pt50, Pt200, Pt1000, as well as RTDs made of copper or nickel (used less and less frequently).

LAW OF RESISTANCE VARIATION/TEMPERATURE

The fundamental values of platinum measurement resistors in the 0 to 850°C and -200 to 0°C operating ranges are determined on the basis of the following interpolation functions (values based on ITS-90):

$R(t) = R_0 (1 + At + Bt^2)$ from 0°C to 850°C

$R(t) = R_0 [1 + At + Bt^2 + Ct^3 (t-100)]$ from -200°C to 0°C

$A = 3.9083 \times 10^{-3}\ °C^{-1}$

$B = -5.775 \times 10^{-7}\ °C^{-2}$

$C = -4.183 \times 10^{-12}\ °C^{-3}$

Two different technologies are used:

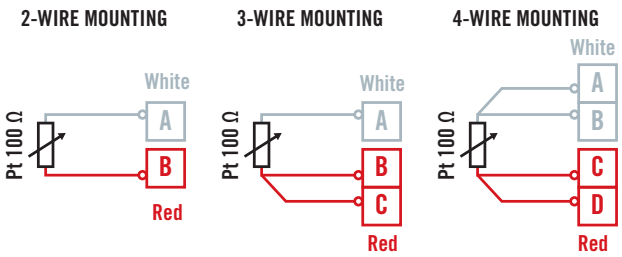
- **resistors made of platinum wire wound on an insulating support.** In most cases, this support is ceramic, but glass supports are also used. The operating ranges extend up to 450 °C, and exceptionally up to 850 °C.

These sensing elements are used because of their high accuracy and stability.

- **platinum film deposited on a ceramic substrate.** The operating ranges extend up to 450 °C. They are less stable than traditional wound elements, but they offer excellent vibration withstand up to 200 °C, shorter response times and lower costs.

2 - MOUNTING OF A PT100 SENSOR

There are 3 possible ways of mounting a Pt100 probe in a sensor:



These three mounting methods each have advantages and disadvantages.

- 2-wire mounting is the simplest and cheapest but it is also the least accurate. Indeed, the resistance of the connection cables is added to the sensor's resistance, leading to a significant error which increases with the length of the cable.

The resistance of the cables is:

R= Ro xL/s

where Ro is the resistivity of the cable (depends on the material used)

L : is the cable length

S : is the cross-section of the conductor

Copper has a resistivity of 17x10-9 ohms/metre.

If you use a copper cable with two conductors whose cross-section is 0.25mm² and whose length is 1 metre to hook up the Pt100, the resistance will be:

R = 17x10-9 x 1 / 0.25x10-6 = 0.068 ohm per conductor.

The total resistance will be 0.136 ohm.

As it is known that the resistance of a Pt100 varies by 0.3851 ohm/°C, 0.136 ohm represents an error of 0.35 °C!

- 3-wire mounting is the most widely-used method in industry because it offers the best compromise between cost and accuracy. Indeed, with this type of mounting, the cable's resistance is compensated by measuring the resistances of the loops A-B and B-C by means of a Wheatstone bridge. This implies that the three conductors have the same resistance. As this is never the case, there is still an error but it is minimal.

- 4-wire mounting is the most accurate because the line and contact resistance are eliminated by measurement (measurements between A-D and B-C). This solution is mainly used in the laboratory because it is more expensive to implement (addition of an extra conductor).

3 - STANDARD

The IEC 60751 international standard (Industrial platinum resistance thermometers and platinum temperature sensors) defines the specifications for the sensing elements and for temperature sensors, including:

- The relation between resistance and temperature
- the tolerances for the elements
- the tolerances for the sensors

IEC 751 CORRESPONDENCE TABLE (EXTRACTS): TEMPERATURE AND RESISTANCE

°C ITS 90	Ω	°C ITS 90	Ω	°C ITS 90	Ω	°C ITS 90	Ω	°C ITS 90	Ω
-200	18.52	10	103.9	210	179.53	410	250.53	610	316.92
-190	22.83	20	107.79	220	183.19	420	253.96	620	320.12
-180	27.10	30	111.67	230	186.84	430	257.38	630	323.30
-170	31.34	40	115.54	240	190.47	440	260.78	640	326.48
-160	35.54	50	119.4	250	194.10	450	264.18	650	329.64
-150	39.72	60	123.24	260	197.71	460	267.56	660	332.79
-140	43.88	70	127.08	270	201.31	470	270.93	670	335.93
-130	48.00	80	130.90	280	204.90	480	274.29	680	339.06
-120	52.11	90	134.71	290	208.48	490	277.64	690	342.18
-110	56.19	100	138.51	300	212.05	500	280.98	700	345.28
-100	60.26	110	142.29	310	215.61	510	284.30	710	348.38
-90	64.30	120	146.07	320	219.15	520	287.62	720	351.46
-80	68.33	130	149.83	330	222.68	530	290.92	730	354.53
-70	72.33	140	153.58	340	226.21	540	294.21	740	357.59
-60	76.33	150	157.33	350	229.72	550	297.49	750	360.64
-50	80.31	160	161.05	360	233.21	560	300.75	760	363.67
-40	84.27	170	164.77	370	236.70	570	304.01	770	366.70
-30	88.22	180	168.48	380	240.18	580	307.25	780	369.71
-20	92.16	190	172.17	390	243.64	590	310.49	790	372.71
-10	96.09	200	175.86	400	247.09	600	313.71	800	375.70
0	100.00							810	378.68
								820	381.65
								830	384.60
								840	387.55
								850	390.48

SENSOR TOLERANCE CLASSES

The IEC 751 standard defines the interchangeability tolerances as follows:

TOLERANCE CLASS	TOLERANCE
A	0.15 + 0.002 x [t]
B	0.3 + 0.005 x [t]

[t] is the absolute temperature value in °C.

According to the standard, the temperature sensors must not be exposed to temperatures higher than 600°C.

Drawing on our experience, we limit our industrial Pt 100 sensors to 450 °C in Class A.

TOLERANCE CLASSES FOR PT100 SENSORS

TEMPERATURE (°C)	TOLERANCE			
	CLASS A		CLASS B	
	(+/-°C)	(+/-Ω)	(+/-°C)	(+/-Ω)
-200	0.55	0.24	1.30	0.56
-100	0.35	0.14	0.80	0.32
0	0.15	0.06	0.30	0.12
100	0.35	0.13	0.80	0.30
200	0.55	0.20	1.30	0.48
300	0.75	0.27	1.80	0.64
400	0.95	0.33	2.30	0.79
500	2.80		0.93	
600	3.30		1.06	

The standard offers the possibility of having tolerance classes defined on the basis of a fraction of Class B.

Class B/3: Tolerance: 0.1 + 0.0017 x t

D - THERMOWELLS

Thermowells and protective tubes are used to protect the measuring elements of the thermocouples (hot junctions) or Pt100 sensors against mechanical damage and corrosive or contaminating environments.

The various types of construction available help users to choose the right combination for their needs.

For example: cast-iron protective tubes are mainly used in installations using molten aluminium, magnesium or zinc. Ceramic tubes are used in sectors such as the steel, glass, cement and lime industries. Their main advantages are their resistance to high temperatures and thermal shocks, their chemical inertness, their good resistance to abrasion and their high dielectric strength.

Thermowells must do two main jobs: :

The first involves protecting the temperature sensors against corrosion or oxidization linked to the treatment and against mechanical stresses. Each of the aforementioned materials provides different levels of protection for different operating conditions. They also enable the sensors to be dismantled without halting production.

The second is to ensure safety on the installation by providing perfect tightness between the process and the exterior. This means they must be designed to withstand the sometimes severe conditions in terms of pressure, flow rate and viscosity of the medium in which they are immersed.

When Directive No. 2014/68/EU: PRESSURE EQUIPMENT is applicable on our customers' installations, we can provide elements ensuring compliance (see chapter D-2).

In the pages which follow, you will find a list of the different materials, accompanied by recommendations concerning their use. As a general rule, it is advisable to use elements with a high chrome content because of its resistance to oxidization and sulphur at high temperatures. The presence of aluminium (1-2 %) in the surface is also useful because of its high resistance: a protective film forms, made up of a mixture of chrome oxide and alumina.

D-1 : MATERIALS FOR THERMOWELL CONSTRUCTION

Many types of steels and nickel-based alloys are used to manufacture thermowells. No other material is capable of withstanding the required operating conditions.

It is important to use the right metal for this type of product. Obviously, the use of an unsuitable metal will lead to premature malfunction, while a metal exceeding the required specifications for a given installation will lead to pointless expenditure.

The main metals used to make thermowells are carbon steel, chromium molybdenum steel, stainless steels (304, 310, 316, 321, 347, 304L, 316L, 446) and nickel-based alloys (Inconel, Incoloy, Hastelloy).

- STAINLESS STEELS:

Metals in this group form an invisible film of chrome oxide which withstands oxidization and corrosive attack by chemicals and acids. To be effective, they must contain at least 14 % chrome. Stainless steels in the 300 series are termed "austenitic", while those in the 400 series are called "ferritic". Unlike ferritic steels, austenitic stainless steels do not become brittle at low temperatures.

SS 304 : This austenitic stainless steel is generally the most widely recommended. Like the other stainless steels in the 300 series, SS 304 steel is subject to "carbide precipitation" between 370 and 900 ºC. In other words, the chrome produces carbides when SS 304 steel is cooled slowly within this temperature range. The ultimate result is localized depletion of the chrome around the carbides, which may lead to intergranular corrosion by acids or other corrosive substances.. This effect is particularly visible at the level of the welds (leading to disintegration of the welds). The maximum air temperature which SS 304 steel can withstand in continuous operation is 900 ºC. Constant vigilance is necessary because the solidity of the metal falls significantly at high temperatures. SS 304 steel is very widely used for producing thermowells for low-temperature applications as most organic and inorganic chemicals have no effect on it.

SS 310 : Contains more chrome (25 %) and nickel (20 %) to improve its high temperature withstand. SS 310 steel is subject to carbide precipitation between 400 and 870 ºC. The maximum air temperature which SS 310 steel can withstand in continuous operation is 1,150 ºC. It is used for applications requiring a good high temperature withstand or in carburizing and reducing environments.

SS 316 : This austenitic stainless steel is used widely due to its great versatility. SS 316 steel contains 18 % chrome and 12 % nickel, but also contains 2-3 % molybdenum to improve its resistance to chlorides. SS 316 steel is subject to carbide precipitation between 400 and 870 ºC. The maximum air temperature which it can withstand is 900ºC. SS 316 steel is used when greater resistance to corrosion is required, particularly in the presence of chlorides.

304L and 316L : The low-carbon versions of SS 304 and SS 316. These alloys help to solve the problem of carbide precipitation due to their low carbon content (0.03 % instead of 0.08 % maximum).

3 - NICKEL-BASED ALLOYS:

A. Incoloy, Inconel, Monel

The nickel-based alloys Inconel and Incoloy are a very important group of alloys. They offer excellent resistance to corrosive attack by a large number of aggressive chemicals. Their oxidization withstand is also excellent at high temperatures and their high temperature withstand is good.

They usually contain 15 to 23 % chrome to create a protective film of oxide. Inconel contains 40 to 73 % nickel, while Incoloy contains 32 to 42 % and 30 to 36 % iron. Some classes contain a small amount of titanium or tantalum to improve their high temperature withstand and aluminium to strengthen the protection provided by the oxide film when it is subjected to high temperatures (a film composed of a mixture of chrome oxide and aluminium oxide).

Inconel 600 : High level of nickel (76%) and chrome (15.5%) to withstand oxidizing and reducing environments. This alloy is used in several high-temperature corrosive environments.

Inconel 601: High level of nickel (76%) and chrome (15.5%), plus 1.5% aluminium. Good high temperature withstand. I601 offers remarkable resistance to oxidization and good resistance against carburizing environments and environments containing sulphur.

Incoloy 800: 32.5 % nickel, 46.0 % iron and 21 % chrome. Resistant to oxidization and corrosion in many environments.

Incoloy 800H: 32.5 % nickel, 46.0 % iron and 21 % chrome. Withstands oxidization and carburization at high temperature. Resistant to sulphuric attack and corrosion in many environments.

Monel 400 : High level of nickel (76%) and chrome (15.5%). Monel ensures good corrosion resistance in saltwater. Not subject to fissuring due to corrosion by chlorides. Monel is used for heat exchangers and applications involving sulphuric acid.

B. Hastelloy

This type of nickel-based alloy is used for excellent resistance to corrosion in many aggressive environments due to their high molybdenum content.

Hastelloy B : 61 % nickel, 28 % molybdenum. Excellent resistance to corrosion caused by hydrochloric, sulphuric, phosphoric and acetic acid, as well as hydrogen chloride.

Hastelloy C : 54 % nickel, 16 % molybdenum, 15.5 % chrome and 4 % tungsten. Excellent resistance to corrosion in many chemical environments, including ferric acid and copper chloride, contaminated inorganic acids and wet chlorine gas. Withstands oxidization at 1,000 °C.

Hastelloy X : 47 % nickel, 9 % molybdenum, 22 % chrome, 0.5% tungsten. Good high temperature withstand and resistant to corrosion at 1,200 °C. Also offers good resistance to reducing environments.

4 – OTHER MATERIALS:

For many applications, the temperature is too high to perform measurements with standard stainless-steel materials or with thermowells manufactured with nickel-based alloys. The most widely-used stainless steels and nickel-based alloys melt below or at 1,400 °C and weaken or become less rigid before reaching 1,400 °C.

Other materials have to be used for this type of applications.

There are two types of metals with melting points significantly higher than stainless steels and nickel-based alloys: tantalum, which melts at 2,996°C and molybdenum, which melts at 2,610°C. The nature of these metals limits their use at high temperatures, however:

- they oxidize quickly (tantalum oxidizes above 276 °C and molybdenum oxidizes above 500 °C). This means they cannot be used to manufacture thermowells, except in strictly non-oxidizing environments.

- In addition, they are too expensive to be used to manufacture standard thermowells or protective tubes. These materials are only used in a few applications, such as sintering furnaces for the nuclear industry.

The solution is to use protective tubes made of non-metallic or ceramic materials. Many materials of this type are available which withstand high temperatures, each with its own capabilities: quartz, silicon carbide, boron nitride, mullite and alumina.

Although these materials withstand high temperature to different degrees, they also have their disadvantages. As they are almost entirely ceramic, they are extremely brittle and can easily be broken when subjected to mechanical shocks. Furthermore, most of these materials do not withstand thermal shocks very well. If the material is suddenly exposed to a flame on one side, it expands. As the other side is colder, the expansion is not uniform. If the thermal shock is sufficiently strong, the protective tube will end up fissuring. The lower the thermal expansion coefficient of these materials, the greater their resistance to thermal shocks, which means they will crack less easily.

Below, you will find a presentation of the aforementioned materials with a few examples of widespread applications.

Quartz :

Quartz, which is pure silica, has a very low thermal expansion coefficient. This means it is particularly resistant to fissuring due to thermal shock. It is also particularly chemically inert and withstands attack by many corrosive chemicals and molten metals. Unfortunately, the fact that quartz is an overmelted “glass” limits the possibilities for its use. It devitrifies at around 1,094 °C, so it cannot be used for installations operating above this temperature.

In addition, any surface contamination accelerates devitrification at high temperatures (devitrification means that the quartz recrystallizes and cannot be used above 1,094 °C).

Quartz is often used in metal-casting industries as a disposable protective tube for a thermocouple due to its excellent resistance to thermal shocks. The quartz tube is immersed in the molten metal to measure the casting temperature. Due to its excellent resistance to thermal shocks, molten quartz can withstand sudden changes in temperature, from the ambient temperature to the melting temperature.

Silicon carbide:

Silicon carbide is another mineral resistant to the corrosion caused by many aggressive environments, such as acid gases. Its low thermal expansion coefficient gives it excellent resistance to thermal shocks and good thermal conductivity. This material is manufactured by the Carborundum Company, part of the St-Gobain Group. There are two types of silicon carbide: Carbofrax A, with approximately 90 % silicon carbide and the rest mainly silica, and KT silicon carbide, with approximately 96 % silicon carbide.

Thermowells made of Carbofrax are much less expensive than those made of KT silicon carbide, but they are not gas-tight. Their high temperature withstand is excellent, however, extending up to 1.649 °C. When this type of sensor is suitable, an internal “sleeve” made of alumina helps to protect platinum-rhodium thermocouples against contamination. KT silicon carbide is used for special applications, when gas-tight thermocouples are necessary. Silicon carbide is often used in metallurgy due to its good resistance to thermal shocks and its high-temperature capabilities. It is used as a protective tube, inserted into a ladle to measure the melting temperature.

Boron nitride:

Boron nitride is a synthetic material manufactured by the Carborundum Company Groupe St-Gobain and which can be used in oxidizing environments up to approximately 1,094 °C or in reduction of inert environments up to approximately 2,760 °C. Its thermal expansion coefficient is very low, making it highly resistant

to thermal shocks. It is not subject to the wettability of many molten metals. Its main advantage is that is can be machined with ordinary equipment and it has lubricant qualities similar to those of graphite. Recently, boron nitride has started being used for thermowells with a calibrated type-B thermocouple to measure the casting temperature of cupronickels.

Alumina and Mullite:

Alumina (aluminium oxide) and mullite (a composite of alumina and silica) have been used for many years for thermowells for chrome-alumel and platinum-rhodium thermocouples. They can be used at high temperatures: 1,900 °C for highly pure alumina and 1,700 °C for mullite. One of the problems of these two materials is that they are sensitive to thermal shocks. They may crack if they are exposed to sudden, localized, uneven temperature changes, whether during heating or cooling.

The thermal expansion coefficient of mullite is equal to approximately 2/3 of alumina's thermal expansion coefficient, making it proportionally more resistant to thermal shocks. Both these materials are gas-tight. Unlike mullite, alumina must be used for platinum-rhodium thermocouples with applications in all types of environments except oxidizing environments. Indeed, silicon may be reduced by mullite and it contaminates platinum-rhodium thermocouples, compromising their calibration.

Generally, alumina and mullite are used to make protective tubes for high-temperature applications, where the risk of thermal shock or mechanical damage is low. This type of protective tube is also widely used in the glass industry.

D-2 - DIRECTIVE N°2014/68/UE : PRESSURE EQUIPMENT

The European Pressure Equipment Directive (PED) specifies the requirements concerning pressure equipment for the distribution of pressure equipment inside the European economic area. The version currently in force is directive 2014/68/EU of the European Parliament and Council dated 15th May 2014 regarding harmonization of the legislation in the member states concerning the commercialization of pressure equipment.

After examining the datasheets from the Pressure Equipment Liaison Committee (CLAP) concerning Directive 2014/68/EU, PYROCONTROLE can inform you that:

- An isolated sensor does not meet the definition of a pressure accessory (Guideline number A-25 – CLAP number X029)
- If a sensor is considered to be a component incorporated in an item of equipment, the requirements must be checked but the marking is not applicable (Guideline number A-22 – CLAP number X027)
- The compliance assessment procedures and the essential safety requirements in PED 97/23/CE are applicable to the whole safety chain (Guideline number A-25 – CLAP number X029)

Consequently, CE marking cannot be placed on an isolated sensor (in the context of the Pressure Equipment Directive).

To fulfil the requirements, we are capable of supplying the following:

- design calculation note (ASME 19.3 or other reference frameworks)
- traceability of materials
- qualification of the welds
- qualification of the welders
- tests and inspections (penetrant tests, helium test, PMI, hydraulic test, etc.)

EXAMPLE OF SENSOR CONFIGURATION

CONFIGURATOR CODE

Parameters to be indicated when ordering

MODEL	PROCESS CONNECTION	HEAD		TC	SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (mm)		HOT JUNCTION	EN OPTION: TRANSMITTER		EN OPTION: TRANSMITTER SCALE		EN OPTION: OPTIONS
TCG	5	2	-	1J	CM	-	6	-	500	-	I	A	-	0-600°	-	2
Reference in table and diagram	1	2		3	4		5		6			7				
Possible choice	None: 5 With extension and G1/2" connector: 6 With G1/2" connector under head: 9	DAN : 2		1T 1J 1K 1N 2K 2J	316L : AC INCONEL600 : CM PYROSIL : DB		4,5 6 8		100 à 30000		Insulated: I (standard) Earthed: M	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C				IP65 : 1 Epoxy : 2 IP65 + epoxy : 3

DIAGRAM

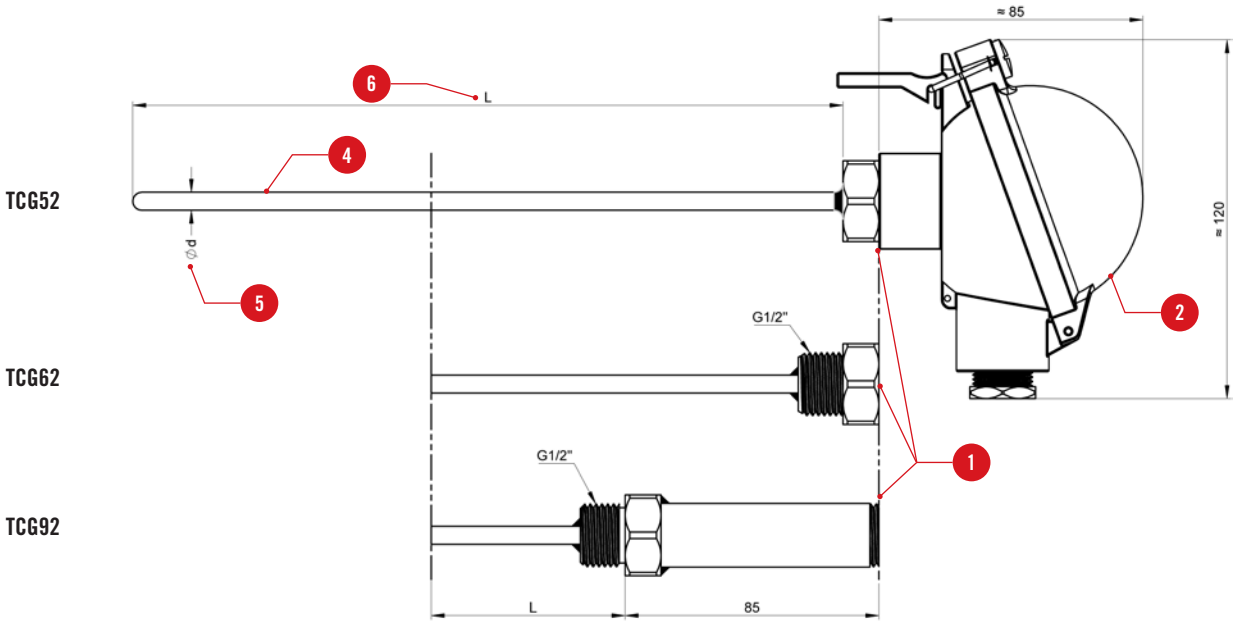


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

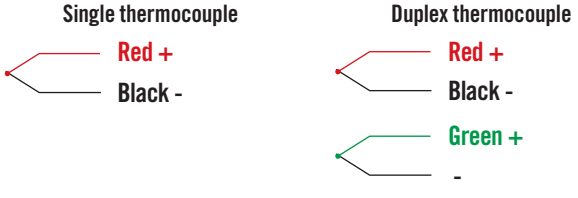
3 TC Class 1	Sheath diameter (mm)		
	4.5	6	8
T (class 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	- (4)
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

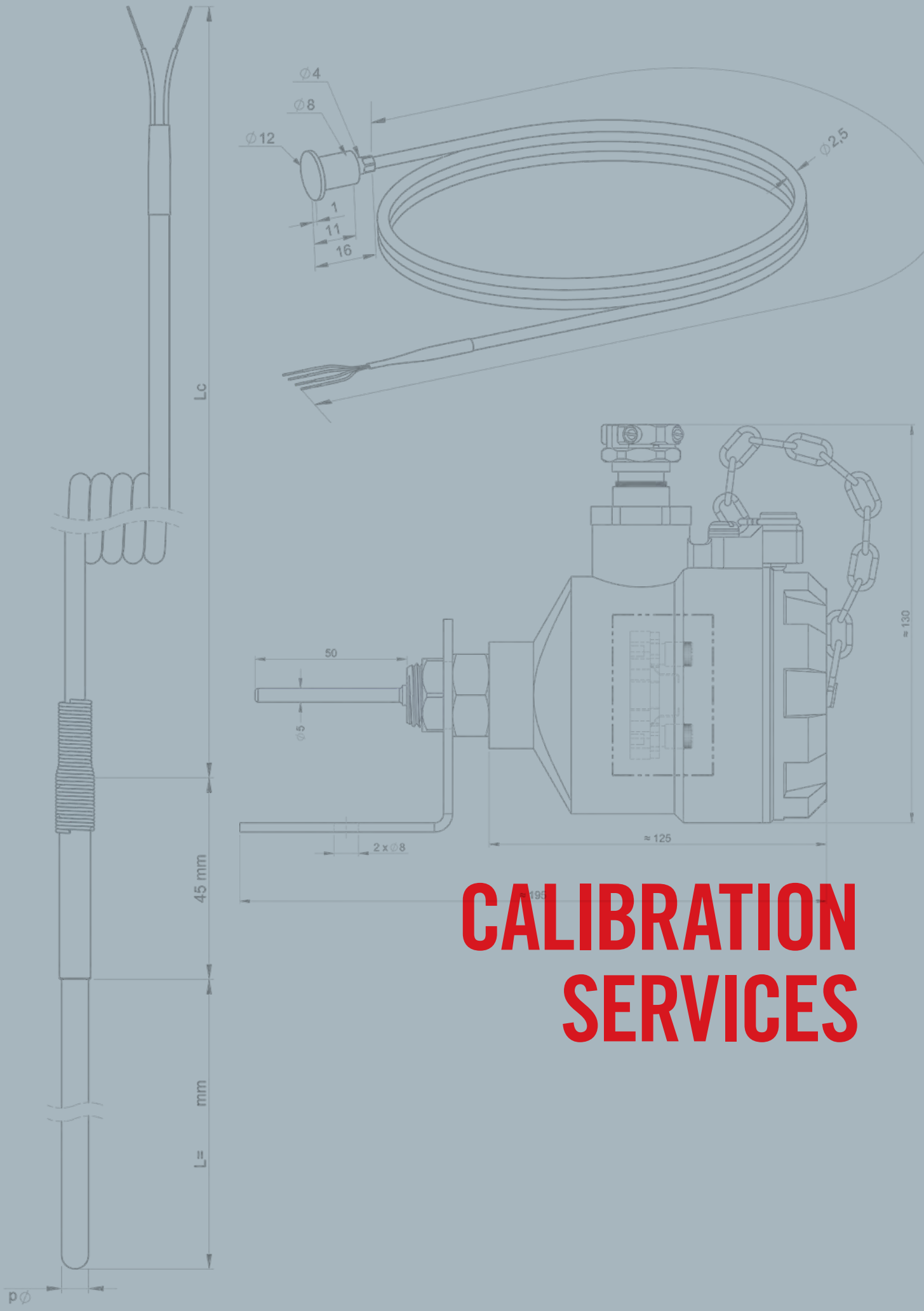
TRANSMITTER (NOT COMPATIBLE FOR DUPLEX)

7

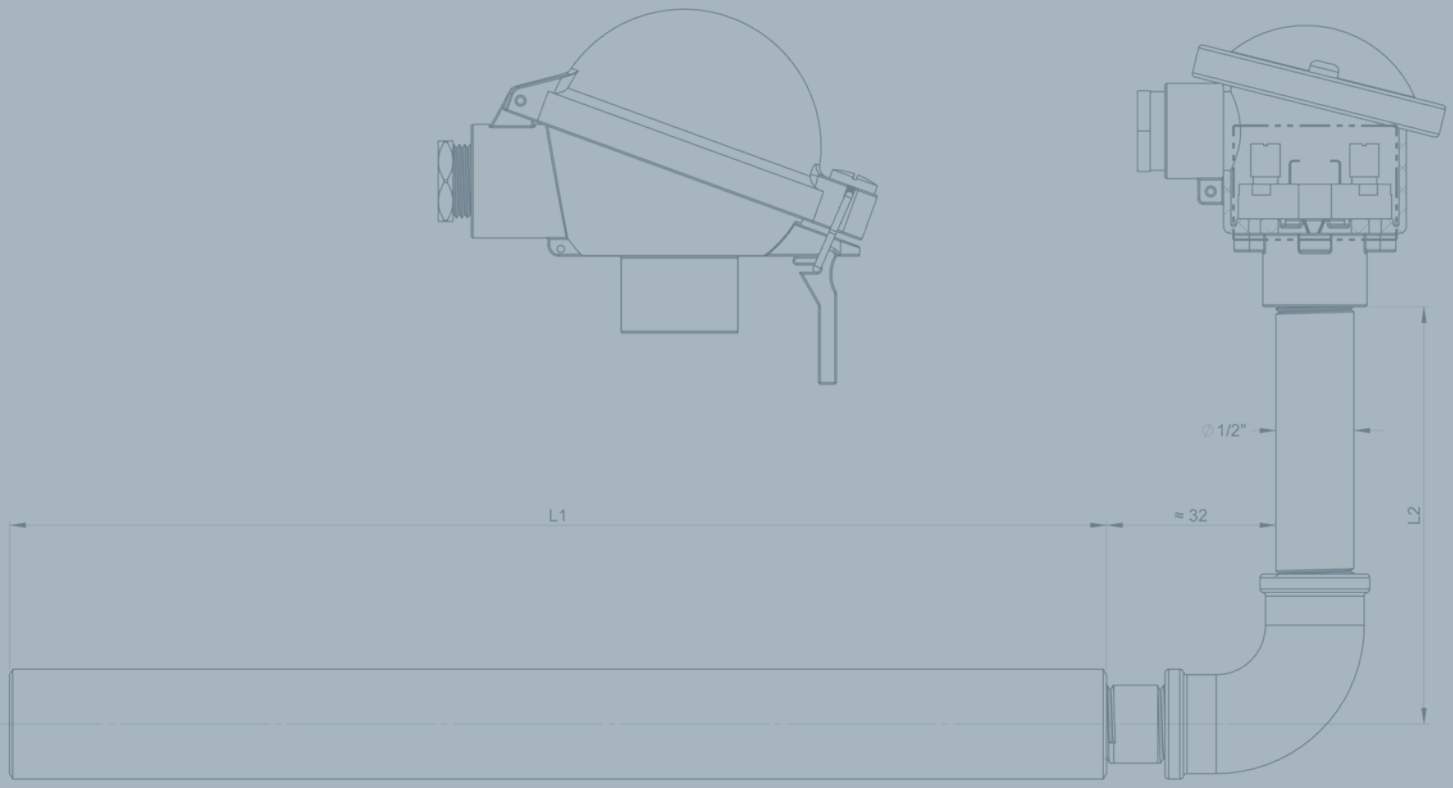
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1,5kV	LC5334A-100
TC + Pt100	4-20mA	1,5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1,5kV	LC5335A-100

CONNECTION





CALIBRATION SERVICES



PYROCONTROLE CALIBRATION 27

COFRAC-ACCREDITED CALIBRATION 28

IN-SITU SENSOR CALIBRATION 30

STANDARD REFERENCE SENSORS 32

ETR REFERENCE STANDARD 32
ETT SECONDARY STANDARD 34



CALIBRATION SERVICE

FOR TEMPERATURE SENSORS

DESCRIPTION

PYROCONTROLE is equipped with its own temperature metrology laboratory, enabling it to offer the following services:

- Calibration of new sensors from Pyrocontrole and other manufacturers.
- Periodic recalibration of sensors from Pyrocontrole and other brands.

Equipped with measuring instruments linked to the national and international reference standards, our laboratory performs high-quality calibration from -40 °C to +450 °C for resistance sensors and -40 °C to +1,500 °C for thermocouples, in accordance with the applicable standards.

Depending on the severity of the requirements, two levels of service are proposed:

- Pyrocontrole calibration with provision of a Calibration Certificate guaranteeing reliable measurements which meet the customers' requirements.
- Cofrac-accredited calibration; the Cofrac accreditation guarantees mastery of the resources, methods and expertise by the staff involved. All these points contribute to the provision of a top-level service acknowledged nationally and internationally.

Calibration Report or Cofrac? Our specialists can advise you according to your needs and how strict your requirements are.

cofrac
ETALONNAGE
Accréditation
N° 2-1385
Scope
available at
cofrac.fr

- **Cofrac-accredited metrology laboratory no. 2-1385**
- **Two possible services: Pyrocontrole calibration with calibration certificate**

Cofrac-accredited calibration

PYROCONTROLE CALIBRATION

PYROCONTROLE's laboratory performs calibration by comparison and issues a calibration certificate linked to reference standards of the SI system of international units.

Calibration by comparison of Pt100 resistance sensors (sensor alone or measurement line linked to a display)
Calibration by comparison of thermocouples (TC alone or TC measurement line linked to a display)
Calibration by comparison of sensor with current-output transmitter
Calibration by comparison of thermocouple with current-output transmitter

UNCERTAINTY OF THE LABORATORY

Item calibrated	Measurement range	Calibration uncertainty	Method and means
Platinum resistance probe Measurement line (resistance probe)	-40 to 90°C	0.07	Comparison with a standard reference platinum resistance thermometer.
	90 to 450°C	0.12	
Platinum resistance probe linked to a current-output transmitter	-40 to 90°C	0.10	
	90 to 450°C	0.13	
Thermocouple Measurement line (thermocouple)	-40 to 290°C	0.30	Comparison with a standard reference S thermocouple.
	290 to 450°C	0.56	
	450°C to 980°C	1.80	
	980 to 1200°C	2.70	
	1200 to 1500°C	3.30	
Thermocouple linked to a current-output transmitter	-40 to 290°C	0.30	Comparison with a standard reference platinum resistance thermometer. Comparison with a standard reference S thermocouple.
	290 to 450°C	0.56	
	450°C to 980°C	1.80	
	980 to 1200°C	2.70	
	1200 to 1500°C	3.30	

SENSOR DIMENSIONS

Means	Measurement range	Diameter of sensors to be calibrated	Length of sensors to be calibrated
Thermostatted bath	-40 to 90°C	Ø ≤ 10mm	L ≥ 150mm
Thermostatted bath	90 to 300°C	Ø ≤ 14mm	L ≥ 150mm
Fluidized bath	300 to 450°C	Ø ≤ 11mm	L ≥ 350mm
Oven	450 to 1200°C	Ø ≤ 8mm	L ≥ 350mm
Oven	500°C to 800°C	Ø ≤ 8mm	L ≥ 400mm
Oven	800 to 1500°C	Ø ≤ 8mm	L ≥ 650mm

NOTE:

We cannot calibrate sensors longer than 1 m.
Possibility of calibrating platinum resistance thermometers with 2 and 3 wire mounting.
The uncertainty indicated on the calibration certificate issued may be downgraded according to the performance of the sensor or measurement line. Count 50 mm extra for the straight part of elbowed sensors ≥ 90°.
Possibility of supplying a correspondence table showing RESISTANCE or EMF / TEMPERATURE (Pt100 or Thermocouple)

COFRAC-ACCREDITED CALIBRATION

PYROCONTROLE's laboratory performs calibration by comparison and provides a calibration certificate issued by our COFRAC-accredited laboratory (Accreditation no. 2-1385)

Calibration by comparison of Pt100 resistance sensors (sensor alone or measurement line linked to a display)

Calibration by comparison of thermocouples (TC alone or TC measurement line linked to a display)

cofrac
ETALONNAGE
Accréditation N° 2-1385 Portée disponible sur www.cofrac.fr

UNCERTAINTY OF THE LABORATORY

Item calibrated	Measurement range	Calibration uncertainty	Method and means
Platinum resistance probe Measurement line (resistance probe)	-40 to 90°C	0.07	Comparison with a standard reference platinum resistance thermometer.
	90 to 450°C	0.12	
Thermocouple Measurement line (thermocouple)	-40 to 290°C	0.30	
	290 to 450°C	0.56	
	450°C to 980°C	1.80	Comparison with a standard reference S thermocouple.
	980 to 1200°C	2.70	
	1200 to 1500°C	3.30	

SENSOR DIMENSIONS

Means	Measurement range	Diameter of sensors to be calibrated	Length of sensors to be calibrated
Thermostatted bath	-40 to 90°C	Ø ≤ 10mm	L ≥ 150mm
Thermostatted bath	90 to 300°C	Ø ≤ 14mm	L ≥ 150mm
Fluidized bath	300 to 450°C	Ø ≤ 11mm	L ≥ 350mm
Oven	450 to 1200°C	Ø ≤ 8mm	L ≥ 350mm
Oven	500°C to 800°C	Ø ≤ 8mm	L ≥ 400mm
Oven	800 to 1500°C	Ø ≤ 8mm	L ≥ 650mm

NOTE:

We cannot calibrate sensors longer than 1 m.
Possibility of calibrating platinum resistance thermometers with 3-wire mounting.
The uncertainty indicated on the calibration certificate issued may be downgraded according to the performance of the sensor or measurement line. Count 50 mm extra for the straight part of elbowed sensors ≥ 90°.


1
2
3
0
4
-1
5

SENSOR DRIFT...

During use, depending on the process constraints, the accuracy of a temperature sensor declines at varying rates and therefore no longer guarantees the correct measurement defined initially (according to the standard: Pt100 Ω sensor or thermocouple).

- **This means it requires regular calibration.**

A TC always drifts downwards, by several degrees a year. To compensate this phenomenon, industrial companies set the temperature of their process higher than nominally necessary with a sufficient margin to offset this drift until the next calibration operation, usually performed once a year. In this way, they define a setpoint higher than the optimum temperature for the heat treatment.

- **This additional heating naturally has consequences:** possible creation of faults and heterogeneity on the parts, premature wear of the refractories and, lastly, excessive energy consumption. This is why it is important to control sensor drift.

...IN-SITU CALIBRATION!

Pyrocontrole's temperature measurement assemblies with in-situ calibration enable you to monitor the evolution of your temperature sensors' drift over time, using a method which is easy to implement. This technology offers numerous advantages in terms of energy saving, productivity, quality and traceability:

- The reduced uncertainty of your measurements allows you to lower the heating setpoint, thus saving energy. By avoiding overheating, the life span of your equipment is improved.
- The process remains available because there is no longer any need to halt production; calibration is performed on the equipment while it is operating, without having to dismantle the sensors so there is no risk of breakage. Maintenance time is thus reduced. This technology provides significant flexibility for scheduling your metrological monitoring operations.
- The improved accuracy of your measurements helps to reduce your standard deviations; the quality of the finished product is also improved and quality monitoring is facilitated. Lastly, you benefit from better traceability of your thermal process.



Sx3 SPS TCG 52

IN-SITU CALIBRATION METHOD WITHOUT DISMANTLING THE SENSOR

This method* of verification by comparison is quick and simple to implement.

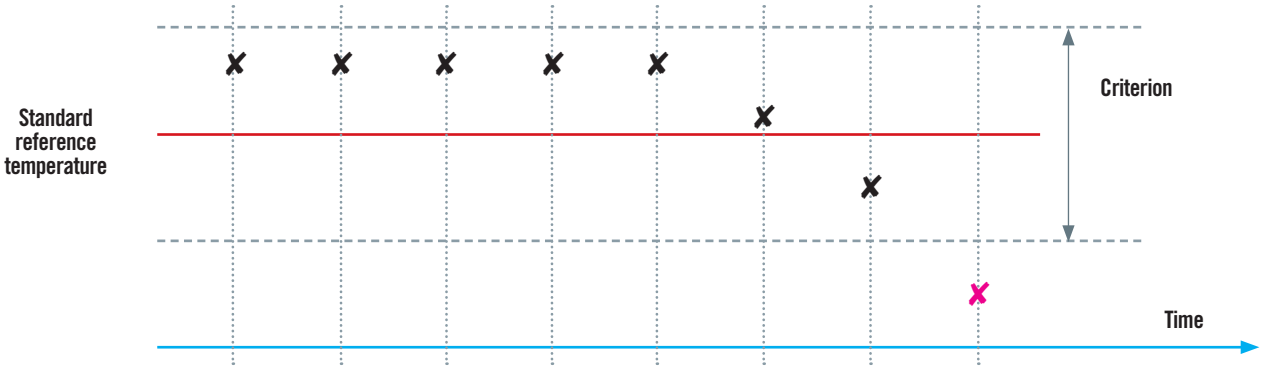


* Patent filed: no. 0213616

- Opening of the connecting head of the sensor to be checked.
- Insertion of the standard reference sensor into the guide tube.
- Connection of the standard reference sensor to the precision thermometer.
- Temperature stabilization.
- Calibration by comparison of the temperature on the reference standard and the temperature on the process sensor.

DECIDE ON THE FREQUENCY OF THE TESTS

At the point of operation, regular comparison of the temperature reading against the temperature given by the standard reference sensor enables you to detect any measurement drift.



Non-contractual document - Please confirm specifications before ordering.

RELATED SERVICES

Pyrocontrole has a temperature metrology calibration laboratory.
COFRAC accreditation no. 2-1385 - Calibration by comparison.

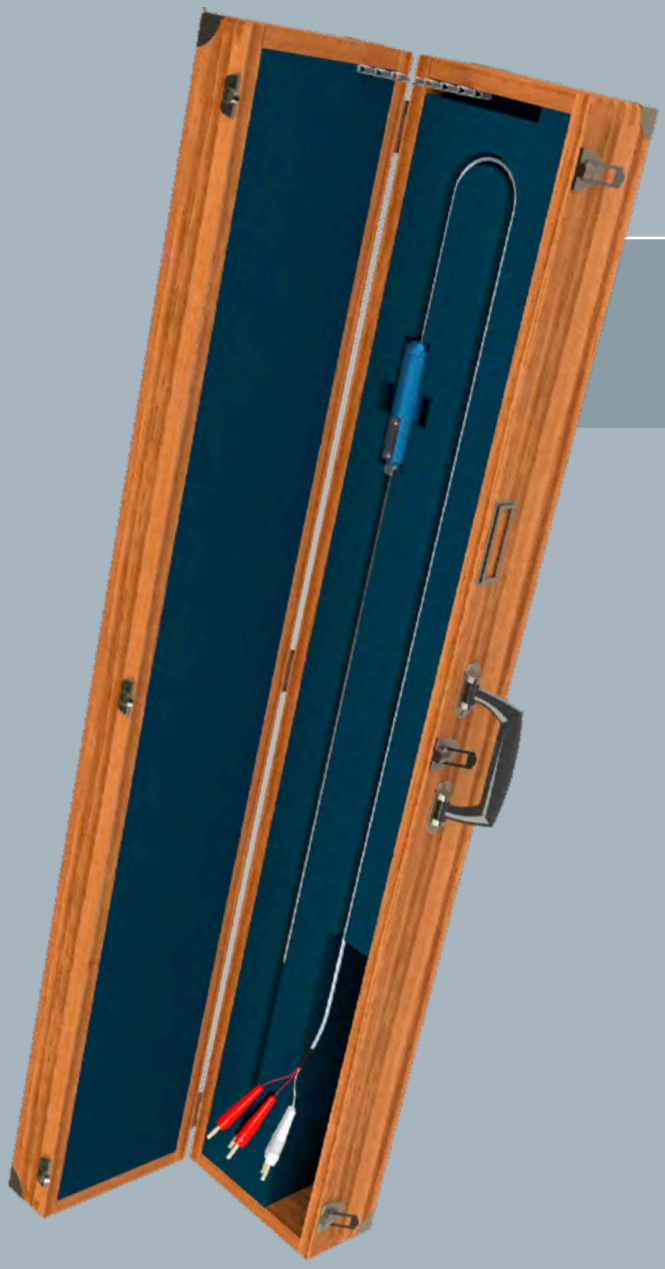
- From -40 °C to +450 °C for Pt100 Ω sensors
- From -40 °C to +1,500 °C for thermocouples

We can add the "in-situ calibration" function on all sensors equipped with DIN/DAN heads, starting at a diameter of 6 mm.

Please contact us if you want to benefit from this feature on your next sensors.

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ETALONNAGE
Accreditation
N° 21385
Scope available at
www.cofrac.fr

906 210 192 - Ed 1 - 06/2009.



ETR

PT100 & THERMOCOUPLE

CLASS A | IEC 60751 | NF EN 60584-1 | up to 1554°C

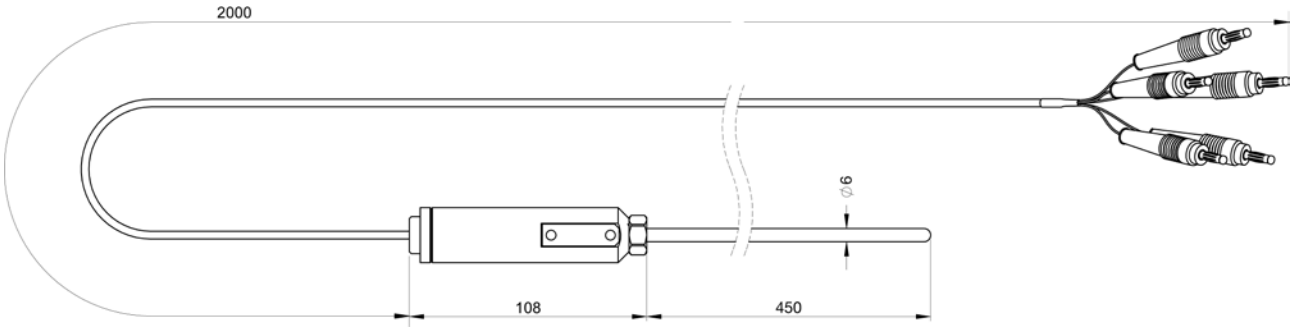
DESCRIPTION

These **reference standards**, used only in laboratories, enable you to perform calibration with a good level of uncertainty (schedule periodic calibration by a COFRAC-accredited laboratory). Delivered in a case with a certificate of calibration by comparison or at the ITS fixed points: please contact us for details.

SPECIFICATIONS

	ETR-PT Pt100 sensor	S thermocouples Model LNE S80
Ranges	-100°C to +450°C	0°C à +1554°C
Resistance at 0°C	100 Ω	-
Stability	Up to 0.05°C	-
Measuring current	1 mA	-
Alpha coefficient	0.003850°C ±4ppm	-
Nominal current	1 mA	-
Diameter and length of sensing element	6 x 450 mm	-
Interchangeability class	Class A as per IEC 60751	-
Calibration certificate	by comparison	
Produced under licence	-	LNE
Material	-	10% rhodium-platinum / pure platinum
Dimensions	-	7 mm x 650 mm
Accessories	Delivered in a case	

DIAGRAM (MM)



TO ORDER

Pt100 sensor

Delivered in a case with a certificate of calibration by comparison.

Possibility of an emf/temperature correspondence table for each degree: please contact us.

Domain	Reproducibility	Reference
-100 °C to +450 °C	≤ 10mΩ (or ≤ 26mK)	L918746-001

S thermocouples

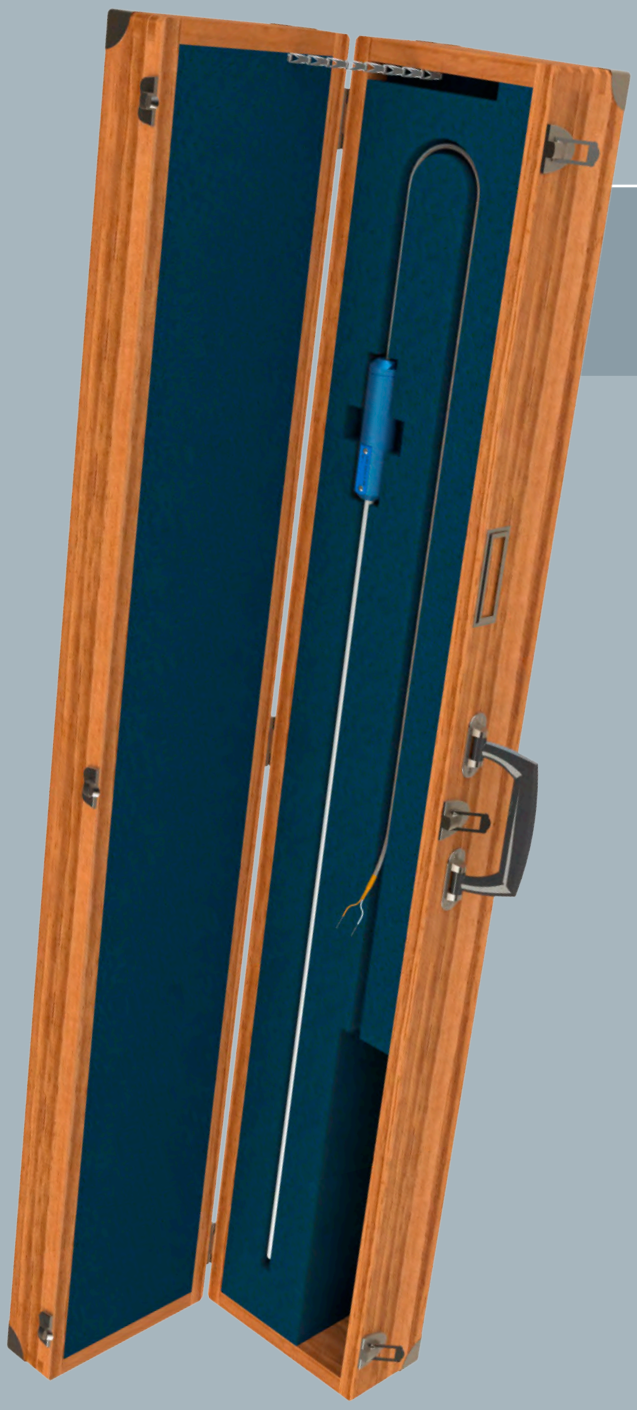
Reference standard

Model BNM-LNE S80: 0 °C to 1,554 °C

Delivered in a case with a certificate of calibration by comparison (7 points: 400, 600, 800, 1,000, 1,200, 1.400 and 1,500 °C) or at the IT fixed points.

Possibility of an emf/temperature correspondence table for each degree: please contact us.

Related service	Model	Reference
Without calibration	BNM-LNE S80	L918189-000
Calibration by comparison	BNM-LNE S80	L968028-001
Fixed-point calibration	BNM-LNE S80	L968028-002



ETT

PT100 & THERMOCOUPLE

CLASS A | IEC 60751 | NF EN 60584-1 | up to 1554°C

DESCRIPTION

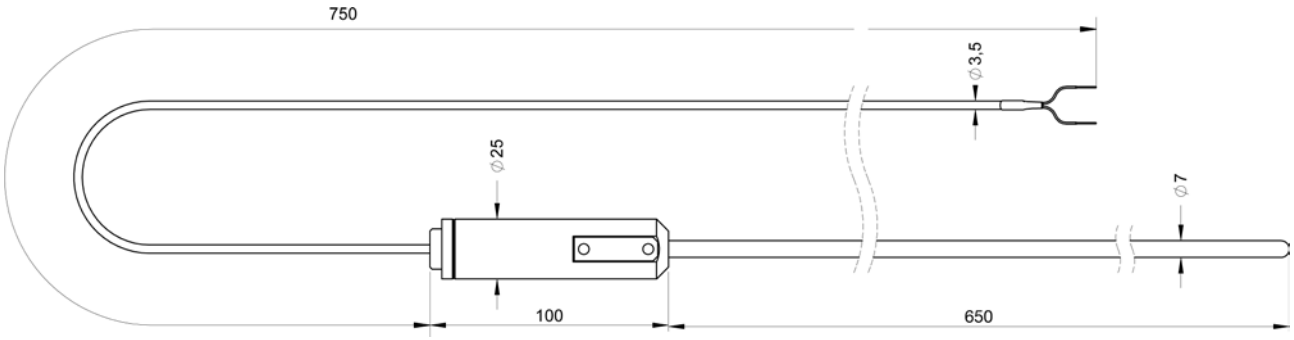
These secondary reference sensors are used in workshops or laboratories, used for calibration. They must also be calibrated periodically against a reference standard.

Possibility of a certificate of calibration at the ITS 90 fixed points or by comparison.

SPECIFICATIONS

	ETT-PT Pt100 sensor	ETT-TCS S thermocouples Model S90-03
Ranges	-100°C to +400°C and -100°C to +550°C	0°C to +1554°C
Resistance at 0°C	100 Ω	-
Stability	Up to 0.05°C	-
Measuring current	1 mA	-
Alpha coefficient	0.003850°C ±4ppm	-
Nominal current	1 mA	-
Diameter and length of sensing element	6 x 450 mm	-
Interchangeability class	Class A as per IEC 60751	-
Option	Case	-
Material	-	10% rhodium-platinum / pure platinum
Dimensions	-	7 mm x 650 mm
Calibration certificate	-	By comparison
Accessories	-	Delivered in a case

DIAGRAM



TO ORDER

Pt100 sensor

Delivered in a case with a certificate of calibration by comparison.

Possibility of an emf/temperature correspondence table for each degree: please contact us.

Domain	Reproducibility	Reference
-100 °C to +400 °C	≤ 25 mΩ (or ≤ 60 mK)	L918749-002
-100 °C to +550 °C		L918749-001

ETT-TCS Type S thermocouples

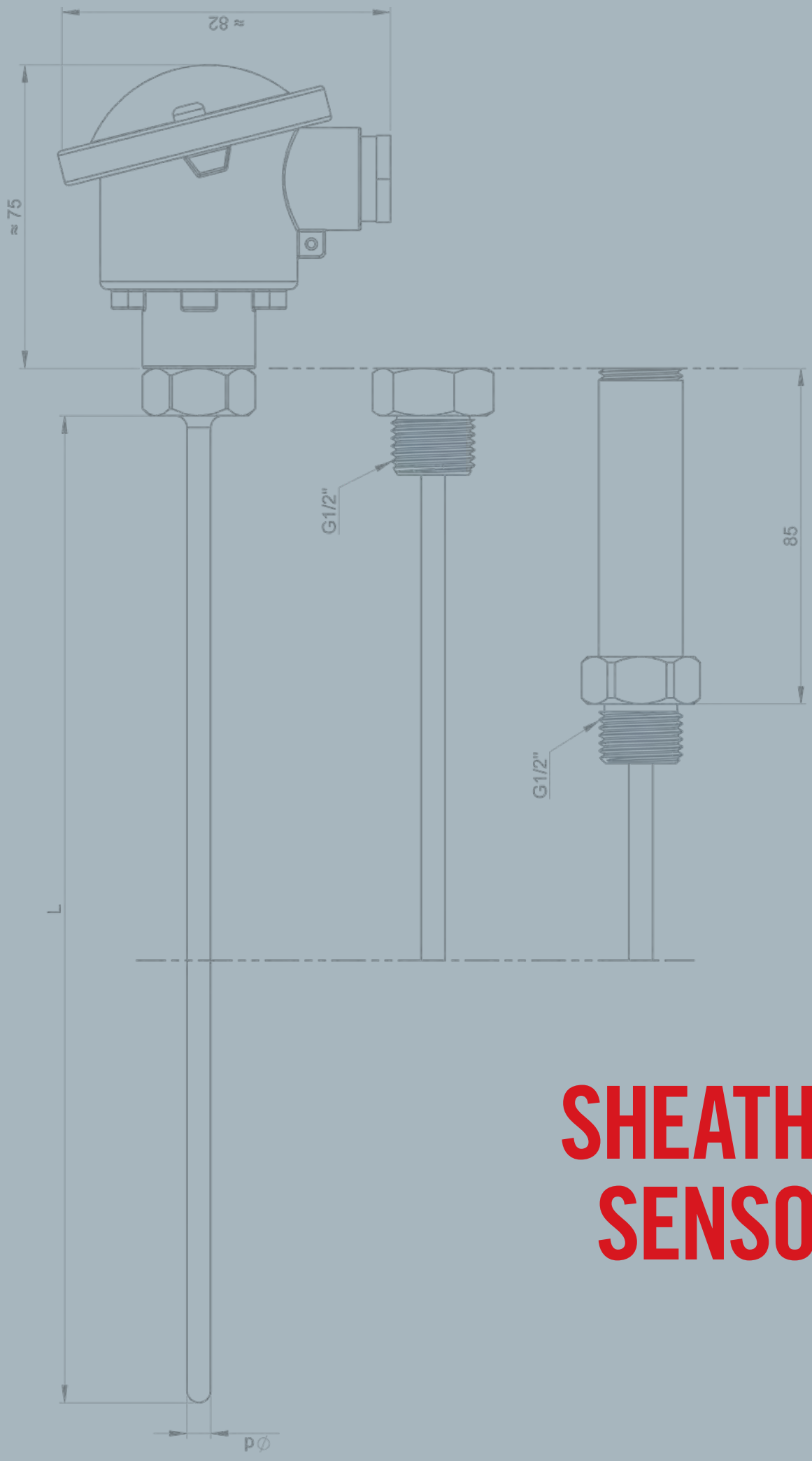
Secondary reference

Model S90-03: 0 °C to 1,554 °C

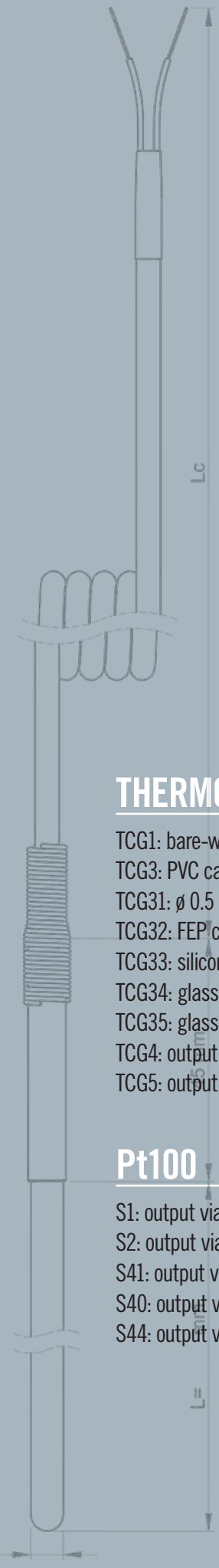
Delivered in a case with a certificate of calibration by comparison.

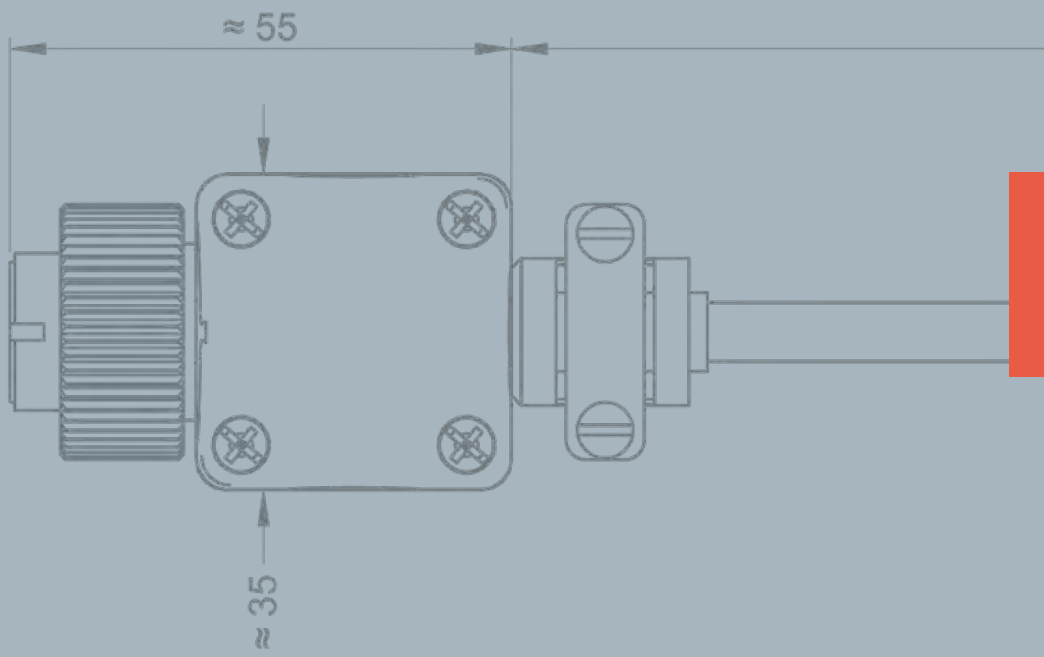
Possibility of an emf/temperature correspondence table for each degree: please contact us.

Domain	Model	Reference
Calibration by comparison	Model S90-03	L918189-000



SHEATHED SENSORS



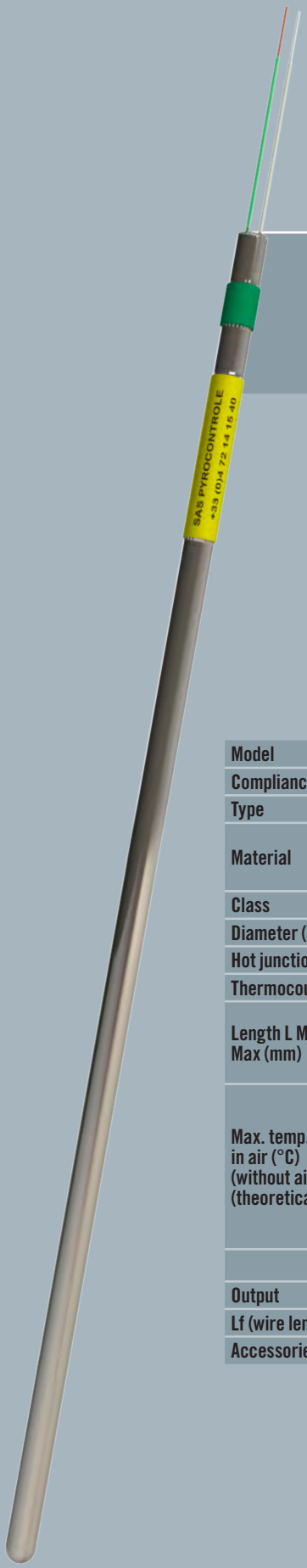


THERMOCOUPLES 38

TCG1: bare-wire and insulated output. 38
TCG3: PVC cable, withstand 105°C. 40
TCG31: ø 0.5 mm - FEP wires, withstand 205°C. 42
TCG32: FEP cable, withstand 205°C. 44
TCG33: silicone cable, withstand 250°C. 46
TCG34: glass silk cable, withstand 350°C. 48
TCG35: glass silk cable, withstand 250°C. 50
TCG4: output via JAEGER connector. 52
TCG5: output via LEMO connector. 54
TCG6: output via standard connector. 56
TCG11: output via miniature connector. 58
TCG51: MA head output. 60
TCGx2: DAN head output. 62
TCGx3: DIN B head output 64
TA: undemanding industrial applications. 66
TB: demanding industrial applications. 68
TMA: abrasive environments 70
SKxx: for portable thermometers. 72

Pt100 74

S1: output via cable, temperature up to 450°C. 74
S2: output via cable, temperature up to 200°C. 76
S41: output via JAEGER connector. 78
S40: output via LEMO connector. 80
S44: output via standard 3-pin connector. 82
S43: output via miniature 3-pin connector. 84
S51: MA head output. 86
Sx2: DAN head output. 88
Sx3: DIN B head output. 90
SPxx: for portable thermometers. 92



TCG1
THERMOCOUPLE

CLASS 1 | IEC 584-1 | up to 1150°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time.

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG1				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel600	316L	316L (single) / 304L (Duplex)	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		0,5 / 1 / 1,5 / 2 / 3 / 4,5 / 6 / 8				
Hot junction		Insulated/Earthed				
Thermocouple		Simple / Duplex			Simple	
Length L Min/ Max (mm)	ø 0.5 mm	100 to 2 500mm				
	ø 1 to 2 mm	100 to 36 000 mm				
	ø > 2 mm	100 to 30 000 mm				
Max. temp. in air (°C) (without air flow) (theoretical)	ø 0.5 mm	600°C	250°C	250°C	600°C	650°C
	ø 1 -1.5 mm	650°C	260°C	260°C	650°C	700°C
	ø 2 mm	700°C	440°C	260°C	700°C	900°C
	ø 3 mm	750°C	520°C	315°C	750°C	1000°C
	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	ø 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Output		Insulated bare wires				
Lf (wire length) (mm)		15mm if d≤2mm; 15 to 40mm if d≥3mm (standard: 40mm)				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	-	TC	-	SHEATH TYPE	-	Ø SHEATH (mm)	-	LENGTH L (mm)	-	HOT JUNCTION
TCG1	-	1J	-	DB	-	1	-	12,000	-	M
Reference in table and DIAGRAM (MM)		1		2		3		4		
Possible choice		1T 1J 1K 1N 2T 2J 2K		304L: AB 316L: AC INCONEL 600: CM PYROSIL: DB		0.5 1 1.5 2 3 4.5 6 8		L for Ø 0.5: 100 to 2,500 mm L for Ø 1-1.5-2: 100 to 36,000 mm L for Ø 3 - 4.5 - 6 - 8: 100 to 30,000 mm		Insulated: I Earthed: M

DIAGRAM (MM)

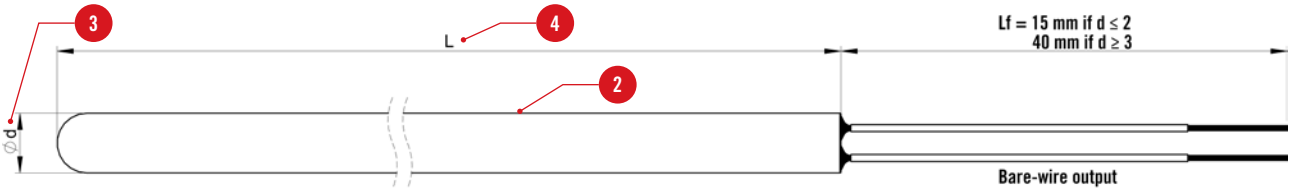
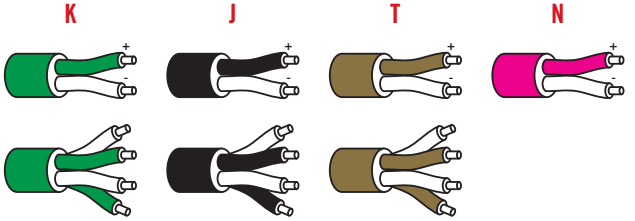


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

TC Class 1 (1)	Sheath diameter (mm)							
	0.5	1	1.5	2	3	4.5	6	8 (3)
T (Class2)	316L	316L	316L	316L	316L	316L	316L	316L
J	316L	316L	316L	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	-
	-	-	PYROSIL	PYROSIL	PYROSIL	PYROSIL	PYROSIL	PYROSIL (2)
2T (Class 2)	-	-	-	304L	-	304L	304L	-
2J	-	-	-	316L	316L	316L	316L	316L
2K	-	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

CONNECTIONS



TO ORDER

Order our standard references on p. 94

For any other configuration, please contact us.



TCG3
THERMOCOUPLE

CLASS 1 | IEC 584-1 | CABLE PVC | up to 1150°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances. The cable must be chosen according to the ambient temperature and the environment in which it is used. Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG3				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel600	316L		Inconel 600	Pyrosil
Class		1		1	1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3 / 4.5 / 6 / 8				
Hot junction		Insulated/Earthed				
Thermocouple		Simple / Duplex		Simple		
Length L Min/ Max (mm)	ø 1 to 2 mm	100 to 36,000 mm				
	ø > 2 mm	100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1 -1.5 mm	650°C	260°C	260°C	650°C	700°C
	ø 2 mm	700°C	440°C	260°C	700°C	900°C
	ø 3 mm	750°C	520°C	315°C	750°C	1000°C
	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	ø 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Output	Type of cable	Compensation				
	Cable sheath	PVC				
	Max. temperature	105°C				
	Conductors	2x0.22 mm², insulated PVC				
	Braid	Internal, copper, not connected to sensor sheath				
	Length Lc Min/ Max (mm)	200 to 10,000 mm				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC		SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (mm)		HOT JUNCTION		LENGTH LC (mm)		CONNECTION		PROTECTIVE SPRING
TCG3	-	1T	-	AB	-	2	-	20,000	-	I	-	4,000	-	SM	-	0
Reference in table and DIAGRAM (MM)		1		2		3		4				5		6		7
Possible choice		1T 1J 1K 1N 2J 2K		304L: AB 316L: AC INCONEL 600: CM PYROSIL: DB		1 1.5 2 3 4.5 6 8		Ø 1-1.5-2: 100 to 36,000 Ø 3 - 4.5 - 6 - 8: 100 to 30,000		Insulated: I (standard) Earthed: M		Lc: 200 to 10,000 mm (standard: 2,000 mm)		Bare wires: FN (standard) Standard male connector: SM Standard female connector: SF Miniature male connector: MM Miniature female connector: MF		Without: 0 With: 1 (standard)

DIAGRAM (MM)

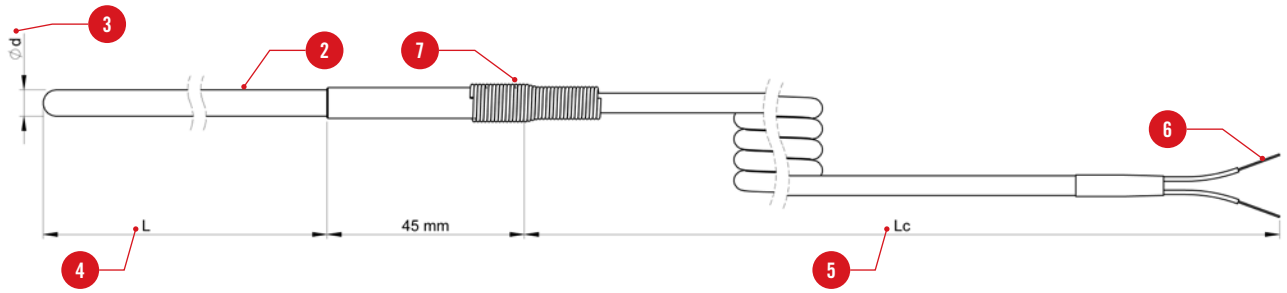
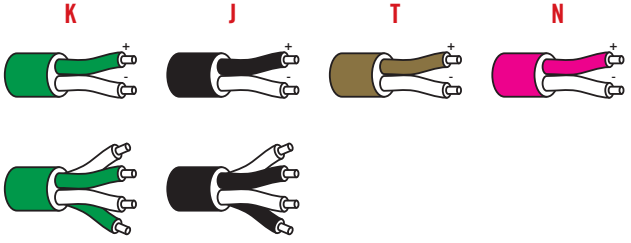


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC Class 1	Sheath diameter (mm)						
	1	1.5	2	3	4.5	6	8 (3)
T (class2)	316L	316L	316L	316L	316L	316L	316L
J	316L	316L	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	-
	-	PYROSIL	PYROSIL	PYROSIL	PYROSIL	PYROSIL	PYROSIL (2)
2J	-	316L	316L	316L	316L	316L	316L
2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

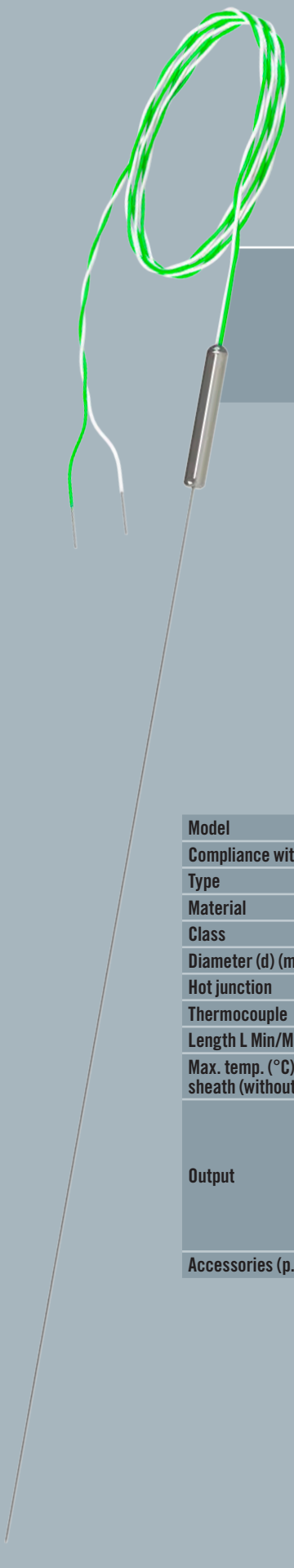
CONNECTIONS



TO ORDER

Order our standard references on p. 95

For any other configuration, please contact us.



TCG31
THERMOCOUPLE

CLASS 1 | IEC 584-1 | DIAMETER 0,5 MM | FEP SHEATHED WIRES | up to 600°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances. The cable has been chosen to withstand most industrial environments.

Thermocouples must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG31		
Compliance with standards		IEC 584-1 / EN 61515		
Type		K	J	T
Material		Inconel600	316L	316L
Class		1		2
Diameter (d) (mm)		0.5		
Hot junction		Insulated/Earthed		
Thermocouple		Single		
Length L Min/Max (mm)		100 to 2,500mm		
Max. temp. (°C) of air in sensor sheath (without air flow) (theoretical)		600°C	250°C	250°C
Output	Type of cable	Extension		
	Cable sheath	FEP		
	Max. temperature	205°C		
	Conductors	2x0.5 mm², twisted, flexible.		
	Length Lc Min/Max (mm)	200 to 10,000 mm		
Accessories (p. 338)		Leak-tight fittings, rotating fittings		

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC		SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (mm)		HOT JUNCTION		LENGTH LC (mm)		CONNECTION
TCG31	-	1K	-	AC	-	0,5	-	400	-	M	-	4,000	-	MM
Reference in table and DIAGRAM (MM)		1		2				3				4		5
Possible choice		1J 1K 1T		316L : AC INCONEL 600 : CM		0,5		100 to 2,500		Insulated: I (standard) Earthed: M		Lc: 200 to 10,000 mm (standard: 2,000 mm)		Bare wires: FN (standard) Standard male connector: SM Standard female connector: SF Miniature male connector: MM Miniature female connector: MF

DIAGRAM (MM)

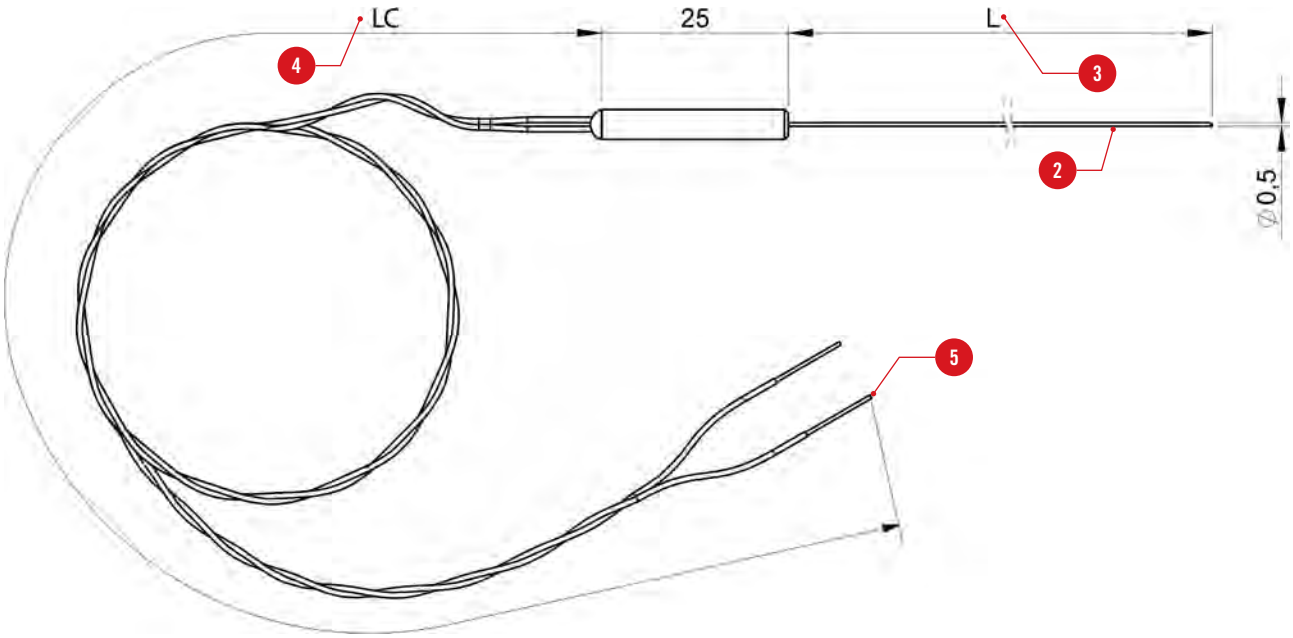
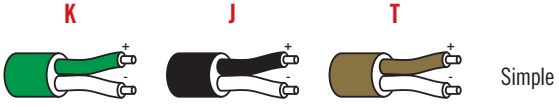


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC Class 1	Sheath diameter (mm)
	0.5
T (Class2)	316L
J	316L
K	INCONEL600

2

CONNECTIONS



For any other configuration, please contact us.



TCG32
THERMOCOUPLE

CLASS 1 | IEC 584-1 | FEP CABLE | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances. The cable must be chosen according to the ambient temperature and the environment in which it is used. The FEP cable withstands chemical agents well and can be used in aggressive environments.

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG32	
Compliance with standards		IEC 584-1 / EN 61515	
Type		K	J
Material		Inconel600	316L
Class		1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3 / 4.5 / 6 / 8	
Hot junction		Insulated/Earthed	
Thermocouple		Single	
Length L Min/ Max (mm)	ø 1 to 2 mm	100 to 36,000 mm	
	ø > 2 mm	100 to 30,000 mm	
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1 -1.5 mm	650°C	260°C
	ø 2 mm	700°C	440°C
	ø 3 mm	750°C	520°C
	ø 4.5 mm	800°C	620°C
	ø 6 mm	1000°C	720°C
	ø 8 mm	1100°C	720°C
Output	Type of cable	Extension	
	Cable sheath	FEP	
	Max. temperature	205°C	
	Conductors	2x0.22 mm², FEP insulation	
	Braid	Internal, copper, not connected to sensor sheath	
	Length Lc Min/ Max (mm)	200 mm to 10,000mm	
Accessories (p. 338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L (mm)	HOT JUNCTION	LENGTH LC (mm)	CONNECTION	PROTECTIVE SPRING
TCG32	- 1J	- CM	- 2	- 520	- M	- 2,000	- FN	- 1
Reference in table and DIAGRAM (MM)	1	2	3	4		5	6	7
Possible choice	1J 1K	316L : AC INCONEL 600 : CM	1 1.5 2 3 4.5 6 8	Ø 1-1.5-2: 100 to 36,000 Ø 3 - 4.5 - 6 - 8: 100 to 30,000	Insulated: I (standard) Earthed: M	Lc: 200 to 10,000 mm (standard: 2,000 mm)	Bare wires: FN (standard) Standard male connector: SM Standard female connector: SF Miniature male connector: MM Miniature female connector: MF	Without: 0 With: 1 (standard)

DIAGRAM (MM)

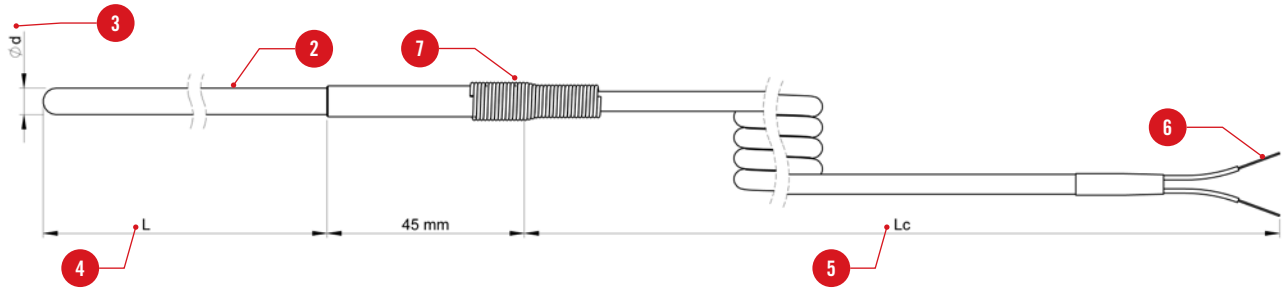
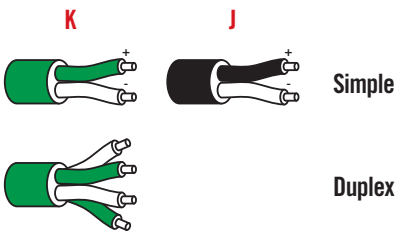


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC Class 1	Sheath diameter (mm)						3
	1	1.5	2	3	4.5	6	8
J	316L	316L	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

2

CONNECTIONS



For any other configuration, please contact us.



TCG33
THERMOCOUPLE

CLASS 1 | IEC 584-1 | SILICONE CABLE | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances. The cable must be chosen according to the ambient temperature and the environment in which it is used. Silicone cables are flexible and have a good temperature withstand for use in environments where the ambient temperature is high. Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG33	
Compliance with standards		IEC 584-1 / EN 61515	
Type		K	J
Material		Inconel600	316L
Classe		1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3 / 4.5 / 6 / 8	
Hot junction		Insulated/Earthed	
Thermocouple		Single	
Length L Min/ Max (mm)	ø 1 to 2 mm	100 to 36,000 mm	
	ø > 2 mm	100 to 30,000 mm	
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1 -1.5 mm	650°C	260°C
	ø 2 mm	700°C	440°C
	ø 3 mm	750°C	520°C
	ø 4.5 mm	800°C	620°C
	ø 6 mm	1000°C	720°C
	ø 8 mm	1100°C	720°C
Output	Type of cable	Extension	
	Cable sheath	Silicone	
	Max. temperature	250°C	
	Conductors	2 x 0.5 mm², glass silk insulation	
	Braid	Internal, copper, not linked to the sensor sheath	
	Length Lc Min/ Max (mm)	200 mm to 10,000 mm	
Accessories (p. 338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L (mm)	HOT JUNCTION	LENGTH LC (mm)	CONNECTION	PROTECTIVE SPRING
TCG33	1J	AC	6	30,000	M	2,000	FN	0
Reference in table and DIAGRAM (MM)	1	2	3	4		5	6	7
Possible choice	1J 1K	316L : AC INCONEL 600 : CM	1 1.5 2 3 4.5 6 8	Ø 1-1.5-2: 100 to 36,000 mm Ø 3 - 4.5 - 6 - 8: 100 to 30,000 mm	Insulated: I (standard) Earthed: M	Lc: 200 to 10,000 mm (standard: 2,000 mm)	Bare wires: FN (standard) Standard male connector: SM Standard female connector: SF Miniature male connector: MM Miniature female connector: MF	Without: 0 With: 1 (standard)

DIAGRAM (MM)

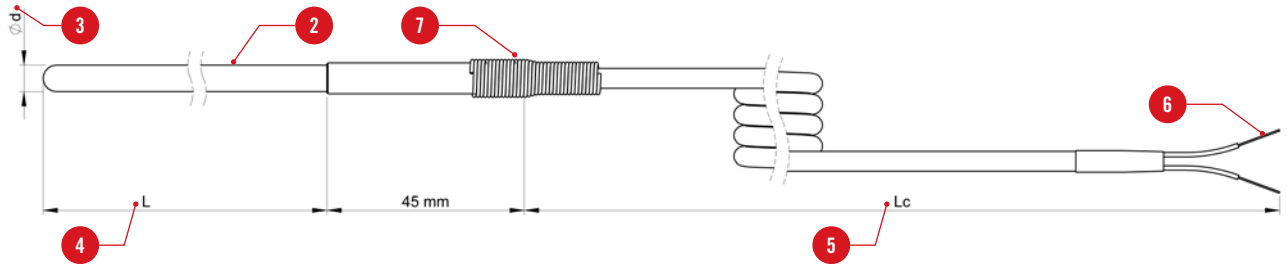
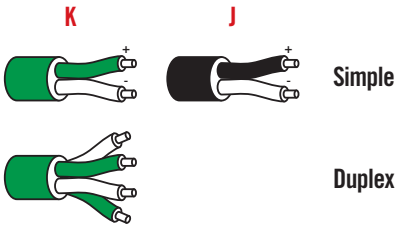


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC Class 1	Sheath diameter (mm)						3
	1	1.5	2	3	4.5	6	8
J	316L	316L	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

2

CONNECTIONS



For any other configuration, please contact us.



TCG34
THERMOCOUPLE

CLASS 1 | IEC 584-1 | GLASS SILK CABLE | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances. The cable must be chosen according to the ambient temperature and the environment in which it is used. The glass silk cable is protected by a stainless-steel braid and has a high temperature withstand for use in environments where the ambient temperature and mechanical risks are high. Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG34	
Compliance with standards		IEC 584-1 / EN 61515	
Type		K	J
Material		Inconel600	316L
Class		1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3 / 4.5 / 6 / 8	
Hot junction		Insulated/Earthed	
Thermocouple		Single / Duplex	Single
Length L Min/ Max (mm)	ø 1 to 2 mm	100 to 36,000 mm	
	ø > 2 mm	100 to 30,000 mm	
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1 -1.5 mm	650°C	260°C
	ø 2 mm	700°C	440°C
	ø 3 mm	750°C	520°C
	ø 4.5 mm	800°C	620°C
	ø 6 mm	1000°C	720°C
	ø 8 mm	1100°C	720°C
Output	Type of cable	Extension	
	Cable sheath	Glass silk	
	Max. temperature	350°C	
	Conductors	2 x 0.5 mm², insulated with glass silk	
	Braid	Internal, glass silk	
	Length Lc Min/ Max (mm)	200 mm to 10,000mm	
Accessories (p. 338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L (mm)	HOT JUNCTION	LENGTH LC (mm)	CONNECTION	PROTECTIVE SPRING
TCG34	1J	AC	3	4,000	I	7,000	SM	1
Reference in table and DIAGRAM (MM)	1	2	3	4		5	6	7
Possible choice	1J 1K 2K	316L : AC INCONEL 600 : CM	1 1.5 2 3 4.5 6 8	Ø 1-1.5-2: 100 to 36000 Ø 3 - 4.5 - 6 - 8: 100 to 30000	Insulated: I (standard) Earthed: M	Lc: 200 to 10000 mm (standard: 2,000 mm)	Bare wires: FN (standard) Standard male connector: SM Standard female connector: SF Miniature male connector: MM Miniature female connector: MF	Without: 0 With: 1 (standard)

DIAGRAM (MM)

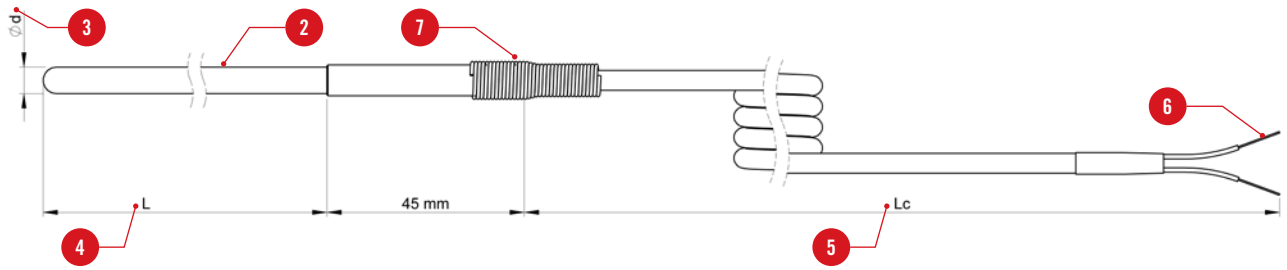
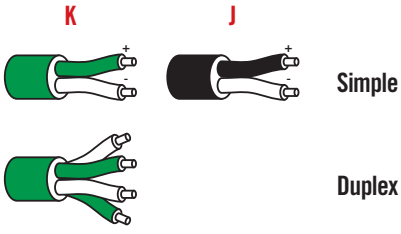


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC Class 1	Sheath diameter (mm)						3
	1	1.5	2	3	4.5	6	8
J	316L	316L	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600 2
2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

CONNECTIONS



For any other configuration, please contact us.



TCG35
THERMOCOUPLE

CLASS 1 | IEC 584-1 | GLASS SILK CABLE | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances. The cable must be chosen according to the ambient temperature and the environment in which it is used. The glass silk cable is protected by a galvanized steel braid for better mechanical resistance and has a good temperature withstand for use in environments where the ambient temperature and mechanical risks are high. Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG35	
Compliance with standards		IEC 584-1 / EN 61515	
Type		K	J
Material		Inconel 600	316L
Class		1	
Diameter (d) (mm)		1 / 1.5/ 2 / 3 / 4.5/ 6 / 8	
Hot junction		Insulated/Earthed	
Thermocouple		Single	
Length L Min/ Max (mm)	ø 1 to 2 mm	100 to 36,000 mm	
	ø > 2 mm	100 to 30,000 mm	
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1 -1.5mm	650°C	260°C
	ø 2 mm	700°C	440°C
	ø 3 mm	750°C	520°C
	ø 4.5mm	800°C	620°C
	ø 6 mm	1000°C	720°C
	ø 8 mm	1100°C	720°C
Output	Type of cable	Extension	
	Cable sheath	Glass silk	
	Max. temperature	250°C	
	Conductors	2 x 1.34 mm², insulated with glass silk	
	Braid	External: galvanized steel	
	Length Lc Min/ Max (mm)	200 mm to 10,000 mm	
Accessories (p. 338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC		SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (mm)		HOT JUNCTION		LENGTH LC (mm)		CONNECTION		PROTECTIVE SPRING
TCG35	-	1K	-	AC	-	3	-	30,000	-	M	-	2,000	-	MM	-	0
Reference in table and DIAGRAM (MM)		1		2		3		4				5		6		7
Possible choice		1J 1K		316L : AC INCONEL 600 : CM		1 1.5 2 3 4.5 6 8		Ø 1-1.5-2: 100 to 36000 Ø 3 - 4.5 - 6 - 8: 100 to 30000		Insulated: I (standard) Earthed: M		Lc: 200 to 10,000 mm (standard: 2,000 mm)		Bare wires: FN (standard) Standard male connector: SM Standard female connector: SF Miniature male connector: MM Miniature female connector: MF		Without: 0 With: 1 (standard)

DIAGRAM (MM)

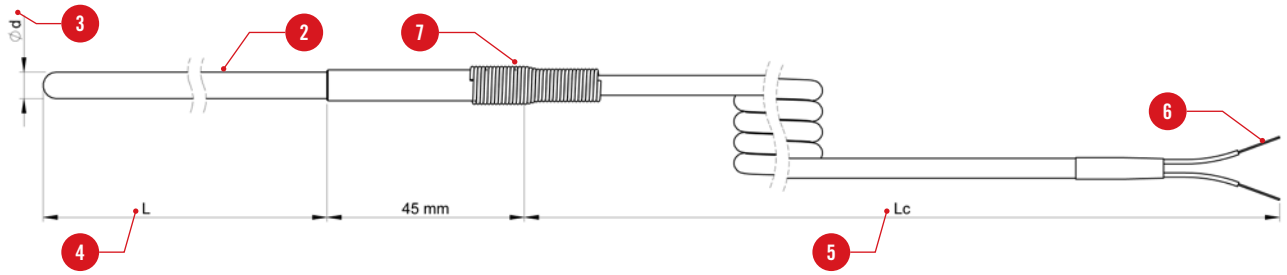
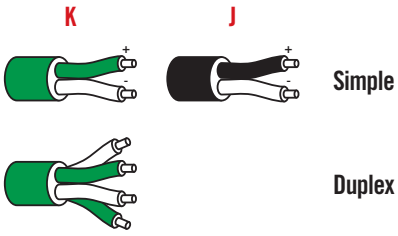


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

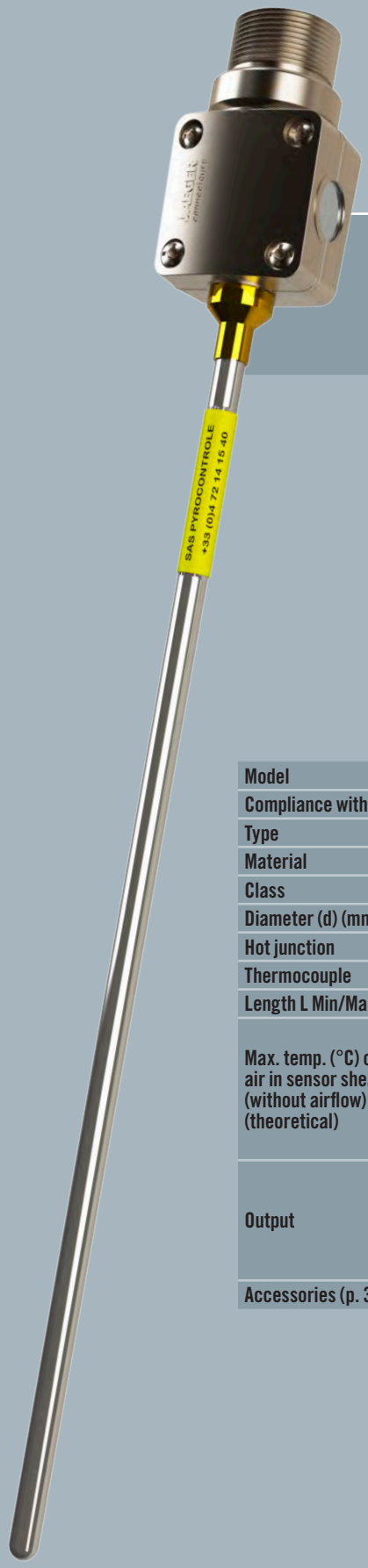
1 TC Class 1	Sheath diameter (mm)						3
	1	1.5	2	3	4.5	6	8
J	316L	316L	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

2

CONNECTIONS



For any other configuration, please contact us.



TCG4
THERMOCOUPLE

CLASS 1 | IEC 584-1 | JAEGER CONNECTOR | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Output equipped with a Jaeger plug-in connector for quick connection.

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG4				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		1	1	
Diameter (d) (mm)		1.5/ 2 / 3 / 4.5/ 6				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L Min/Max (mm)		100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1.5 mm	650°C	260°C	260°C	650°C	700°C
	ø 2 mm	700°C	440°C	250°C	700°C	900°C
	ø 3 mm	750°C	520°C	300°C	750°C	1000°C
	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
Output		Male JAEGER plug-in connector, reference 532203 (single) or 532204 (duplex).				
	Option	Extension with female JAEGER plug and cable clamp, reference 42953 (single) or 43085 (duplex), and PVC extension cable, 2x0.22mm² conductors, PVC insulation, internal copper braid. Withstand 105°C.				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

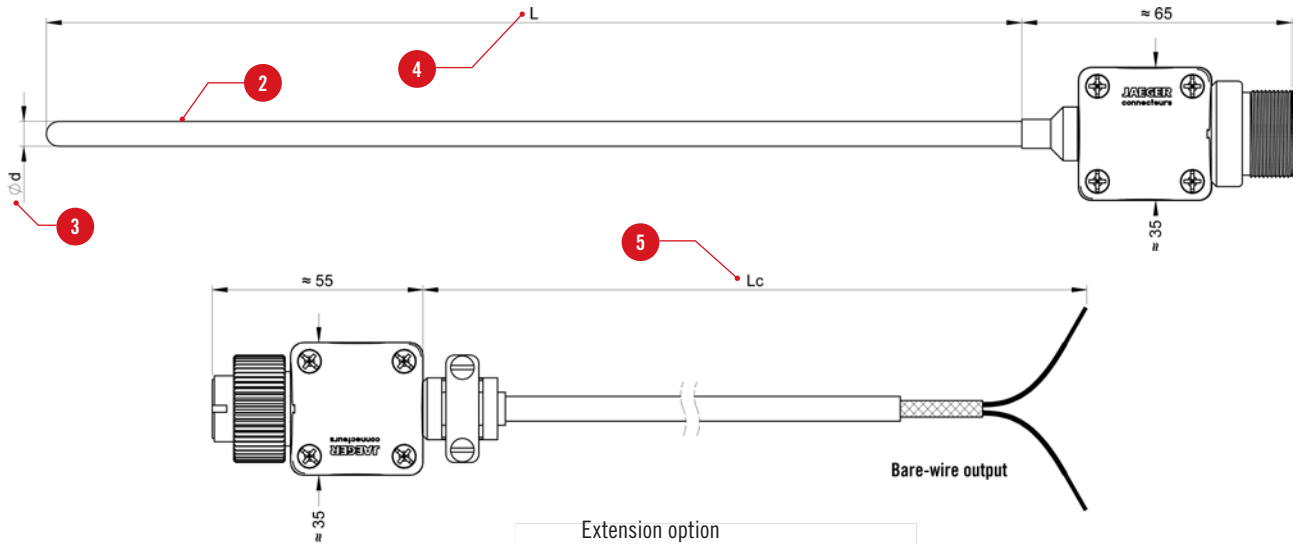
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

	MODEL		TC		SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (mm)		HOT JUNCTION		OPTION EXTENSION CABLE
	TCG4	-	1N	-	DB	-	2	-	1,000	-	I	-	10,000
Reference in table and DIAGRAM (MM)			1		2		3		4				5
Possible choice			1T 1J 1K 1N 2J 2K		316L : AC INCONEL 600 : CM PYROSIL : DB		1.5 2 3 4.5 6		Ø 2: 100 to 36,000 Ø 3 - 4.5 - 6: 100 to 30,000		Insulated: I (standard) Earthed: M		Length Lc: 200 to 25,000 mm

DIAGRAM (MM)



Extension option

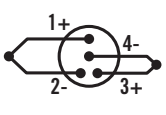
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC	Sheath diameter (mm)				3
	1.5	2	3	4.5	6
T	316L	316L	316L	316L	316L
J	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
	PYROSIL	PYROSIL	PYROSIL	PYROSIL	PYROSIL
2J	-	316L	316L	316L	316L
2K	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600

2

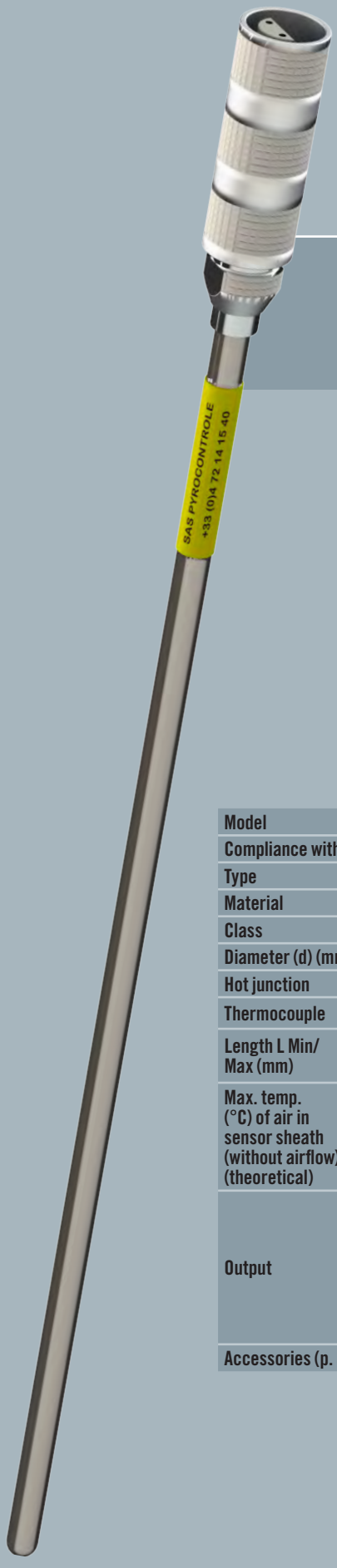
CONNECTIONS

Simple 



Duplex

For any other configuration, please contact us.



TCG5
THERMOCOUPLE

CLASS 1 | IEC 584-1 | LEMO CONNECTOR | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Output equipped with a LEMO plug-in connector for quick connection. As an option, the extension with the corresponding plug can be supplied with a PVC cable for a temperature withstand of 105°C.

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG5				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L / 304L	Inconel 600	Pyrosil
Class		1		1	1	
Diameter (d) (mm)		1 / 1.5/ 2 / 3 / 4.5				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex			Simple	
Length L Min/ Max (mm)	ø 1 to 2 mm	100 to 36,000 mm				
	ø > 2 mm	100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 1-1.5mm	650°C	260°C	250°C	650°C	700°C
	ø 2 mm	700°C	440°C	250°C	700°C	900°C
	ø 3 mm	750°C	520°C	300°C	750°C	1000°C
	ø 4.5mm	800°C	620°C	350°C	800°C	1100°C
Output		Male plug-in LEMO PC connector Reference: PC1 for d = 1 to 3 mm Reference: PC2 for d = 4.5 mm				
	Option	Extension with LEMO F plug Reference: F1 for d = 1 to 3 mm Reference: F2 for d = 4.5 mm and PVC extension cable, 2x0.22mm² conductors, PVC insulation, internal copper braid. Withstand 105°C.				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

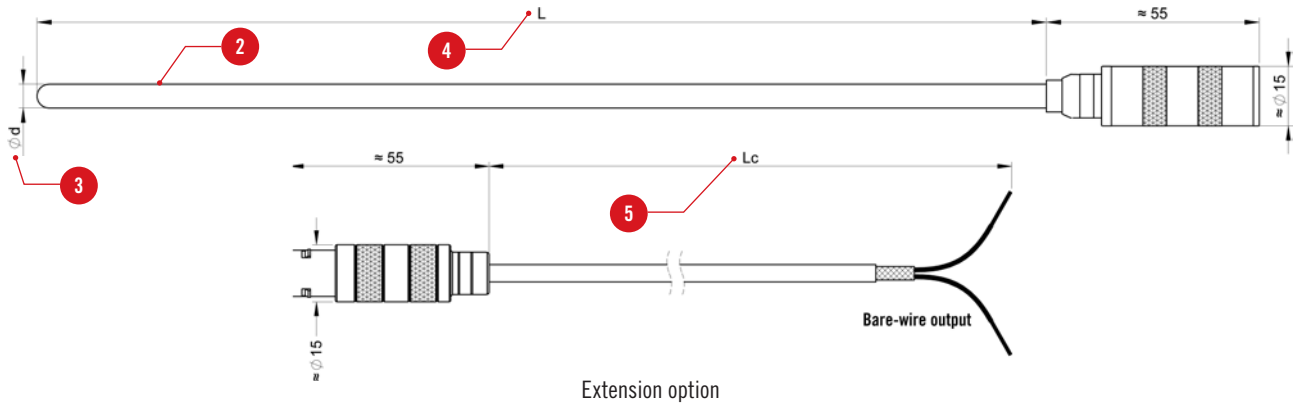
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L (mm)	HOT JUNCTION	OPTION LENGTH LC (mm)
TCG5	2K	CH	1	34,000	M	5,000
Reference in table and DIAGRAM (MM)	1	2	3	4		5
Possible choice	1T 1J 1K 1N 2T 2J 2K	304L : AB 316L : AC INCONEL 600 : CM PYROSIL : DB	1 1.5 2 3 4.5	Ø 1-1.5-2: 100 to 36,000 Ø 3 - 4.5: 100 to 30,000	Insulated: I (standard) Earthed: M	Lc: 200 to 25,000 mm

DIAGRAM (MM)



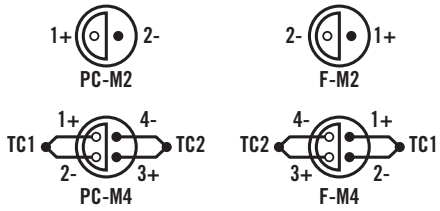
Extension option

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC	Sheath diameter (mm)				3
	1	1.5	2	3	4.5
T	316L	316L	316L	316L	316L
J	316L	316L	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
	-	PYROSIL	PYROSIL	PYROSIL	PYROSIL
2T	-	-	304L	-	304L
2J	-	-	316L	316L	316L
2K	-	-	INCONEL600	INCONEL600	INCONEL600

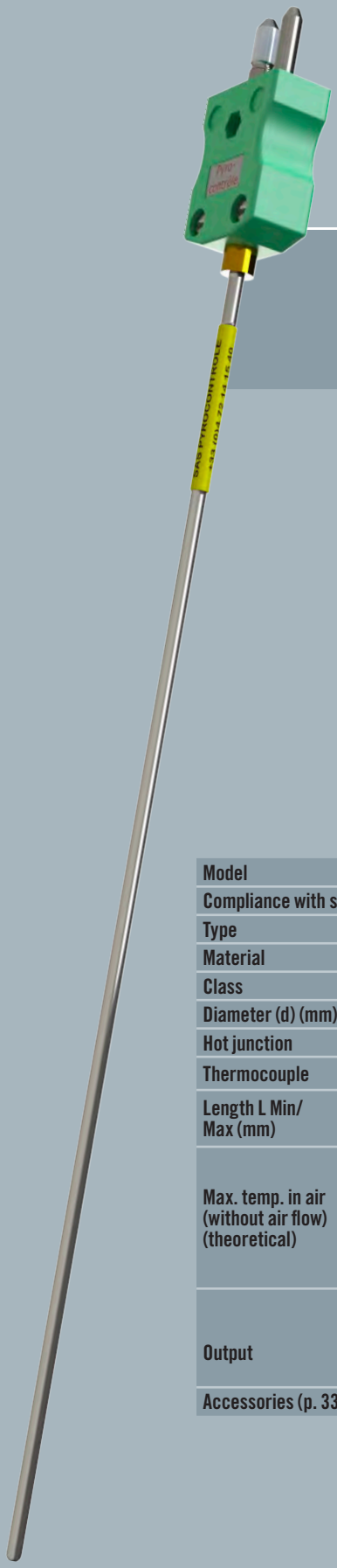
2

CONNECTIONS



Sensor Extension

For any other configuration, please contact us.



TCG6
THERMOCOUPLE

CLASS 1 | IEC 584-1 | STANDARD CONNECTOR | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Output equipped with a standard plug-in male connector with compensated contacts for quick connection. As an option, the extension with the corresponding female plug can be supplied with a PVC cable for a withstand of 105°C.

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG6				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L / 304L	Inconel 600	Pyrosil
Class		1		1	1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3 / 4.5 / 6				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex			Single	
Length L Min/ Max (mm)	Diam. 1 to 2 mm	100 to 36,000 mm				
	Diam.> 2 mm	100 to 30,000 mm				
Max. temp. in air (without air flow) (theoretical)	Diam.1 -1.5mm	650°C	260°C	250°C	650°C	700°C
	Diam. 2 mm	700°C	440°C	250°C	700°C	900°C
	Diam. 3 mm	750°C	520°C	300°C	750°C	1000°C
	Diam. 4.5mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
Output		Standard plug-in male connector with compensated contacts				
	Option	Extension with standard female plug with compensated contacts and cable clamp, PVC extension cable, 2x0.22mm² conductors, insulated with PVC, internal copper braid. Withstand 105°C.				
Accessories (p. 338)		Leak-tight fittings, rotating fittings, connectors				

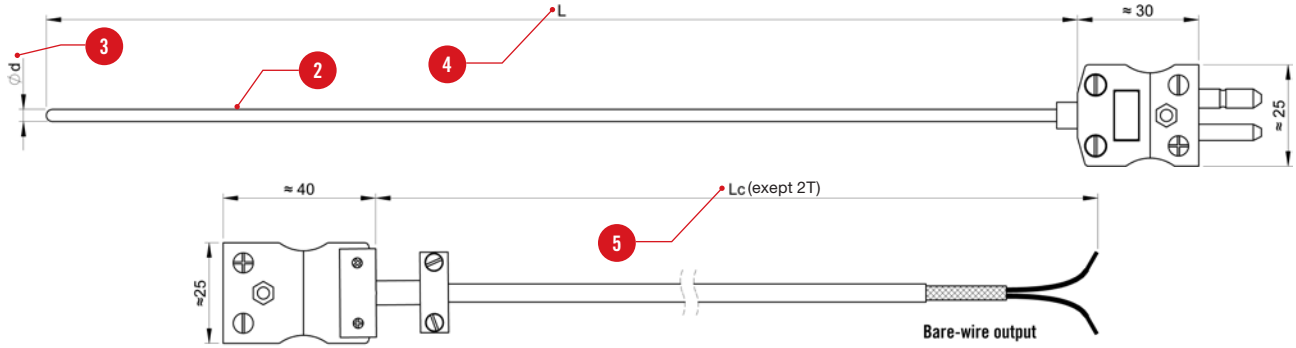
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L (MM)	HOT JUNCTION	OPTION LENGTH LC
TCG6	2J	AB	1	450	M	520
Reference in table and DIAGRAM (MM)	1	2	3	4		5
Possible choice	1T 1J 1K 1N 2T 2J 2K	304L : AB 316L : AC INCONEL 600 : CM PYROSIL : DB	1 1.5 2 3 4.5 6	Ø 1-1.5-2: 100 to 36,000 Ø 3 - 4.5: 100 to 30,000	Insulated: I (standard) Earthed: M	200 to 25,000 mm

DIAGRAM (MM)

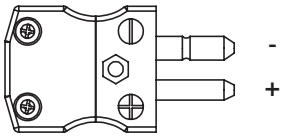


Extension option

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC	Sheath diameter (mm)						3
	1	1.5	2	3	4.5	6	
T	316L	316L	316L	316L	316L	316L	
J	316L	316L	316L	316L	316L	316L	
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	
N	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	2
	-	PYROSIL	PYROSIL	PYROSIL	PYROSIL	PYROSIL	
2T	-	-	304L	-	304L	304L	
2J	-	-	316L	316L	316L	316L	
2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	

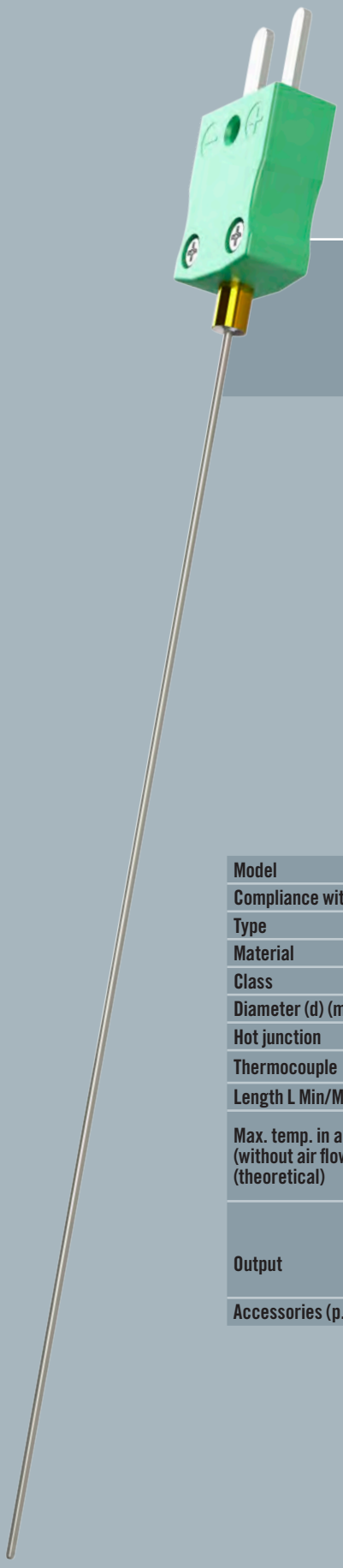
CONNECTIONS



For any other configuration, please contact us.

TO ORDER

Order our standard references on p. 96



TCG11
THERMOCOUPLE

CLASS 1 | IEC 584-1 | MINIATURE CONNECTOR | up to 900°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Output equipped with a miniature plug-in male connector with compensated contacts for quick connection. As an option, the extension with the corresponding female plug can be supplied with a PVC cable for a withstand of 105°C.

Thermocouples must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG11				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3				
Hot junction		Insulated/Earthed				
Thermocouple		Single				
Length L Min/Max (mm)		100 to 36,000 mm				
Max. temp. in air (without air flow) (theoretical)	Diam.1 -1.5mm	650°C	260°C	250°C	650°C	700°C
	Diam. 2 mm	700°C	440°C	250°C	700°C	900°C
Output		Miniature plug-in male connector with compensated contacts				
	Option	Extension with miniature female plug with compensated contacts and cable clamp, PVC extension cable, 2x0.22mm² conductors, insulated with PVC, internal copper braid. Withstand 105°C."				
Accessories (p. 338)		Leak-tight fittings, rotating fittings, connectors				

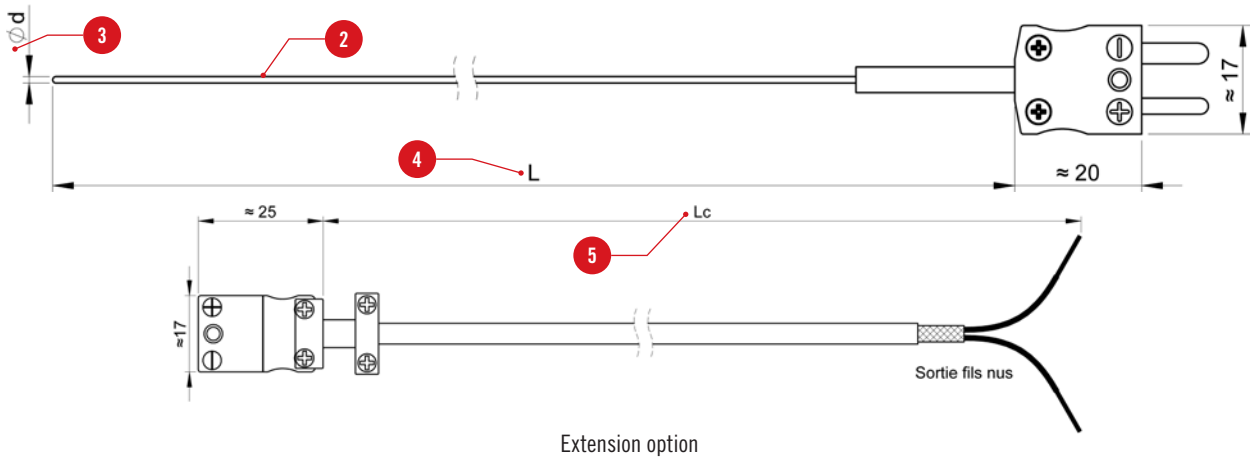
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L (mm)	HOT JUNCTION	OPTION LENGTH LC (mm)
TCG11	1N	CM	3	4,200	I	1,000
Reference in table and DIAGRAM (MM)	1	2	3	4		5
Possible choice	1T 1J 1K 1N	316L : AC INCONEL 600 : CM PYROSIL : DB	1 1.5 2 3	100 to 36,000	Insulated: I (standard) Earthed: M	Length Lc: 200 to 25,000 mm

DIAGRAM (MM)

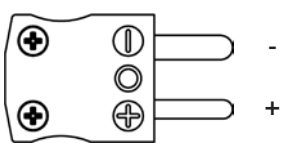


Extension option

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1 TC	Sheath diameter (mm)				3
	1	1.5	2	3	
T	316L	316L	316L	316L	
J	316L	316L	316L	316L	
K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	2
N	INCONEL600	INCONEL600	INCONEL600	INCONEL600	
	-	PYROSIL	PYROSIL	PYROSIL	

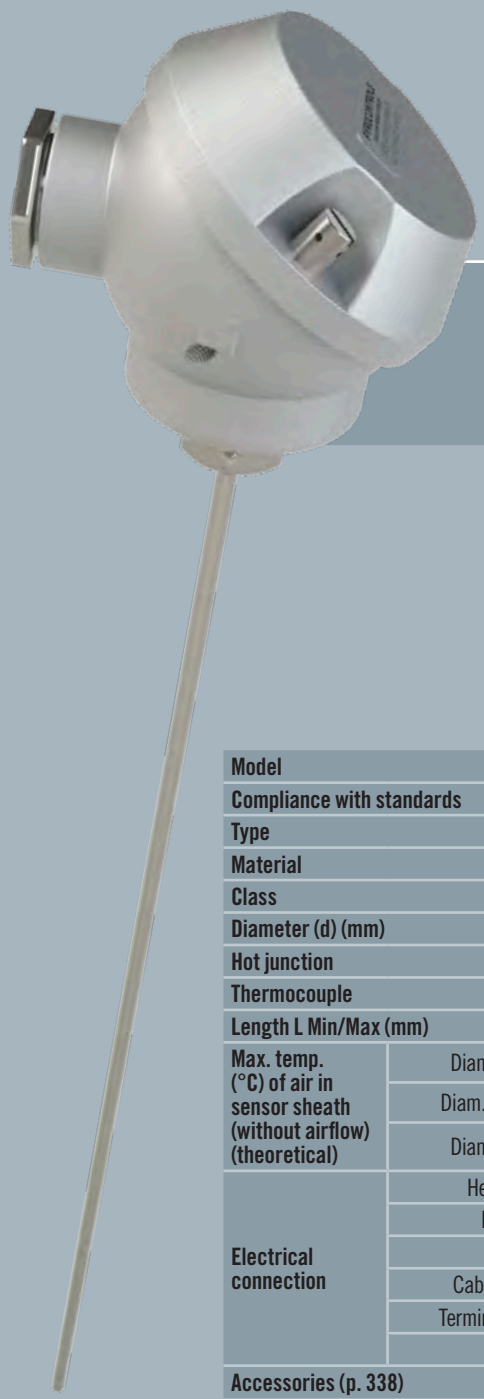
CONNECTIONS



TO ORDER

Order our standard references on p. 97

For any other configuration, please contact us.



TCG51
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | up to 1150°C

DESCRIPTION

Sheathed thermocouple with output via MA head. For use when the space available for the connecting head is limited.

SPECIFICATIONS

Model		TCG51				
Compliance with standards		IEC 584-1				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		1	1	
Diameter (d) (mm)		3 / 4.5/ 6				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L Min/Max (mm)		100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 3 mm	750°C	520°C	300°C	750°C	1000°C
	Diam. 4.5mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
Electrical connection	Head type	MA				
	Material	Light alloy				
	Output	1 cable gland PG09				
	Cable diam.	4 mm to 6mm				
	Terminal strip	2 to 4 terminals				
	IP	IP54				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	HEAD		TC		SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (MM)		HOT JUNCTION
TCG	5	1	-	1N	-	AC	-	3	-	20,000	-	I
Reference in table and DIAGRAM (MM)		1		2		3		4		5		
Possible choice	Without: 5	MA : 1		1T 1J 1K 1N 2K 2J		316L : AC INCONEL600 : CM PYROSIL : DB		3 4.5 6		100 to 30,000		Insulated: I (standard) Earthed: M

DIAGRAM (MM)

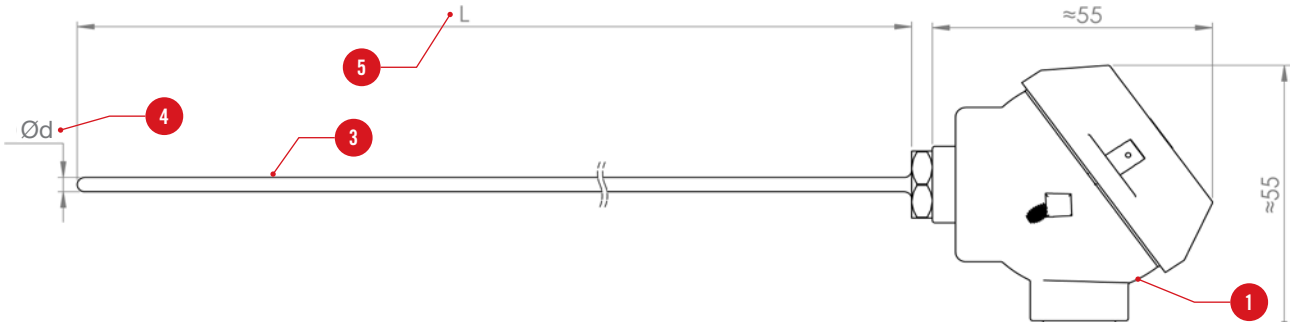
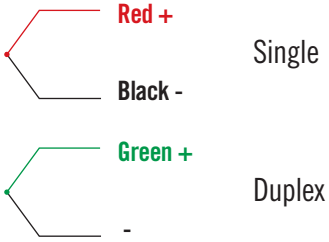


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

2 TC Class 1	Sheath diameter (mm)		
	3	4.5	6 (4)
T (class 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	INCONEL600 (3)
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

CONNECTION



For any other configuration, please contact us.



TCGx2
THERMOCOUPLE

IP 65 | CLASS 1 | IEC 584-1 | up to 1150°C

DESCRIPTION

Sheathed thermocouple with output via DAN head. The DAN head is versatile and easy to open with its valve lever and can be equipped with a terminal strip for connection or a 4-20mA transmitter.

SPECIFICATIONS

Model		TCGx2				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		4.5/ 6 / 8				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L Min/Max (mm)		100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 4.5mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Without - under G1/2 head - Extension + G1/2 fitting				
Electrical connection	Head type	DAN				
	Material	Light alloy				
	Output	1 cable gland M20x1.5				
	Cable diam.	5.5 mm to 7.5 mm				
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)				
	Coating	None (standard) or epoxy (option)				
	IP	IP54 (standard) or IP65 (option)				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	HEAD		TC	SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (mm)		HOT JUNCTION	OPTION: TRANSMITTER		OPTION: TRANSMITTER SCALE		OPTIONS
TCG	6	2	-	1K	CM	-	6	-	20,000	-	M	A	-	0/420	-	1
Reference in table and DIAGRAM (MM)	1	2		3	4		5		6			7				
Possible choice	Without: 5 With extension and G1/2" fitting: 6 With fitting under G1/2" head: 9	DAN : 2		1T 1J 1K 1N 2K 2J	316L : AC INCONEL600 : CM PYROSIL : DB		4,5 6 8		100 to 30,000		Insulated: I (standard) Earthed: M	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C				Epoxy + screw (IP65): 1 Epoxy + lever (IP54): 2 ⚠ If IP65, screwed cover and without valve lever

DIAGRAM (MM)

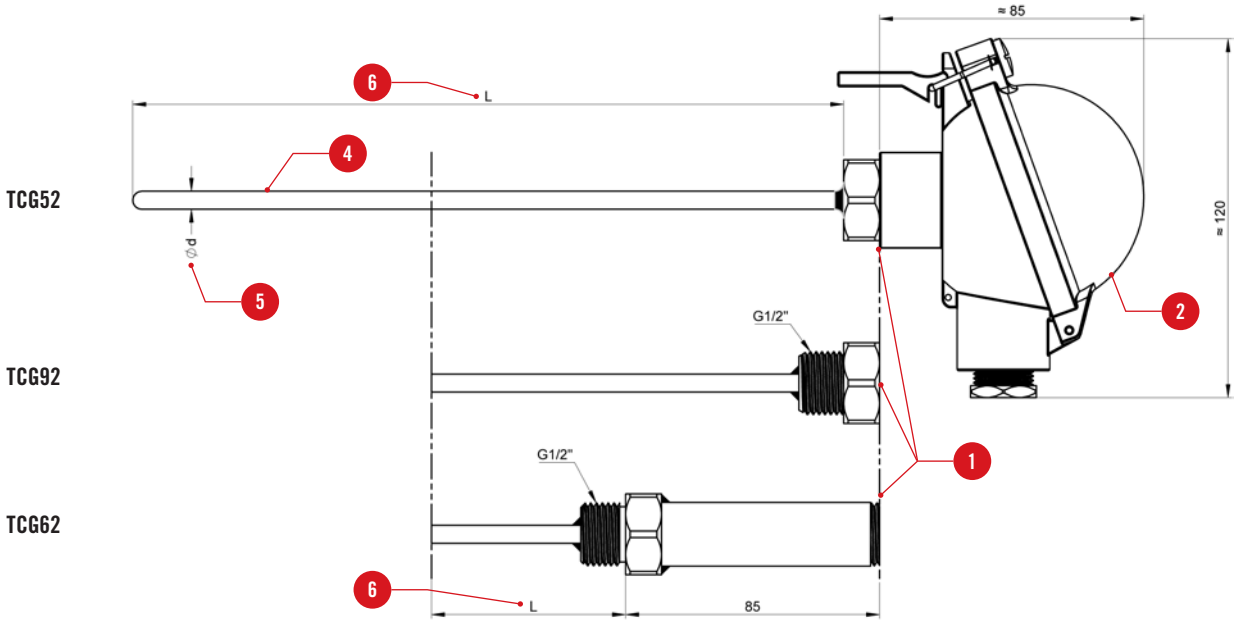


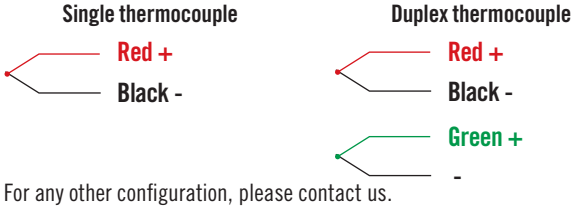
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

TC Class (3)	Sheath diameter (mm)		
	4.5	6	8
T (class 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	- (4)
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

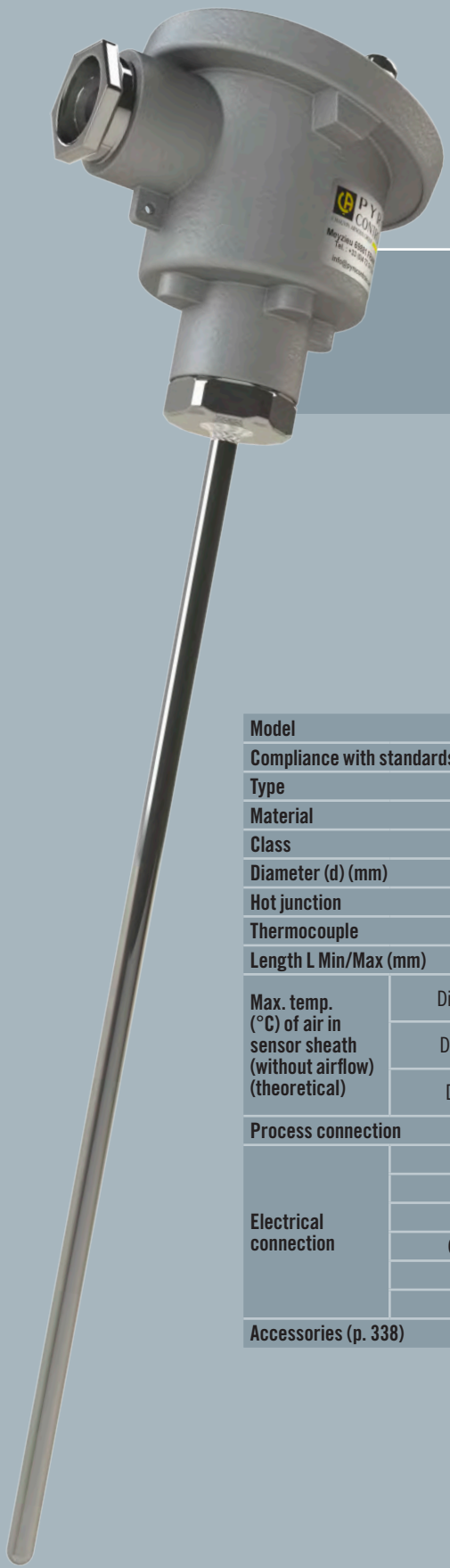
TRANSMITTER (NOT COMPATIBLE WITH DUPLEX) (7)

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION



For any other configuration, please contact us.



TCGx3
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | up to 1150°C

DESCRIPTION

Sheathed thermocouple with output via DIN B head. The DIN B head is versatile and economical and can be fitted with a terminal strip or a 4-20mA transmitter.

SPECIFICATIONS

Model		TCGx3				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		4.5/ 6 / 8				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L Min/Max (mm)		100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 4.5mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm"	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Without - under G1/2 head - extension + G1/2 fitting				
Electrical connection	Head type	DIN B				
	Material	Light alloy				
	Output	1 cable gland M20x1.5				
	Cable diam.	5.5 mm to 7.5 mm				
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)				
	IP	IP54				
Accessories (p. 338)		Leak-tight fittings, rotating fittings				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	HEAD		TC		SHEATH TYPE		Ø SHEATH (mm)		LENGTH L (MM)		HOT JUNCTION	OPTION: TRANSMITTER		OPTION: TRANSMITTER SCALE
TCG	5	3	-	1J	-	AC	-	6	-	2,500	-	I		-	
Reference in table and DIAGRAM (MM)	1	2		3		4		5		6			7		
Possible choice	Without: 5 With extension and G1/2" fitting: 6 With fitting under G1/2" head: 9	DIN B : 3		1T 1J 1K 1N 2K 2J		316L : AC INCONEL600 : CM PYROSIL : DB		4.5 6 8		100 to 30,000		Insulated: I (standard) Earthed: M	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C		

DIAGRAM (MM)

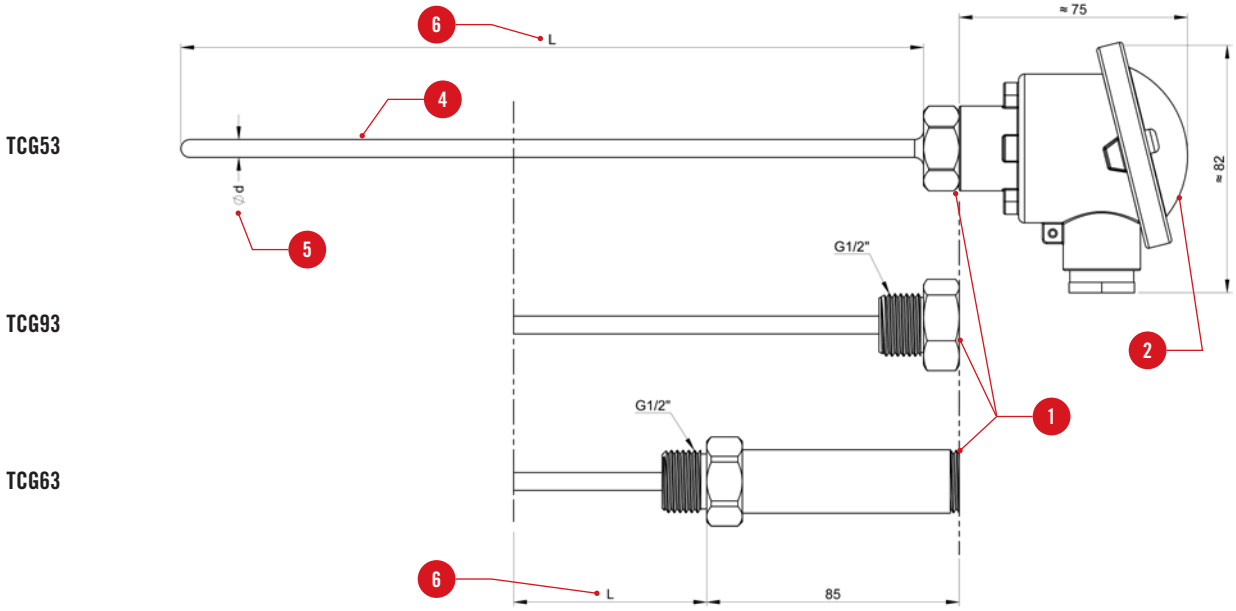


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

3 TC Class 1	Sheath diameter (mm)		
	4,5	6	8
T (class 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	-
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

4

TRANSMITTER (NOT COMPATIBLE WITH DUPLEX)

7

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION

Single thermocouple

Red +

Black -

Duplex thermocouple

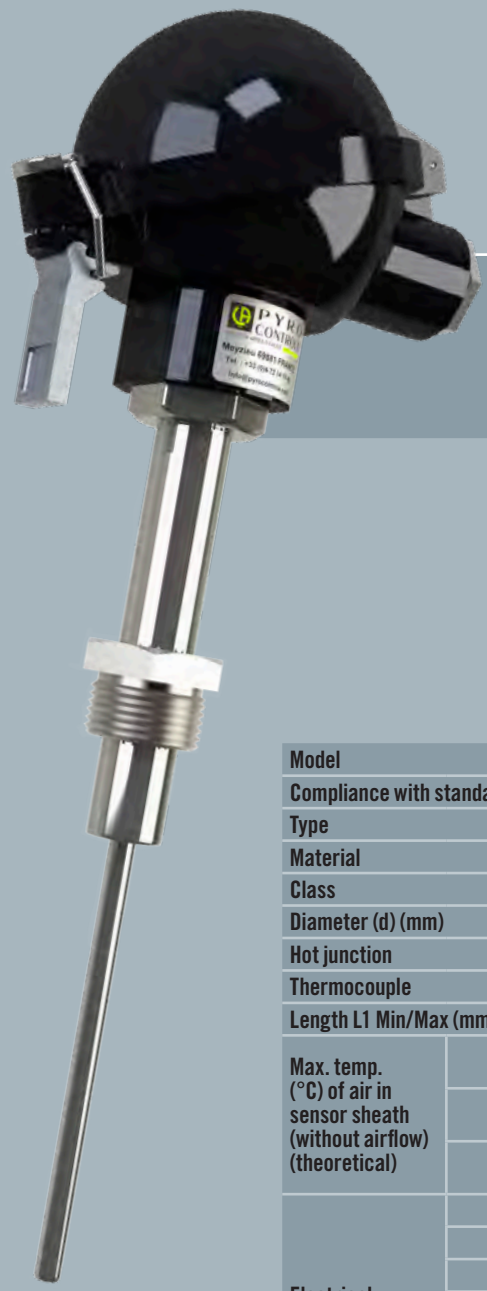
Red +

Black -

Green +

-

For any other configuration, please contact us.



TA
THERMOCOUPLE

IP 54 | IP 65 Option | CLASS 1 | IEC 584-1 | up to 1150°C

DESCRIPTION

Sensor for industrial applications. The TA assembly is a rugged product for undemanding applications.

SPECIFICATIONS

Model		TA				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		1	1	
Diameter (d) (mm)		4.5/ 6 / 8				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L1 Min/Max (mm)		100 to 30,000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 4.5mm	800°C	620°C	350°C	800°C	1150°C
	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1150°C
	Diam. 8 mm	1050°C	720°C	350°C	1100°C	1150°C
Electrical connection	Head type	DIN B ou DAN				
	Material	Light alloy				
	Output	1 cable gland M20x1.5				
	Cable diam.	5.5 mm to 7.5 mm				
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)				
	Coating	Without (standard) or epoxy (DAN option)				
	IP	IP54 (standard) or IP65 (DAN option)				
Accessories (p. 338)		Cables, cable gland. Interchangeable measuring elements.				

TYPES OF FASTENINGS



No fastening | Threaded fitting under head | Welded threaded fitting | Compression fitting | Sleeve threaded at the tip | EBA flange

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (MM)	HOT JUNCTION	FASTENING
TA	2	2K	CM	6	4,500	M	0
Reference in table and DIAGRAM (MM)	1	2	3	4	5		6
Possible choice	DAN : 2 DIN B : 3	1T 1J 1K 1N 2K 2J	316L : AC INCONEL600 : CM PYROSIL : DB	4,5 6 8	100 to 30,000	Insulated: I (standard) Earthed: M	Without: 0 Threaded connector under head: 1 Welded threaded connector: 2 Compression fitting: 3 Sleeve threaded at one end: 4 EBA flange: 5

THREAD: FLANGE SIZE	LENGTH L2 (MM)	Ø SLEEVE	LENGTH L3 (MM)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE	OPTION: OPTIONS*
A	500	1	200	A	0/450	1
	7	8	9	10		
G 1/2" : A 1/2" NPT : B 3/4" NPT : C	100 to 500 mm	1/4" : 1 3/8" : 2 1/2" : 3	10 to 300 mm	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C		Epoxy + screw (IP65): 1 Epoxy + lever (IP54): 2 (*): if DAN head ⚠ If IP65, screwed cover and without valve lever

DIAGRAM (MM)

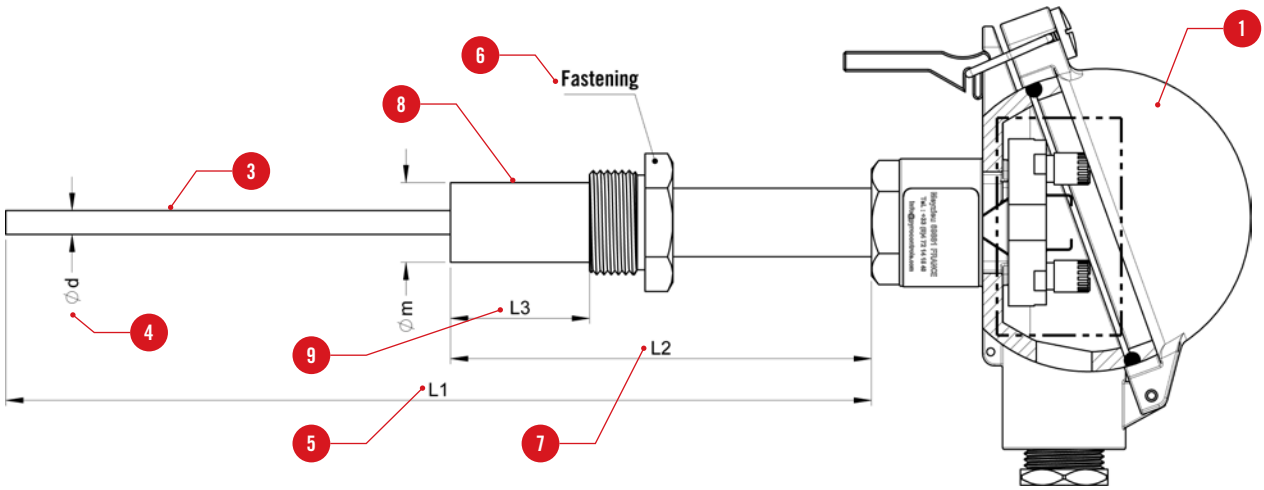


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

TC Class 1 (2)	Sheath diameter (mm) (4)		
	4.5	6	8
T (class 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N (3)	INCONEL600	INCONEL600	-
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

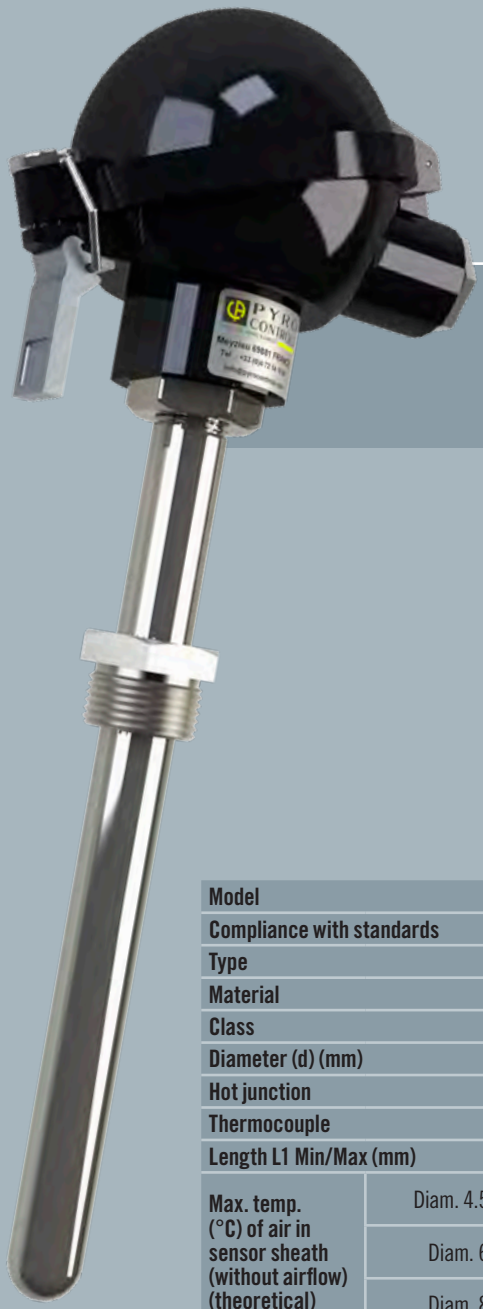
For any other configuration, please contact us.

TRANSMITTER (NOT COMPATIBLE WITH DUPLEX) (10)

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION





TB
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | up to 1200°C

DESCRIPTION

Sensor designed for applications in demanding environments such as powders in motion, sand, granulates, mixing of bitumen or rubber. The thermocouple is protected by a protective tube to improve its withstand.

SPECIFICATIONS

Model		TB				
Compliance with standards		IEC 584-1 / EN 61515				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		4.5/ 6 / 8				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L1 Min/Max (mm)		100 to 3000 mm				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Electrical connection	Head type	DIN B or DAN				
	Material	Light alloy				
	Output	1 cable gland M20x1.5				
	Cable diam.	5.5 mm to 7.5 mm				
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)				
	Coating	Without (standard) or epoxy (DAN option)				
	IP	IP54 (standard) or IP65 (DAN option)				
Accessories (p. 338)		Cables, cable gland. Interchangeable measuring elements.				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	HOT JUNCTION	FASTENING
TB	2	1T	CM	6	2,000	I	A
Reference in table and DIAGRAM (MM)	1	2	3	4	5		6
Possible choice	DAN : 2 DIN B : 3	1T 1J 1K 1N 2K 2J	316L : AC INCONEL600 : CM PYROSIL : DB	4.5 6 8	100 to 3000	Insulated: I (standard) Earthed: M	Without: 0 G1/2": A 1/2NPT: B 3/4 NPT: C

OPTION

PROT. TUBE	PROT. TUBE Ø	LENGTH L2 (mm)	TRANSMITTER	TRANSMITTER SCALE	OPTIONS*
AC	1/4"	1,500	A	0/450	1
7	8	9	10		
316L : AC 304L : AB AR25/20 : AK AISI446 : BB Inconel 600 : CM	13.5 mm : 1/4" 17.2 mm : 3/8" 21.3 mm : 1/2"	50 to 2950 mm	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C		Epoxy + screw (IP65): 1 Epoxy + lever (IP54): 2 (*): if DAN head ⚠ If IP65, screwed cover and without valve lever

DIAGRAM (MM)

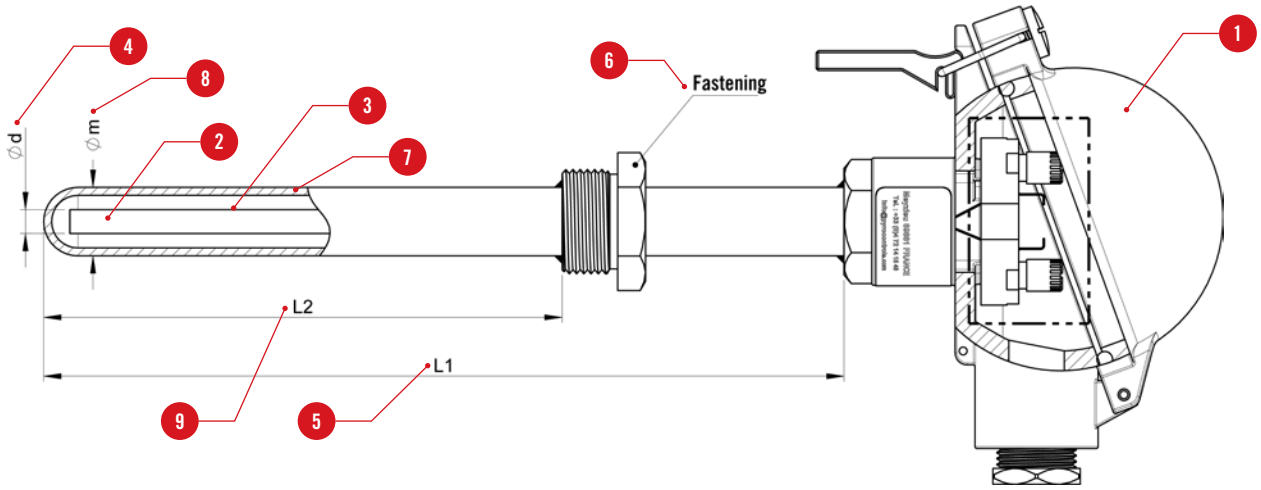


TABLE OF CONDUCTOR TYPE - SHEATH DIAMETER

2 TC Class 1	Sheath diameter (mm)		4
	4.5	6	8
T (class 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	- 3
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

For any other configuration, please contact us.

TRANSMITTER (NOT COMPATIBLE WITH DUPLEX) 10

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-100
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION





TMA
THERMOCOUPLE

IP	IP	CLASSE	IEC	
54	65 Option	1	584-1	up to 500°C

DESCRIPTION

Sensor designed for applications in abrasive environments such as powders in motion, sand, granulates, mixing of bitumen, rubber, etc. The thermocouple's hot junction is connected to the earth for a quick response time and is protected by a tungsten carbide end-piece to ensure mechanical resistance to abrasion.

SPECIFICATIONS

Model		TMA
Compliance with standards		IEC 584-1
Type		K / J
Class		1
Hot junction		Earthed
Thermocouple		Single
Material	End-piece	Tungsten carbide
	Connector	Hard chromium
	Extension	AISI 310
Diameter (mm)	End-piece	5
	Extension	21
Length L1 Min/Max (mm)		150 to 500 mm
Fastening		Without (standard) or threaded fitting on sheath diam.21mm or flange (option)
Max. temp. (°C) (without flow) (theoretical)		500°C (crimped earmold)
Electrical connection	Head type	DAN
	Material	Light alloy
	Output	1 cable gland M20x1.5
	Cable diam.	5.5 mm to 7.5 mm
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)
	Coating	Without (standard) or epoxy (DAN option)
	IP	IP54 (standard) or IP65 (option DAN)
Accessories (p. 338)		Cables, cable gland

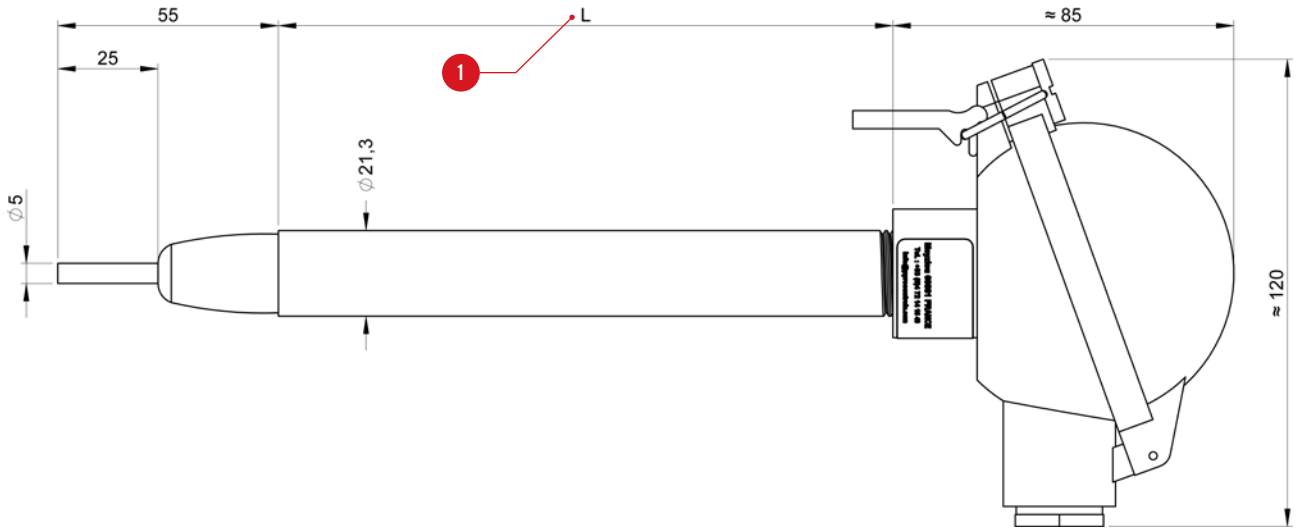
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

	MODEL		TC		LENGTH L1 (mm)		TRANSMITTER	OPTION TRANSMITTER SCALE		DAN HEAD OPTIONS
	TMA	-	1J	-	400	-	C		-	
Reference in table and DIAGRAM (MM)					1		2			
Possible choice			1J 1K		100 to 500		LC5334A-100 : A LC5335A-100 : C			Epoxy + screw (IP65): 1 Epoxy + lever (IP54): 2 * If IP65, screwed cover and without valve lever

DIAGRAM (MM)



TRANSMITTER

2

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

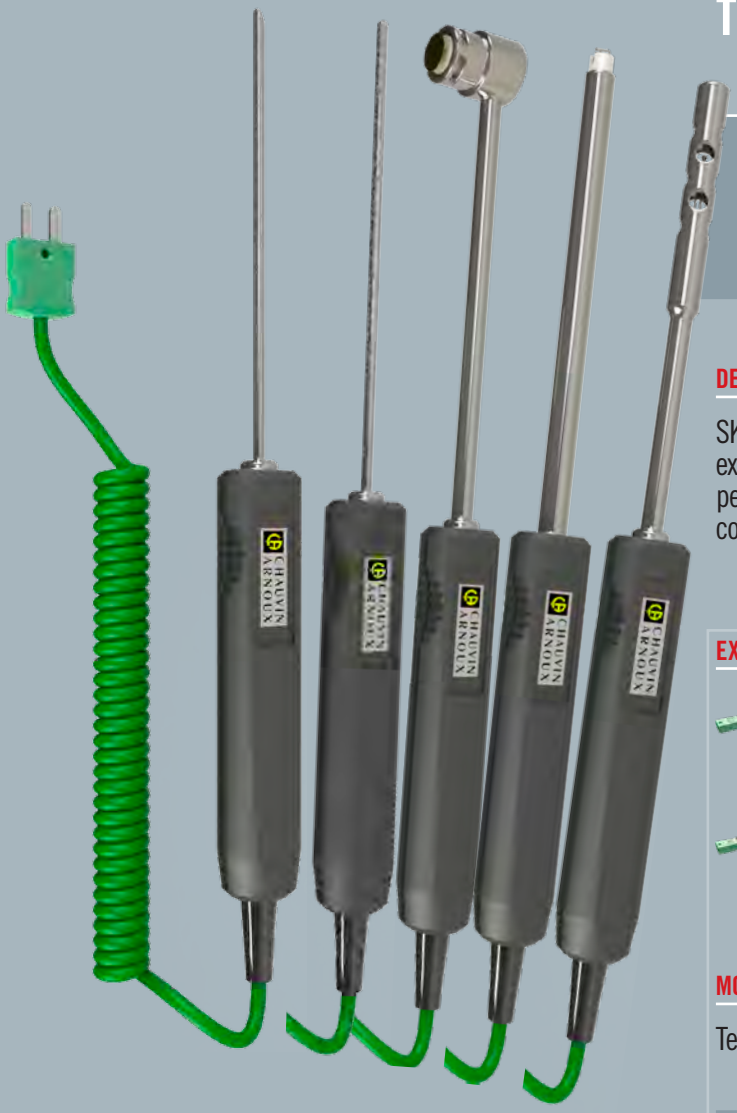
CONNECTION

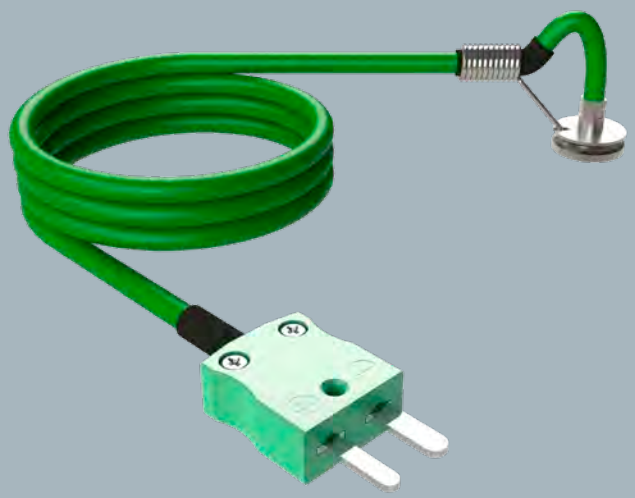


Simple

For any other configuration, please contact us.

SKxx
THERMOCOUPLE





IEC 584-1 | IP 54 | CLASS 1 | up to 1100°C

DESCRIPTION

SKxx, a complete range of K-thermocouple sensors and extensions for measuring ambient, surface or immersion/ penetration temperatures. Equipped with miniature male compensated connectors, these sensors are interchangeable.

EXTENSIONS


CK1


CK2


CK3


CK4

MODELS

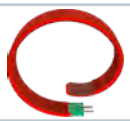
Temperature withstand of extensions: -40 °C to +100 °C

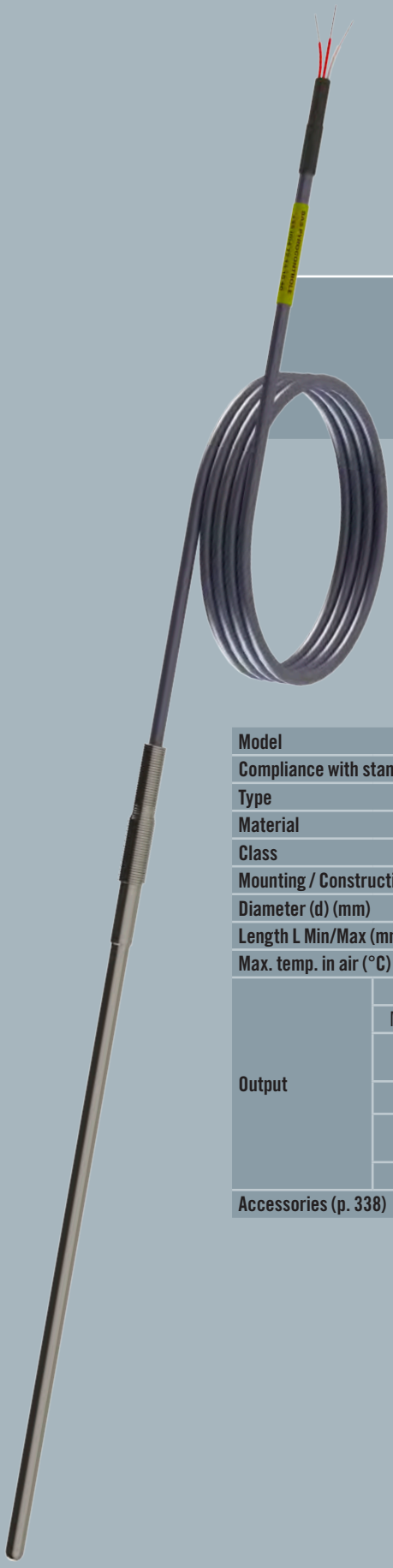
	Description	Diameter	Length	Référence
CK1	Terminated by male plug / female plug	4 mm	1 m	P03652909
CK2	Terminated by male plug / 2 bare wires	4 mm	1 m	P03652910
CK3	Terminated by 5-pin DIN plug / female socket	4 mm	1 m	P03652913
CK4	Terminated by 2 banana plugs / female socket	4 mm	1 m	P03652914

ACCESSORIES / REPLACEMENT PARTS

- PP1 handle for CK extension P03652912
- Miniature 2-pole male compensated connector P03652925

SPECIFICATIONS AND CODES FOR ORDERS

Model	Model	Description	Measurement range	Tolerance class	63% response time	Plunger diameter	Plunger length	Ref.
	SK20	Sheathed sensor as per the NF EN 61615 standard. Hot junction insulated from the earth. Inconel 600 protective sheath	-40 °C to +450 °C	Cl.1	1 s	1.5mm	1 m	P01655010
	SK13	Sensor with stainless-steel sheath	-50 °C to +1100 °C	Cl.2	6 s	3 mm	30 cm	P03652918
	SK3	Slightly bendable sensor with stainless-steel sheath	-50 °C to +1000 °C	Cl.2	2 s	4.5mm	50 cm	P03652903
	SK2	Bendable sensor with stainless-steel sheath. Bend radius > 4 mm	-50 °C to +1000 °C	Cl.2	3 s in environment	2 mm	1 m	P03652902
	SK6	"General-purpose" sensor recommended for measurements when access is difficult. Do not use in liquids (tip not leak-tight)	-50 °C to +285 °C	Cl.2	1 s by contact	1 mm	1 m	P03652906
	SK7	In "calm" environments without moving air, shake the sensor to favour thermal exchange	-50 °C to +250 °C	Cl.2	12 s	5 mm	15 cm	P03652907
	SK17	In "calm" environments without moving air, shake the sensor to favour thermal exchange	-50 °C to +600 °C	Cl.2	5 s	6 mm	13 cm	P03652921
	SK1	Sensor with stainless-steel sheath for penetration (20 mm min.) in pasty, viscous or liquid substances	-50 °C to +800 °C	Cl.2	1 s	3 mm	15 cm	P03652901
	SK11	Sensor with stainless-steel sheath for penetration (20 mm min.) in pasty, viscous or liquid substances	50 °C to +600 °C	Cl.2	12 s	3 mm	13 cm	P03652917
	SK4	Sheathed sensor with stainless-steel sensing element and Teflon base. For small, flat surfaces. Silicone grease can be used to improve contact quality.	0°C to +250°C	Cl.2	1 s	5 mm	15 cm	P03652904
	SK14	For surface temperatures when access is difficult	-50°C to +450°C	Cl.2	8 s	6 mm	13 cm	P03652919
	SK5	For flat surfaces. The spring ensures optimum contact even if the sensor is not placed perpendicularly. Silicone grease can be used to improve contact quality.	-50°C to +500°C	Cl.2	1 s	5 mm Ø in contact 8.5 mm	15 cm	P03652905
	SK15	For flat surfaces. The spring ensures optimum contact even if the sensor is not placed perpendicularly. Silicone grease can be used to improve contact quality.	-50°C to +900°C	Cl.2	2 s	8 mm	13 cm	P03652920
	SK8	For measurements on pipes. The copper sheet is applied to the clean, dry pipe, with the double-sided Velcro ribbon ensuring contact by winding.	-50°C to +140°C	Cl. 2	10 s on stainless steel pipe 12 mm in diameter	Ø 10-90 mm	32 cm	P03652908
	SK19	Sensor with magnet for flat metal surfaces.	-50°C to +200°C	Cl.2	7 s	4 mm	1 m	P03652922



S1
Pt100

CLASS A | IEC 60751 | up to 600°C | SINGLE OR DUPLEX

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, output via cable, for temperature measurement up to 450°C in low pressure and low flow-rate environments.

SPECIFICATIONS

Model		S1		
Compliance with standards		IEC 60751		
Type		Pt100 Ω		
Material		316L		
Class		A: up to 450°C - B: from 450°C to 600°C		
Mounting / Construction		Single: 1x3 wires or 1x4 wires - Duplex: 2x2 wires or 2x3 wires		
Diameter (d) (mm)		1.6 / 3 / 4.5/ 6 / 8		
Length L Min/Max (mm)		See table opposite		
Max. temp. in air (°C)		600°C		
Output	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3. 4 or 6 x 0.22 mm, PVC insulation	3. 4 or 6 x 0.22 mm, FEP insulation	3. 4 or 6 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p. 338)		Leak-tight fittings, rotating fittings		

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	NO. PT100	MOUNTING	Ø SHEATH (mm)	LENGTH L (mm)	CABLE	LENGTH LC (mm)	CONNECTION	PROTECTIVE SPRING
S1	- 1	- B	- 3	- 50/1,500	- PVC	- 2,500	- SM	- 0
Reference in table and DIAGRAM (MM)	1	2	3	4	5	6	7	8
Possible choice	1	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	1.6 3 4.5 6 8	As per table below	PVC: PVC FEP: FEP Silicone: SIL	200 to 10,000 mm	Bare wires: FN (standard) Standard 3-pin male connector: SM Miniature 3-pin male connector: MM Size-2 PC2M3 LEMO connector: LE Size 1 Jaeger connector: JA	Without: 0 With: 1 (standard)

⚠ Silicone cable not possible with 2x3-wire mounting

DIAGRAM (MM)

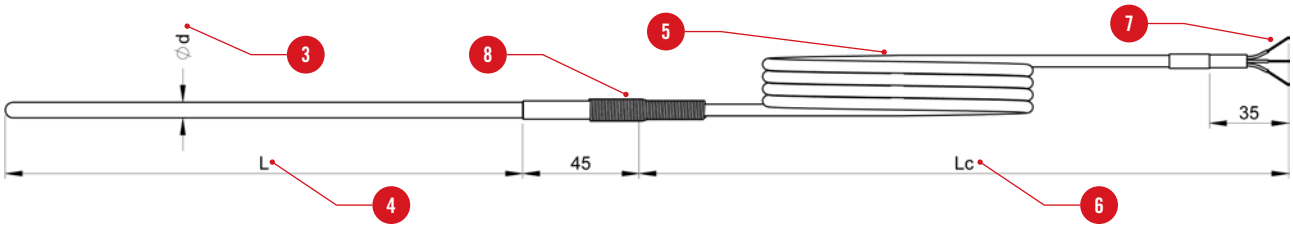
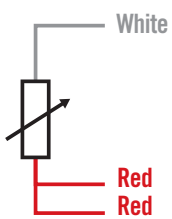


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

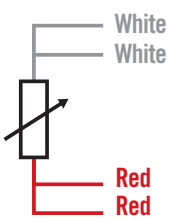
1 Number of Pt100	2 Mounting	Length min./max. (mm) Sheath diameter (mm) 1.6	3	4.5	6	8
1	1x3 wires	50 / 250	50 / 1500	50 / 1500	50 / 1500	50 / 1500
	1x4 wires	50 / 250	50 / 1500	50 / 1500	50 / 1500	50 / 1500
2	2x2 wires	-	50 / 250	50 / 250	50 / 250	50 / 250
	2x3 wires	-	50 / 1500	50 / 1500	50 / 1500	50 / 1500

CONNECTIONS

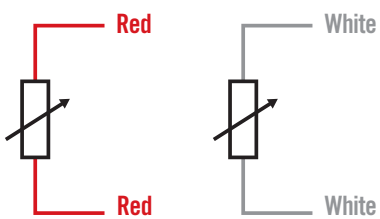
Connection of 1 Pt100 Ω
1x3 wires



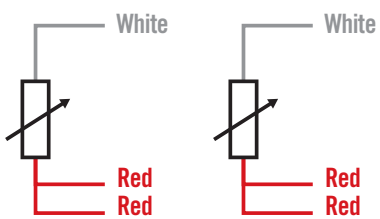
Connection of 1 Pt100 Ω
1x4 wires



Connection of 2 Pt100 Ω
2x2 wires



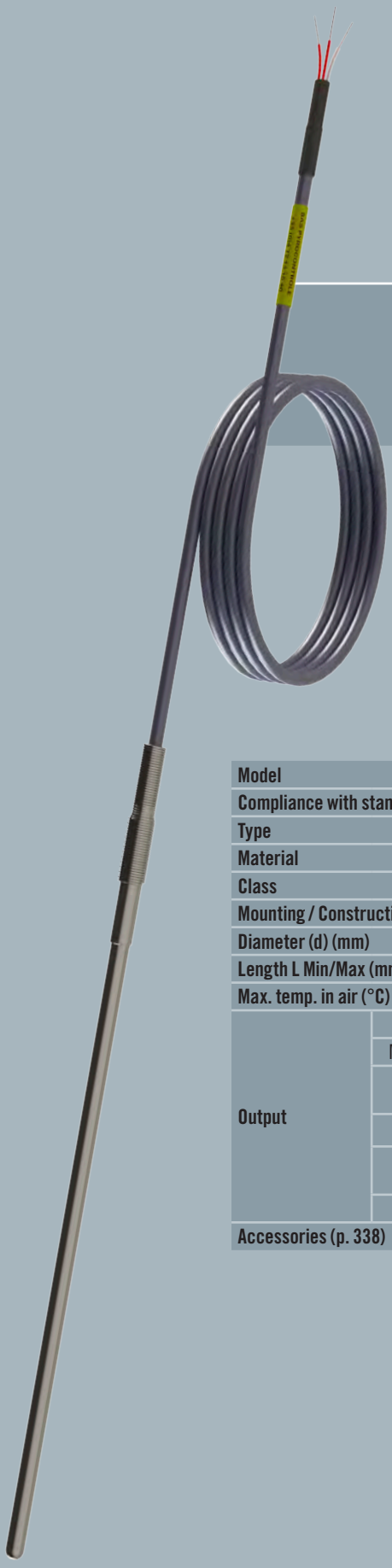
Connection of 2 Pt100 Ω
2x3 wires



For any other configuration, please contact us.

TO ORDER

Order our standard references on p. 98



S2
Pt100

CLASS A | IEC 60751 | up to 250°C | SINGLE OR DUPLEX

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, with cable output, for temperature measurement up to 200°C. Economical assembly designed for use in low-pressure, low flow-rate environments.

SPECIFICATIONS

Model		S2x		
Compliance with standards		IEC 60751		
Type		Pt100 Ω		
Material		316L		
Class		A		
Mounting / Construction		Single: 1x3 wires or 1x4 wires - Duplex: 2x2 wires or 2x3 wires		
Diameter (d) (mm)		3 / 4.5/ 6 / 8		
Length L Min/Max (mm)		As per table opposite		
Max. temp. in air (°C)		Max according to cable (see below)		
Output	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	250°C	250°C
	Conductors	3, 4 or 6 x 0.22 mm, PVC insulation	3, 4 or 6 x 0.22 mm, FEP insulation	3, 4 or 6 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p. 338)		Leak-tight fittings, rotating fittings		

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	CABLE	NO. PT100	MOUNTING	Ø SHEATH (mm)	LENGTH L (mm)	LENGTH LC (mm)	CONNECTION	PROTECTIVE SPRING
S2	- 2	- 1	- B	- 3	- 150	- 5,200	- MM	- 0
Reference in table and DIAGRAM (MM)	1	2	3	4	5	6	7	8
Possible choice	PVC: 0 FEP: 2 Silicone: 1	1 2	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	3 4,5 6 8	as per table below	200 to 10,000 mm	Bare wires: FN (standard) Standard 3-pin male connector: SM Miniature 3-pin male connector: MM Size-2 PC2M3 LEMO connector: LE Size 1 Jaeger connector: JA	Without : 0 With : 1 (standard)

DIAGRAM (MM)

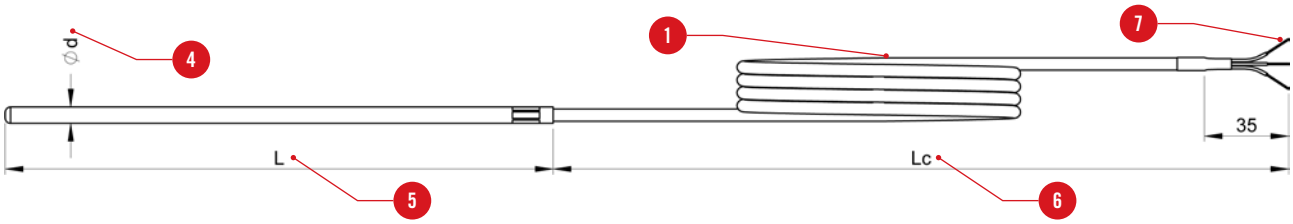
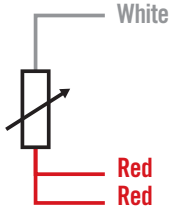


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

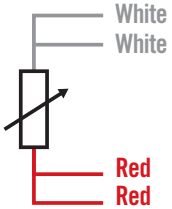
Number of Pt100	Mounting (3)	Min./max. length (mm) — Sheath diameter (mm)				(4)
		3	4,5	6	8	
1	1x3 wires	50 / 1500	50 / 1500	50 / 1500	50 / 500	
	1x4 wires	50 / 1500	50 / 1500	50 / 1500	50 / 500	
2 (2)	2x2 wires	-	50 / 250	50 / 250	50 / 250	(5)
	2x3 wires	-	-	50 / 1500	50 / 500	

CONNECTIONS (3)

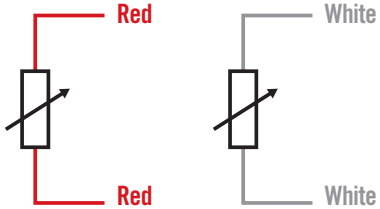
Connection 1 Pt100 Ω
1x3 wires



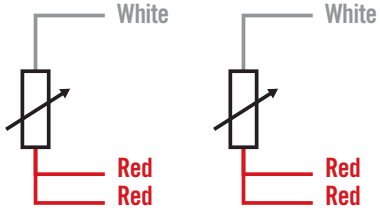
Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



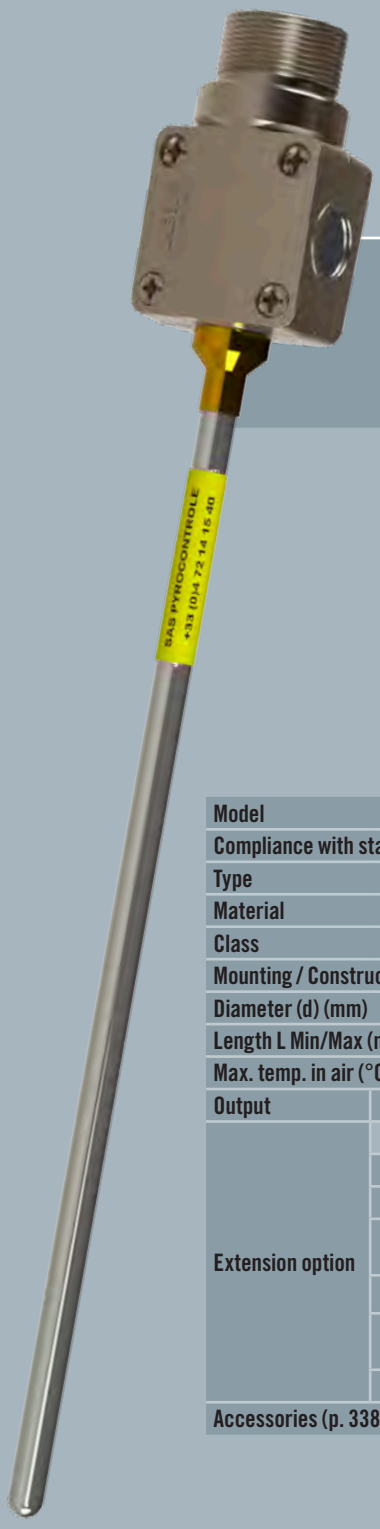
Connection 2 Pt100 Ω
2x3 wires



For any other configuration, please contact us.

TO ORDER

Order our standard references on p. 99



S41

Pt100

CLASS A | IEC 60751 | JAEGER CONNECTOR | up to 600°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, output via Jaeger connector, for temperature measurement up to 450°C in low-pressure and low flow-rate environments.

SPECIFICATIONS

Model		S41		
Compliance with standards		IEC 60751		
Type		Pt100 Ω		
Material		316L		
Class		A: up to 450°C - B: from 450°C to 600°C		
Mounting / Construction		Single: 1x3 wires or 1x4 wires - Duplex: 2x2 wires or 2x3 wires		
Diameter (d) (mm)		3 / 4.5/ 6		
Length L Min/Max (mm)		50 … 1500		
Max. temp. in air (°C)		200 or 450°C		
Output	Connector	Jaeger size 1 ref. 0532.203		
Extension option	Extension with female JAEGER plug and cable clamp with PVC, FEP or silicone extension cable			
	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3, 4 or 6 x 0.22 mm, PVC insulation	3, 4 or 6 x 0.22 mm, FEP insulation	3, 4 or 6 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p. 338)		Leak-tight fittings, rotating fittings		

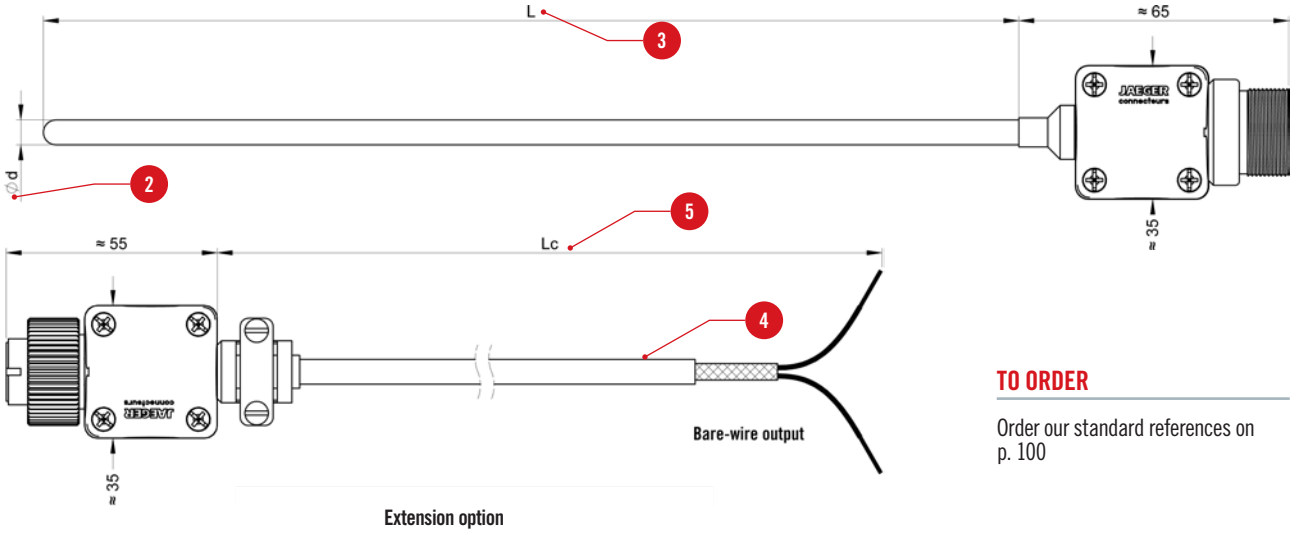
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	OPERATING TEMP. (°C)	MOUNTING	Ø (mm)	LENGTH L (mm)	OPTION: EXTENSION CABLE	OPTION: LENGTH LC (mm)
S41	200	B	3	750	FEP	9,000
Reference in table and DIAGRAM (MM)		1	2	3	4	5
Possible choice	200 450	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	3 4.5 6	50 to 1,500	PVC: PVC FEP: FEP Silicone: SIL	200 to 10,000 mm

DIAGRAM (MM)



TO ORDER

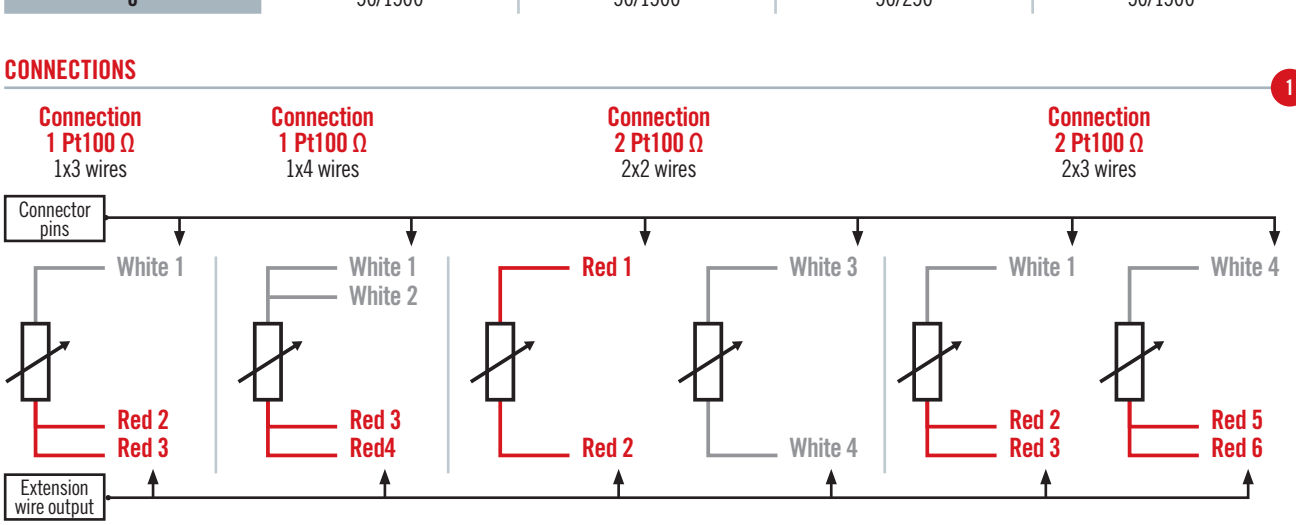
Order our standard references on p. 100

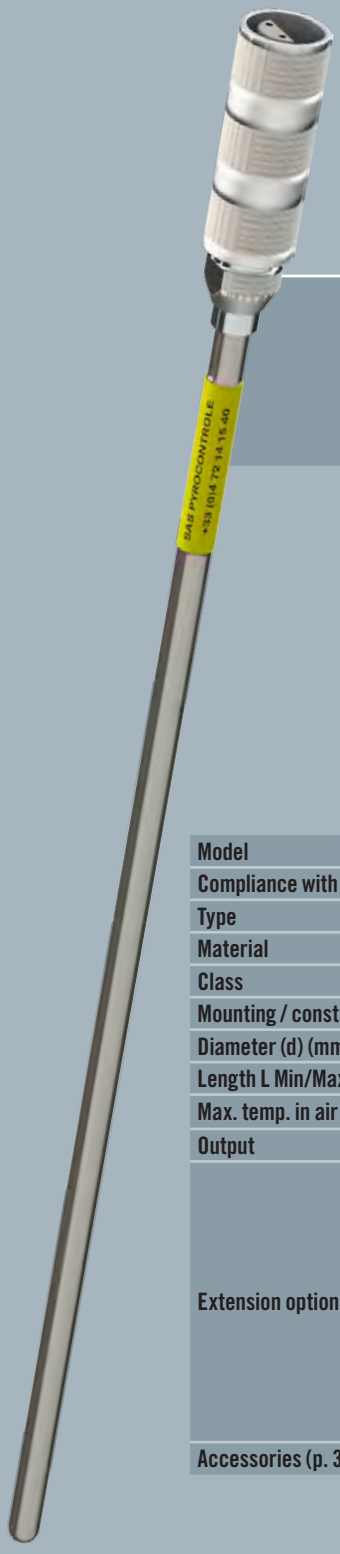
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

Diameter (mm)	1 Pt100		2 Pt100	
	1x3 wires	1x4 wires	2x2 wires	2x3 wires (1)
3	50/1500	50/1500	-	-
(2) 4.5	50/1500	50/1500	50/250	50/1500
6	50/1500	50/1500	50/250	50/1500

CONNECTIONS

(1)





S40

Pt100

CLASS A | IEC 60751 | LEMO CONNECTOR | up to 600°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, output via LEMO connector, for temperature measurement up to 450°C in low-pressure and low flow-rate environments.

SPECIFICATIONS

Model		S40		
Compliance with standards		IEC 60751		
Type		Pt100 Ω		
Material		316L		
Class		A: up to 450°C - B: from 450°C to 600°C		
Mounting / construction		Single: 1x3 wires or 1x4 wires - Duplex: 2x2 wires or 2x3 wires		
Diameter (d) (mm)		3 / 4.5/ 6		
Length L Min/Max (mm)		50 … 1500		
Max. temp. in air (°C)		200 or 450°C		
Output	Connector	LEMO size 2 ref. PC2M3		
Extension option	Extension with female LEMO plug and PVC, FEP or silicone extension cable.			
	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3, 4 or 6 x 0.22 mm, PVC insulation	3, 4 or 6 x 0.22 mm, FEP insulation	3, 4 or 6 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p. 338)		Leak-tight fittings, rotating fittings		

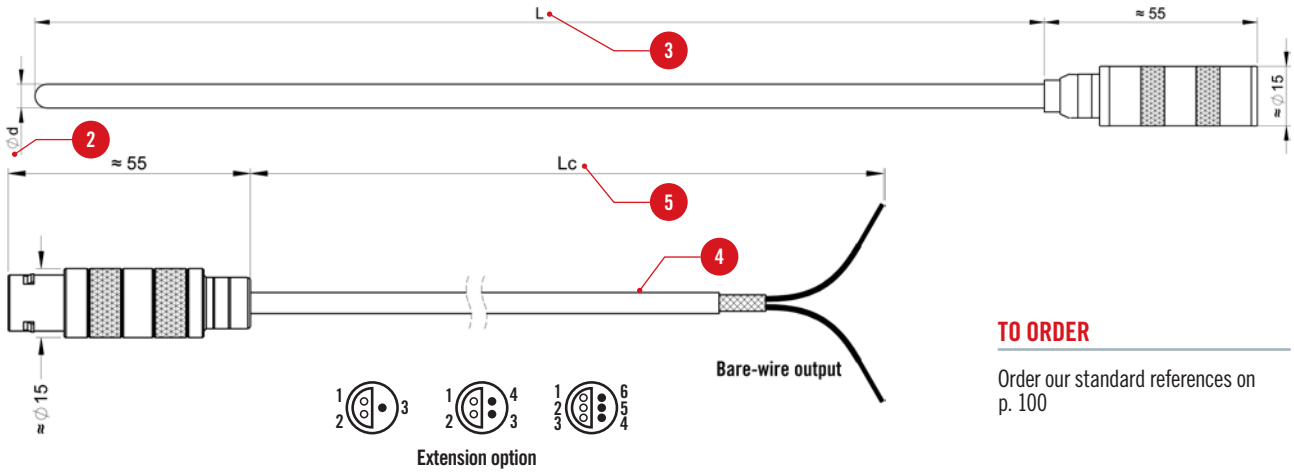
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	OPERATING TEMP. (°C)	MOUNTING	Ø (mm)	LENGTH L (mm)	OPTION: EXTENSION CABLE	OPTION: LENGTH LC (mm)
S40	200	C	4.5	75	PVC	5,200
Reference in table and DIAGRAM (MM)		1	2	3	4	5
Possible choice	200 450	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	3 4.5 6	50 to 1,500	PVC: PVC FEP: FEP Silicone: SIL	200 to 10,000 mm

DIAGRAM (MM)



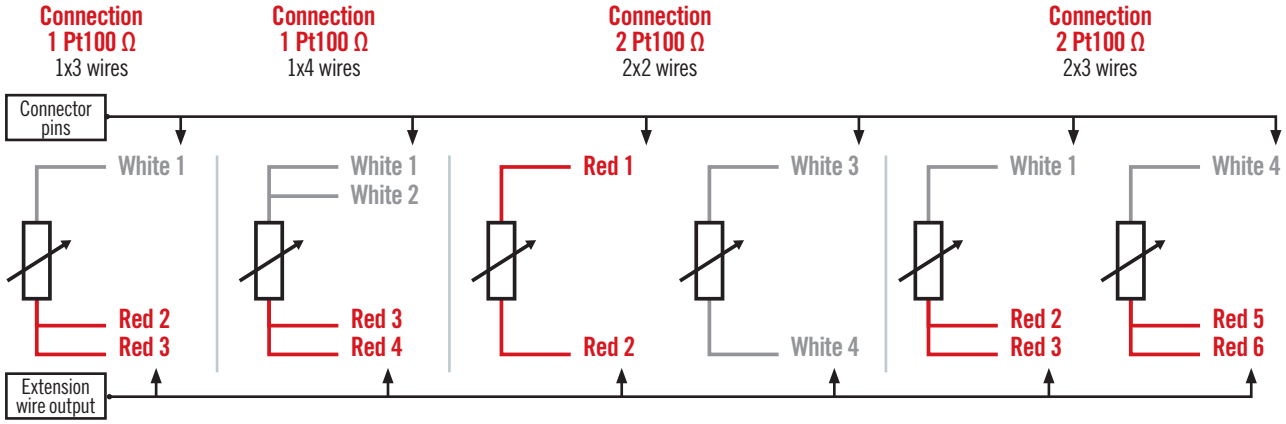
TO ORDER

Order our standard references on p. 100

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

Diameter (mm)	1 Pt100		2 Pt100	
	1x3 wires	1x4 wires	2x2 wires	2x3 wires
3	50/1500	50/1500	50/250	50/1500
4.5	50/1500	50/1500	50/250	50/1500
6	50/1500	50/1500	50/250	50/1500

CONNECTIONS





S44

Pt100

CLASS A | IEC 60751 | STANDARD CONNECTOR | up to 600°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, output via standard 3-pin male connector, for temperature measurement up to 450°C in low-pressure and low flow-rate environments.

SPECIFICATIONS

Model		S44		
Compliance with standards		IEC 60751		
Type		Pt100 Ω		
Material		316L		
Class		A: up to 400°C - B: from 450°C to 600°C		
Mounting / Construction		Single: 1x3 wires		
Diameter (d) (mm)		3 / 4.5/ 6		
Length L Min/Max (mm)		50 … 1500		
Max. temp. in air (°C)		200 or 450°C		
Output	Connector	Standard 3-pin male		
Extension option	Type	Extension with standard 3-pin female plug with PVC, FEP or silicone extension cable		
	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3 x 0.22 mm, PVC insulation	3 x 0.22 mm, FEP insulation	3 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p. 338)		Leak-tight fittings, rotating fittings		

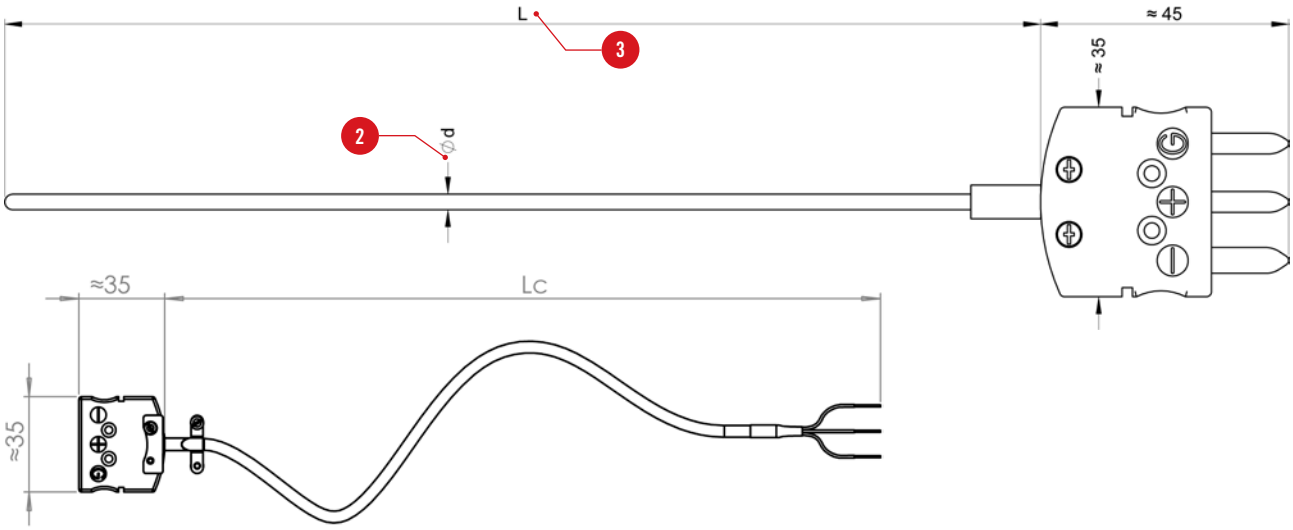
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		OPERATING TEMP. (°C)		Ø (mm)		LENGTH L (mm)		OPTION: EXTENSION CABLE		OPTION: LENGTH LC (mm)
S44	-	450	-	3	-	1,000	-	PVC	-	5,000
Reference in table and DIAGRAM (MM)		1		2		3				
Possible choice		200 450		3 4,5 6		50 to 1,500		PVC : PVC FEP : FEP Silicone : SIL		200 to 10,000 mm

DIAGRAM (MM)

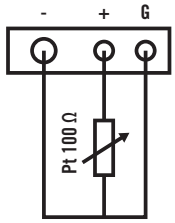


OPERATING TEMPERATURE LIMIT ACCORDING TO DIAMETER

Diameter (mm)	Temperature	
	200°C	450°C
3	•	-
4.5	•	•
6	•	•

CONNECTIONS

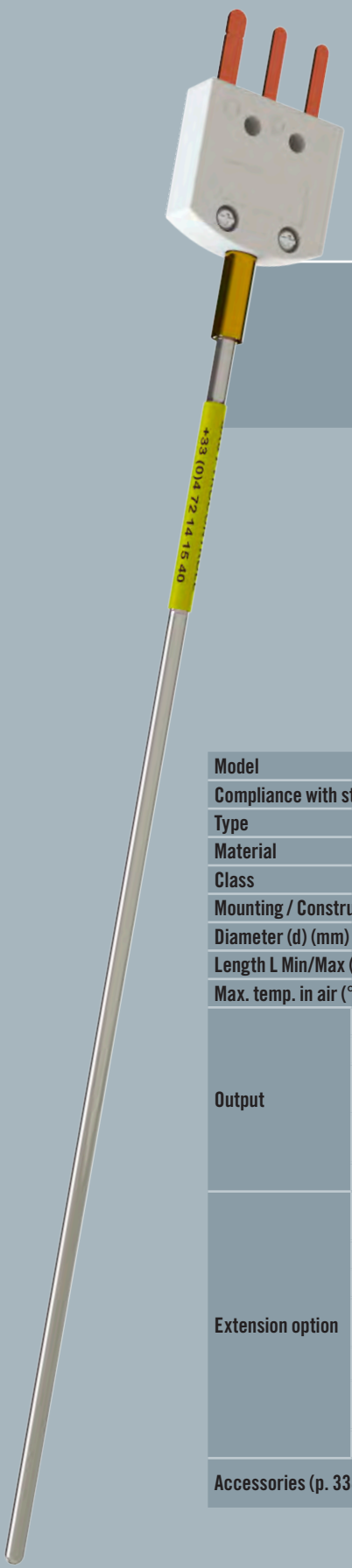
Standard 3-pin connector



TO ORDER

Order our standard references on p. 101

For any other configuration, please contact us.



S43

Pt100

CLASS A | IEC 60751 | MINIATURE CONNECTOR | up to 600°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, output via miniature 3-pin connector, for temperature measurement up to 450°C in low-pressure and low flow-rate environments.

SPECIFICATIONS

Model		S43		
Compliance with standards		IEC 60751		
Type		Pt100 Ω		
Material		316L		
Class		A : up to 450°C - B : from 450°C to 600°C		
Mounting / Construction		Single: 1x3 wires		
Diameter (d) (mm)		3		
Length L Min/Max (mm)		50 … 1500		
Max. temp. in air (°C)		200 / 450°C		
Output	Connector	3-pin miniature male		
	Format	Miniature		
	Dimensions (Lxwxh) (mm)	19 x 24 x 8		
	Temperature withstand	-50… + 210°C		
	Material	Pins: Copper - Body: glass-fibre reinforced nylon		
Extension option	Type	Extension with standard female 3-pin plug 3 broches and PVC, FEP or silicone extension cable		
	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3 x 0.22 mm, isolated PVC	3 x 0.22 mm, isolated FEP	3 x 0.22 mm, isolated FEP
	Shielding braid	•	•	
	Length Lc Min/Max (mm)	200 to 10 000 mm		
	Ending	Bare and insulated wires		
Accessories (p. 338)		Cable clamp for connector, female connector, leak-tight fittings, rotating fittings		

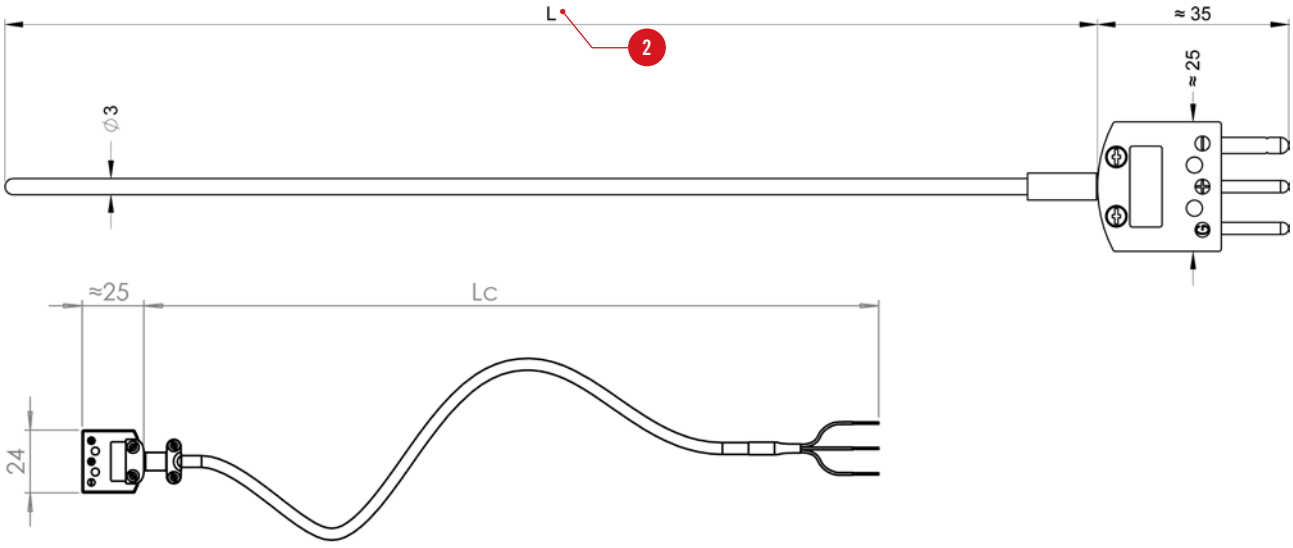
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	OPERATING TEMP. (°C)	LENGTH L (mm)	EN OPTION EXTENSION CABLE	EN OPTION LENGTH LC (mm)
S43	450	1,250	PVC	5,000
Reference in table and DIAGRAM (MM)	1	2		
Possible choice	200 450	50 to 1,500	PVC : PVC FEP : FEP Silicone : SIL	200 to 10,000 mm

DIAGRAM (MM)

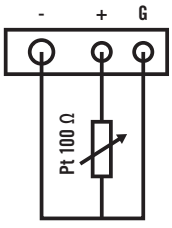


TO ORDER

Order our standard references on p. 101

CONNECTION

Standard 3-pin connectors



For any other configuration, please contact us.



S51

Pt100

IP 54 | CLASS 1 | IEC 60751 | up to 600°C | SINGLE OR DUPLEX

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, with output via MA head for temperature measurement up to 450°C in low-pressure and low flow-rate environments. For use when the space available for the connecting head is limited.

SPECIFICATIONS

Model		S51
Compliance with standards		IEC 60751
Class		A : up to 450°C - B : from 450°C to 600°C
Mounting / Construction		Single: 1x3 wires or 1x4 wires Duplex: 2x2 wires
Diameter (d) (mm)		3 / 4.5 / 6
Length L Min/Max (mm)		50 … 1500
Min./max. operating temperature (°C)		-40…+200°C / -40…+450°C
Process connection		Without
Electrical connection	Head type	MA
	Material	Light alloy
	Output	1 cable gland PG 9 x 1.5
	Cable diameter	diam.5 et 6
	Terminal strip	2 to 4 terminals
	IP	IP54
Accessories (p. 338)		Leak-tight fittings, rotating fittings

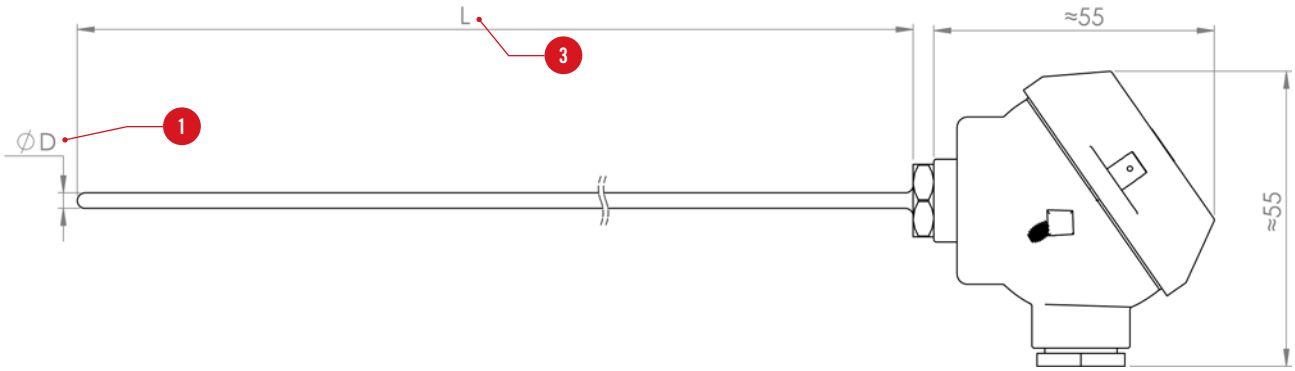
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TEMPERATURE		Ø (mm)		MOUNTING		LENGTH L (mm)
S51	-	450	-	6	-	B	-	750
Reference in table and DIAGRAM (MM)				1		2		3
Possible choice		200°C 450°C		3 4.5 6		1x3 wires: B 1x4 wires: C 2x2 wires: D		100 to 1,500 see table

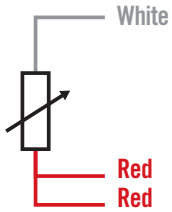
DIAGRAM (MM)



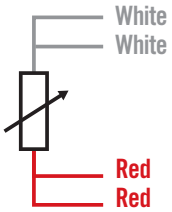
CONNECTIONS

2

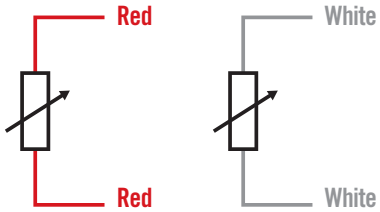
Connection 1 Pt100 Ω
1x3 wires



Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires

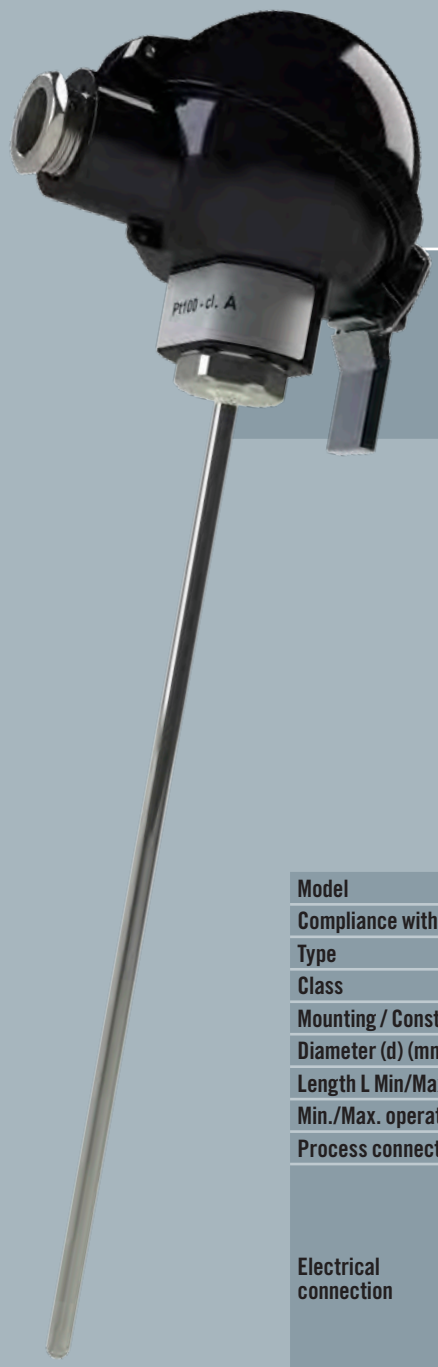


LENGTH ACCORDING TO MOUNTING TYPE AND SHEATH DIAMETER

Number of Pt100	1		2
Diameter (mm)	Type of mounting		
	1x3 wires	1x4 wires	2x2 wires
3	50/1500	50/1500	-
4.5	50/1500	50/1500	50/250
6	50/1500	50/1500	50/250

1 2 3

For any other configuration, please contact us.



Sx2
Pt100

IP 65 | CLASS A | IEC 60751 | SINGLE OR DUPLEX | up to 600°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, with output via DAN head for temperature measurement up to 450°C in low-pressure and low flow-rate environments. The DAN head is versatile and easy to open with its valve lever and can be equipped with a terminal strip for connection or a 4-20mA transmitter.

SPECIFICATIONS

Model		Sx2
Compliance with standards		IEC 60751
Type		Pt100 Ω
Class		A: up to 450°C - B: from 450°C to 600°C
Mounting / Construction		Single: 1x3 wires or 1x4 wires - Duplex: 2x2 wires or 2x3 wires
Diameter (d) (mm)		4.5/ 6 / 8
Length L Min/Max (mm)		50 … 1,500
Min./Max. operating temp. (°C)		-40…+450°C / -40…+600°C
Process connection		Without - under G1/2 head - extension + G1/2 fitting
Electrical connection	Head type	DAN
	Material	Light alloy
	Output	1 cable gland M 20 x 1.5
	Cable diameter	5.5 to 7.5 mm
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)
	Coating	None (standard) or epoxy (option)
	IP	IP54 (standard) or IP65 (option)
Accessories (p. 338)		Leak-tight fittings, rotating fittings

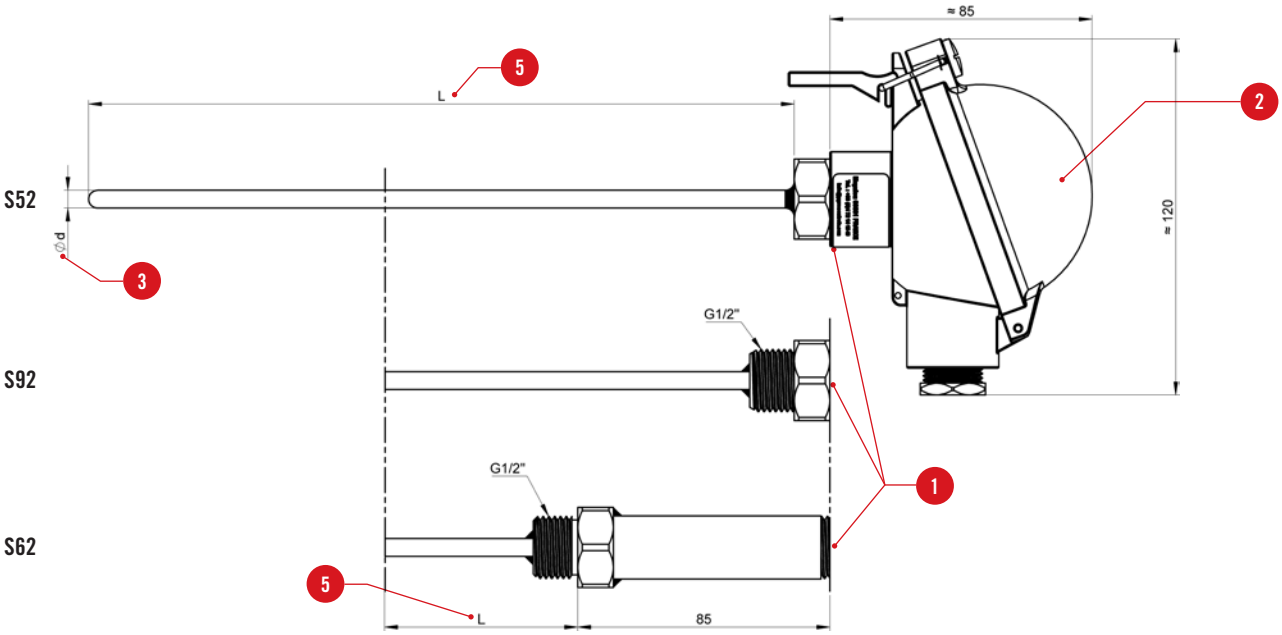
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	HEAD		TEMP.		Ø (mm)		MOUNTING		LENGTH L (mm)		OPTION TRANSMITTER		OPTION TRANSMIT. SCALE		OPTION OPTIONS
S	5	2	-	450	-	6	-	C	-	1,200	-	C	-	0/450	-	1
Reference in table and DIAGRAM (MM)	1	2				3		4		5		6				
Possible choice	Without: 5 With extension and G1/2" fitting: 6 With G1/2" fitting under head: 9	DAN		450°C 600°C		4.5 6 8		1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E		100 to 1,500*		LC5331A-321 : B LC5335A-100 : C LC5333A-100 : D				Epoxy + screw (IP65): 1 Epoxy + lever (IP54): 2 ⚠ If IP65, screwed cover and without valve lever

*2x2-wire mounting: length L limited to 250 mm

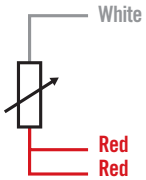
DIAGRAM (MM)



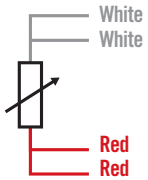
CONNECTIONS

4

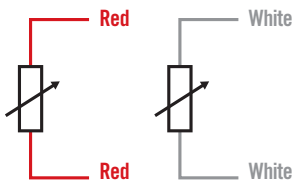
Connection 1 Pt100 Ω 1x3 wires



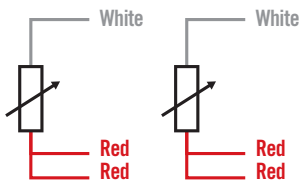
Connection 1 Pt100 Ω 1x4 wires



Connection 2 Pt100 Ω 2x2 wires



Connection 2 Pt100 Ω 2x3 wires



TRANSMITTER (only with 1 Pt 100) - OPTION

6

Transmitter			
Input	**Output**	**Galvanic insulation**	**Reference**
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100
Pt100	4-20mA	no	LC5333A-100

For any other configuration, please contact us.



Sx3
Pt100

IP 54 | CLASS A | IEC 60751 | SINGLE OR DUPLEX | up to 600°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, with output via DIN B head for temperature measurement up to 450°C in low-pressure and low flow-rate environments. The DIN B head is economical and versatile and can be equipped with a terminal strip for connection or a 4-20mA transmitter.

SPECIFICATIONS

Model		Sx3
Compliance with standards		IEC 60751
Class		A: up to 450°C - B: from 450°C to 600°C
Mounting / Construction		Single: 1x3 wires or 1x4 wires - Duplex: 2x2 wires or 2x3 wires
Diameter (d) (mm)		4.5/ 6 / 8
Length L Min/Max (mm)		50 … 1500
Min./Max. operating temp. (°C)		-40…+200°C / -40…+450°C
Process connection		without - under G1/2 head - extension + G1/2 fitting
Electrical connection	Head type	DIN B
	Material	Light alloy
	Output	1 cable gland M 20 x 1.5
	Cable diameter	5.5 to 7.5 mm
	Equipment	Ceramic terminal strip (standard) or 4-20mA transmitter (option)
	IP	IP54
Accessories (p. 338)		Leak-tight fittings, rotating fittings

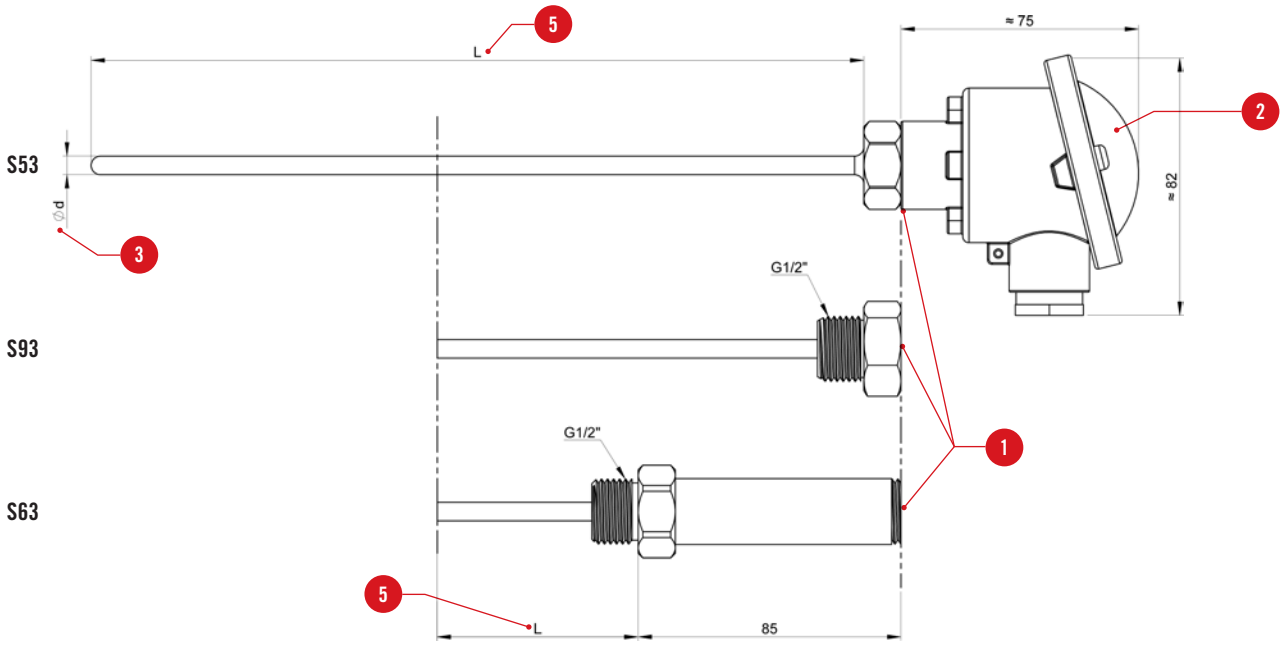
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	HEAD		TEMP.		Ø (mm)		MOUNTING		LENGTH L (mm)		OPTION TRANSMITTER		TRANSMIT. SCALE
S	9	3	-	450	-	8	-	E	-	750	-	C	-	0/600
Reference in table and DIAGRAM (MM)	1	2				3		4		5		6		
Possible choice	Without: 5 With extension and G1/2" fitting: 6 With G1/2" fittings under head: 9	DIN B		200°C 450°C		4.5 6 8		1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E		50 to 1,500*		LC5331A-321 : B LC5335A-100 : C LC5333A-100 : D		

*2x2-wire mounting: length L limited to 250 mm - S63 mounting: length L limited to 1,400 m

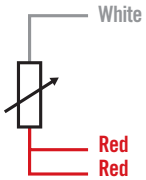
DIAGRAM (MM)



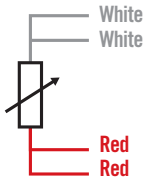
CONNECTIONS

4

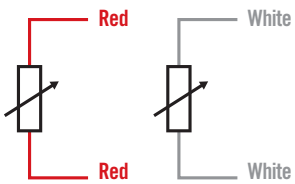
Connection 1 Pt100 Ω 1x3 wires



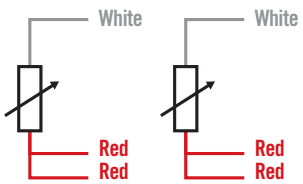
Connection 1 Pt100 Ω 1x4 wires



Connection 2 Pt100 Ω 2x2 wires



Connection 2 Pt100 Ω 2x3 wires



TRANSMITTER (only with 1 Pt 100) - OPTION

6

Transmitter			
Input	Output	Galvanic insulation	Reference
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100
Pt100	4-20mA	no	LC5333A-100

For any other configuration, please contact us.



SPxx

Pt100

CLASS A

IEC 60751

up to 600° C

DESCRIPTION

SPxx is a comprehensive range of Pt100 resistive sensors for measuring ambient, surface or immersion / penetration temperatures. The Class A/B Pt100 sensors fulfil a wide range of requirements: temperature measurement of ambient air, liquid, pasty, viscous or industrial products in the range from -100 °C to 600 °C. Each sensor is equipped with a handle and spiral cable for manual measurement (45 cm to 1 m) and a miniature male connector with 3 flat pins.

SPECIFICATIONS AND CODES FOR ORDERS

Model	Model	Description	Measurement range	Tolerance class	63% response time	Plunger diameter	Plunger length	References
	SP14	General-purpose sensor. Stainless-steel sheath	-40 °C to 450 °C	Cl. A	7 s	3 mm	20 cm	P01655020
	SP10	Surface sensor with spring	-50 °C to 200 °C	Cl. B	6 s	5 mm	13 cm	P03652712
	SP11	Stainless-steel needle sensor for penetration	-100 °C to 600 °C	Cl. B	7 s	3 mm	13 cm	P03652713
	SP12	Air sensor	-100 °C to 600 °C	Cl. B	5 s	5 mm	13 cm	P03652714
	SP13	Stainless-steel sensor for immersion	-100 °C to 600 °C	Cl. B	7 s	3 mm	13 cm	P03652715

RELATED PRODUCTS

Contact thermometers

For thermocouple



CA 1821
CA 1822
see page 342

For temperature sensor



CA 1823

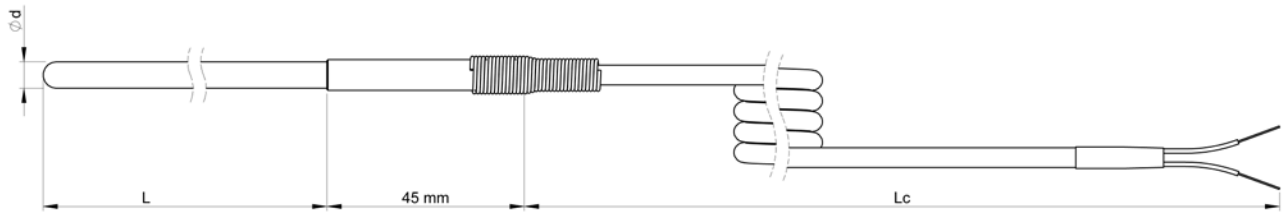
see page 343

TCG1



TC	Sheath type	Ø sheath (mm)	Length L (mm)	Hot junction	Configurator code	Reference
1K	INCONEL 600	0,5	262	Insulated	TCG1-1K-CM-0,5-262-I	L220151-009
1K	INCONEL 600	0,5	512	Insulated	TCG1-1K-CM-0,5-512-I	L220151-014
1K	INCONEL 600	0,5	1012	Insulated	TCG1-1K-CM-0,5-1012-I	L220151-024
1K	INCONEL 600	0,5	2012	Insulated	TCG1-1K-CM-0,5-2012-I	L220151-034
1K	INCONEL 600	0,5	3012	Insulated	TCG1-1K-CM-0,5-3012-I	L220151-038
1K	INCONEL 600	1	262	Insulated	TCG1-1K-CM-1-262-I	L220152-009
1K	INCONEL 600	1	512	Insulated	TCG1-1K-CM-1-512-I	L220152-014
1K	INCONEL 600	1	1012	Insulated	TCG1-1K-CM-1-1012-I	L220152-024
1K	INCONEL 600	1	2012	Insulated	TCG1-1K-CM-1-2012-I	L220152-034
1K	INCONEL 600	1	3012	Insulated	TCG1-1K-CM-1-3012-I	L220152-038
1K	INCONEL 600	1,5	262	Insulated	TCG1-1K-CM-1,5-262-I	L220153-009
1K	INCONEL 600	1,5	512	Insulated	TCG1-1K-CM-1,5-512-I	L220153-014
1K	INCONEL 600	1,5	1012	Insulated	TCG1-1K-CM-1,5-1012-I	L220153-024
1K	INCONEL 600	1,5	2012	Insulated	TCG1-1K-CM-1,5-2012-I	L220153-034
1K	INCONEL 600	1,5	3012	Insulated	TCG1-1K-CM-1,5-3012-I	L220153-038
1K	INCONEL 600	2	262	Insulated	TCG1-1K-CM-2-262-I	L220154-009
1K	INCONEL 600	2	512	Insulated	TCG1-1K-CM-2-512-I	L220154-014
1K	INCONEL 600	2	1012	Insulated	TCG1-1K-CM-2-1012-I	L220154-024
1K	INCONEL 600	2	2012	Insulated	TCG1-1K-CM-2-2012-I	L220154-034
1K	INCONEL 600	2	3012	Insulated	TCG1-1K-CM-2-3012-I	L220154-038
1K	INCONEL 600	3	262	Insulated	TCG1-1K-CM-3-262-I	L220155-009
1K	INCONEL 600	3	512	Insulated	TCG1-1K-CM-3-512-I	L220155-014
1K	INCONEL 600	3	1012	Insulated	TCG1-1K-CM-3-1012-I	L220155-024
1K	INCONEL 600	3	2012	Insulated	TCG1-1K-CM-3-2012-I	L220155-034
1K	INCONEL 600	3	3012	Insulated	TCG1-1K-CM-3-3012-I	L220155-038
1K	INCONEL 600	4,5	262	Insulated	TCG1-1K-CM-4,5-262-I	L220156-009
1K	INCONEL 600	4,5	512	Insulated	TCG1-1K-CM-4,5-512-I	L220156-014
1K	INCONEL 600	4,5	1012	Insulated	TCG1-1K-CM-4,5-1012-I	L220156-024
1K	INCONEL 600	4,5	2012	Insulated	TCG1-1K-CM-4,5-2012-I	L220156-034
1K	INCONEL 600	4,5	3012	Insulated	TCG1-1K-CM-4,5-3012-I	L220156-038
1K	INCONEL 600	6	262	Insulated	TCG1-1K-CM-6-262-I	L220157-009
1K	INCONEL 600	6	512	Insulated	TCG1-1K-CM-6-512-I	L220157-014
1K	INCONEL 600	6	1012	Insulated	TCG1-1K-CM-6-1012-I	L220157-024
1K	INCONEL 600	6	2012	Insulated	TCG1-1K-CM-6-2012-I	L220157-034
1K	INCONEL 600	6	3012	Insulated	TCG1-1K-CM-6-3012-I	L220157-038
1K	INCONEL 600	8	262	Insulated	TCG1-1K-CM-8-262-I	L220158-009
1K	INCONEL 600	8	512	Insulated	TCG1-1K-CM-8-512-I	L220158-014
1K	INCONEL 600	8	1012	Insulated	TCG1-1K-CM-8-1012-I	L220158-024
1K	INCONEL 600	8	2012	Insulated	TCG1-1K-CM-8-2012-I	L220158-034
1K	INCONEL 600	8	3012	Insulated	TCG1-1K-CM-8-3012-I	L220158-038

TCG3



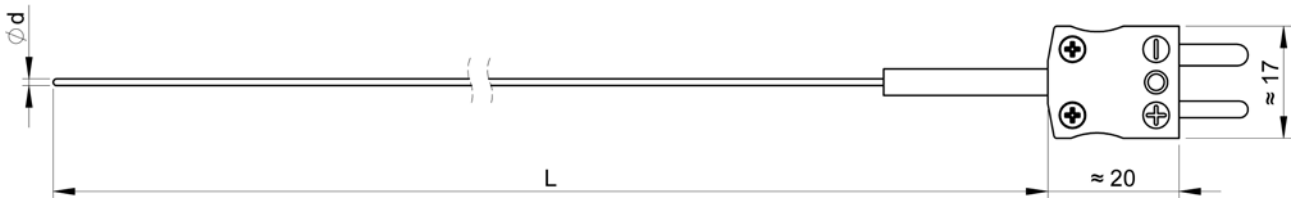
TC	Sheath type	Ø sheath (mm)	Length L (mm)	Hot junction	Length Lc (mm)	Length L (mm)	Hot junction	Configurator code	Reference
1K	INCONEL 600	1,5	100	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-100-I-2000-FN-1	L220353-100
1K	INCONEL 600	1,5	150	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-150-I-2000-FN-1	L220353-150
1K	INCONEL 600	1,5	200	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-200-I-2000-FN-1	L220353-200
1K	INCONEL 600	1,5	250	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-250-I-2000-FN-1	L220353-509
1K	INCONEL 600	1,5	300	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-300-I-2000-FN-1	L220353-300
1K	INCONEL 600	1,5	400	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-400-I-2000-FN-1	L220353-400
1K	INCONEL 600	1,5	500	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-500-I-2000-FN-1	L220353-514
1K	INCONEL 600	1,5	750	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-750-I-2000-FN-1	L220353-750
1K	INCONEL 600	1,5	1000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-1000-I-2000-FN-1	L220353-524
1K	INCONEL 600	1,5	2000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-2000-I-2000-FN-1	L220353-534
1K	INCONEL 600	1,5	3000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-1,5-3000-I-2000-FN-1	L220353-538
1K	INCONEL 600	3	100	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-100-I-2000-FN-1	L220355-100
1K	INCONEL 600	3	150	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-150-I-2000-FN-1	L220355-150
1K	INCONEL 600	3	200	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-200-I-2000-FN-1	L220355-200
1K	INCONEL 600	3	250	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-250-I-2000-FN-1	L220355-509
1K	INCONEL 600	3	300	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-300-I-2000-FN-1	L220355-300
1K	INCONEL 600	3	400	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-400-I-2000-FN-1	L220355-400
1K	INCONEL 600	3	500	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-500-I-2000-FN-1	L220355-514
1K	INCONEL 600	3	750	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-750-I-2000-FN-1	L220355-750
1K	INCONEL 600	3	1000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-1000-I-2000-FN-1	L220355-524
1K	INCONEL 600	3	2000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-2000-I-2000-FN-1	L220355-534
1K	INCONEL 600	3	3000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-3-3000-I-2000-FN-1	L220355-538
1K	INCONEL 600	4,5	100	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-100-I-2000-FN-1	L220356-100
1K	INCONEL 600	4,5	150	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-150-I-2000-FN-1	L220356-150
1K	INCONEL 600	4,5	200	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-200-I-2000-FN-1	L220356-200
1K	INCONEL 600	4,5	250	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-250-I-2000-FN-1	L220356-509
1K	INCONEL 600	4,5	300	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-300-I-2000-FN-1	L220356-300
1K	INCONEL 600	4,5	400	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-400-I-2000-FN-1	L220356-400
1K	INCONEL 600	4,5	500	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-500-I-2000-FN-1	L220356-514
1K	INCONEL 600	4,5	750	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-750-I-2000-FN-1	L220356-750
1K	INCONEL 600	4,5	1000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-1000-I-2000-FN-1	L220356-524
1K	INCONEL 600	4,5	2000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-2000-I-2000-FN-1	L220356-534
1K	INCONEL 600	4,5	3000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-4,5-3000-I-2000-FN-1	L220356-538
1K	INCONEL 600	6	100	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-100-I-2000-FN-1	L220357-100
1K	INCONEL 600	6	150	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-150-I-2000-FN-1	L220357-150
1K	INCONEL 600	6	200	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-200-I-2000-FN-1	L220357-200
1K	INCONEL 600	6	250	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-250-I-2000-FN-1	L220357-509
1K	INCONEL 600	6	300	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-300-I-2000-FN-1	L220357-300
1K	INCONEL 600	6	400	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-400-I-2000-FN-1	L220357-400
1K	INCONEL 600	6	500	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-500-I-2000-FN-1	L220357-514
1K	INCONEL 600	6	750	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-750-I-2000-FN-1	L220357-750
1K	INCONEL 600	6	1000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-1000-I-2000-FN-1	L220357-524
1K	INCONEL 600	6	2000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-2000-I-2000-FN-1	L220357-534
1K	INCONEL 600	6	3000	Insulated	2000	Bare wire	Without	TCG3-1K-CM-6-3000-I-2000-FN-1	L220357-538

TCG6



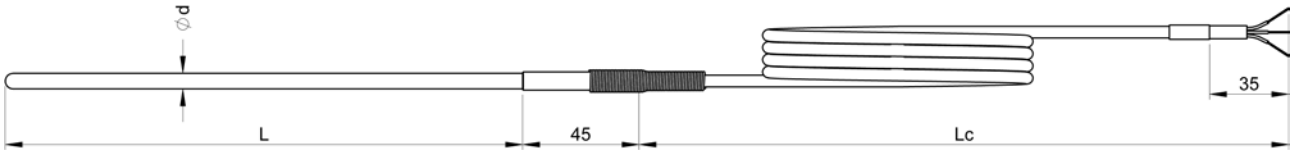
TC	Sheath type	Ø sheath (mm)	Length L (mm)	Hot junction	Configurator code	Reference
1K	INCONEL 600	1,5	250	Insulated	TCG6-1K-CM-1,5-250-I	L220653-009
1K	INCONEL 600	1,5	500	Insulated	TCG6-1K-CM-1,5-500-I	L220653-014
1K	INCONEL 600	1,5	1000	Insulated	TCG6-1K-CM-1,5-1000-I	L220653-024
1K	INCONEL 600	1,5	2000	Insulated	TCG6-1K-CM-1,5-2000-I	L220653-034
1K	INCONEL 600	1,5	3000	Insulated	TCG6-1K-CM-1,5-3000-I	L220653-038
1K	INCONEL 600	3	250	Insulated	TCG6-1K-CM-3-250-I	L220655-009
1K	INCONEL 600	3	500	Insulated	TCG6-1K-CM-3-500-I	L220655-014
1K	INCONEL 600	3	1000	Insulated	TCG6-1K-CM-3-1000-I	L220655-024
1K	INCONEL 600	3	2000	Insulated	TCG6-1K-CM-3-2000-I	L220655-034
1K	INCONEL 600	3	3000	Insulated	TCG6-1K-CM-3-3000-I	L220655-038
1K	INCONEL 600	4,5	250	Insulated	TCG6-1K-CM-4,5-250-I	L220656-009
1K	INCONEL 600	4,5	500	Insulated	TCG6-1K-CM-4,5-500-I	L220656-014
1K	INCONEL 600	4,5	1000	Insulated	TCG6-1K-CM-4,5-1000-I	L220656-024
1K	INCONEL 600	4,5	2000	Insulated	TCG6-1K-CM-4,5-2000-I	L220656-034
1K	INCONEL 600	4,5	3000	Insulated	TCG6-1K-CM-4,5-3000-I	L220656-038
1K	INCONEL 600	6	250	Insulated	TCG6-1K-CM-6-250-I	L220657-009
1K	INCONEL 600	6	500	Insulated	TCG6-1K-CM-6-500-I	L220657-014
1K	INCONEL 600	6	1000	Insulated	TCG6-1K-CM-6-1000-I	L220657-024
1K	INCONEL 600	6	2000	Insulated	TCG6-1K-CM-6-2000-I	L220657-034
1K	INCONEL 600	6	3000	Insulated	TCG6-1K-CM-6-3000-I	L220657-038

TCG11



TC	Sheath type	Ø sheath (mm)	Length L (mm)	Hot junction	Configurator code	Reference
1K	INCONEL 600	1	250	Insulated	TCG11-1K-CM-1-250-I	L221152-009
1K	INCONEL 600	1	500	Insulated	TCG11-1K-CM-1-500-I	L221152-014
1K	INCONEL 600	1	1000	Insulated	TCG11-1K-CM-1-1000-I	L221152-024
1K	INCONEL 600	1	2000	Insulated	TCG11-1K-CM-1-2000-I	L221152-034
1K	INCONEL 600	1	3000	Insulated	TCG11-1K-CM-1-3000-I	L221152-038
1K	INCONEL 600	1,5	250	Insulated	TCG11-1K-CM-1,5-250-I	L221153-009
1K	INCONEL 600	1,5	500	Insulated	TCG11-1K-CM-1,5-500-I	L221153-014
1K	INCONEL 600	1,5	1000	Insulated	TCG11-1K-CM-1,5-1000-I	L221153-024
1K	INCONEL 600	1,5	2000	Insulated	TCG11-1K-CM-1,5-2000-I	L221153-034
1K	INCONEL 600	1,5	3000	Insulated	TCG11-1K-CM-1,5-3000-I	L221153-038
1K	INCONEL 600	3	250	Insulated	TCG11-1K-CM-3-250-I	L221155-009
1K	INCONEL 600	3	500	Insulated	TCG11-1K-CM-3-500-I	L221155-014
1K	INCONEL 600	3	1000	Insulated	TCG11-1K-CM-3-1000-I	L221155-024
1K	INCONEL 600	3	2000	Insulated	TCG11-1K-CM-3-2000-I	L221155-034
1K	INCONEL 600	3	3000	Insulated	TCG11-1K-CM-3-3000-I	L221155-038

S1



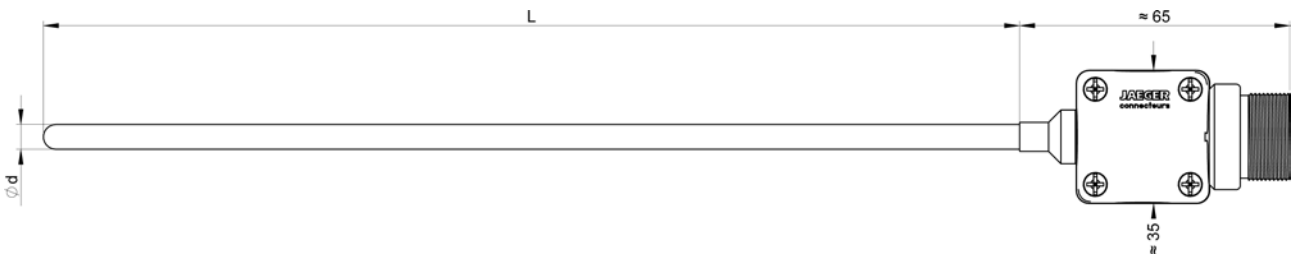
PT100 number	Mounting	Diameter	Length	Cable	Cable length	Connection	Spring	Class A temperature	Max temperature	Configurator code
1	C	3	500	PVC	2000	FN	1	450	600	S1-1-C-3-500-PVC-2000-FN-1
1	C	3	1000	PVC	2000	FN	1	450	600	S1-1-C-3-1000-PVC-2000-FN-1
1	C	3	1500	PVC	2000	FN	1	450	600	S1-1-C-3-1500-PVC-2000-FN-1
1	C	4,5	500	PVC	2000	FN	1	450	600	S1-1-C-4,5-500-PVC-2000-FN-1
1	C	4,5	1000	PVC	2000	FN	1	450	600	S1-1-C-4,5-1000-PVC-2000-FN-1
1	C	4,5	1500	PVC	2000	FN	1	450	600	S1-1-C-4,5-1500-PVC-2000-FN-1
1	C	6	500	PVC	2000	FN	1	450	600	S1-1-C-6-500-PVC-2000-FN-1
1	C	6	1000	PVC	2000	FN	1	450	600	S1-1-C-6-1000-PVC-2000-FN-1
1	C	6	1500	PVC	2000	FN	1	450	600	S1-1-C-6-1500-PVC-2000-FN-1
1	C	8	500	PVC	2000	FN	1	450	600	S1-1-C-8-500-PVC-2000-FN-1
1	C	8	1000	PVC	2000	FN	1	450	600	S1-1-C-8-1000-PVC-2000-FN-1
1	C	8	1500	PVC	2000	FN	1	450	600	S1-1-C-8-1500-PVC-2000-FN-1
2	E	3	500	PVC	2000	FN	1	450	600	S1-2-E-3-500-PVC-2000-FN-1
2	E	3	1000	PVC	2000	FN	1	450	600	S1-2-E-3-1000-PVC-2000-FN-1
2	E	3	1500	PVC	2000	FN	1	450	600	S1-2-E-3-1500-PVC-2000-FN-1
2	E	4,5	500	PVC	2000	FN	1	450	600	S1-2-E-4,5-500-PVC-2000-FN-1
2	E	4,5	1000	PVC	2000	FN	1	450	600	S1-2-E-4,5-1000-PVC-2000-FN-1
2	E	4,5	1500	PVC	2000	FN	1	450	600	S1-2-E-4,5-1500-PVC-2000-FN-1
2	E	6	500	PVC	2000	FN	1	450	600	S1-2-E-6-500-PVC-2000-FN-1
2	E	6	1000	PVC	2000	FN	1	450	600	S1-2-E-6-1000-PVC-2000-FN-1
2	E	6	1500	PVC	2000	FN	1	450	600	S1-2-E-6-1500-PVC-2000-FN-1
2	E	8	500	PVC	2000	FN	1	450	600	S1-2-E-8-500-PVC-2000-FN-1
2	E	8	1000	PVC	2000	FN	1	450	600	S1-2-E-8-1000-PVC-2000-FN-1
2	E	8	1500	PVC	2000	FN	1	450	600	S1-2-E-8-1500-PVC-2000-FN-1

S2



PT100 number	Mounting	Diameter	Length	Cable	Cable length	Connection	Spring	Class A temperature	Max temperature	Configurator code
1	C	3	500	PVC	2000	FN	1	200	300	S2-0-1-C-3-500-2000-FN-1
1	C	3	1000	PVC	2000	FN	1	200	300	S2-0-1-C-3-1000-2000-FN-1
1	C	3	1500	PVC	2000	FN	1	200	300	S2-0-1-C-3-1500-2000-FN-1
1	C	4,5	500	PVC	2000	FN	1	200	300	S2-0-1-C-4,5-500-2000-FN-1
1	C	4,5	1000	PVC	2000	FN	1	200	300	S2-0-1-C-4,5-1000-2000-FN-1
1	C	4,5	1500	PVC	2000	FN	1	200	300	S2-0-1-C-4,5-1500-2000-FN-1
1	C	6	500	PVC	2000	FN	1	200	300	S2-0-1-C-6-500-2000-FN-1
1	C	6	1000	PVC	2000	FN	1	200	300	S2-0-1-C-6-1000-2000-FN-1
1	C	6	1500	PVC	2000	FN	1	200	300	S2-0-1-C-6-1500-2000-FN-1
2	E	3	500	PVC	2000	FN	1	200	300	S2-0-2-E-3-500-2000-FN-1
2	E	3	1000	PVC	2000	FN	1	200	300	S2-0-2-E-3-1000-2000-FN-1
2	E	3	1500	PVC	2000	FN	1	200	300	S2-0-2-E-3-1500-2000-FN-1
2	E	4,5	500	PVC	2000	FN	1	200	300	S2-0-2-E-4,5-500-2000-FN-1
2	E	4,5	1000	PVC	2000	FN	1	200	300	S2-0-2-E-4,5-1000-2000-FN-1
2	E	4,5	1500	PVC	2000	FN	1	200	300	S2-0-2-E-4,5-1500-2000-FN-1
2	E	6	500	PVC	2000	FN	1	200	300	S2-0-2-E-6-500-2000-FN-1
2	E	6	1000	PVC	2000	FN	1	200	300	S2-0-2-E-6-1000-2000-FN-1
2	E	6	1500	PVC	2000	FN	1	200	300	S2-0-2-E-6-1500-2000-FN-1

S41



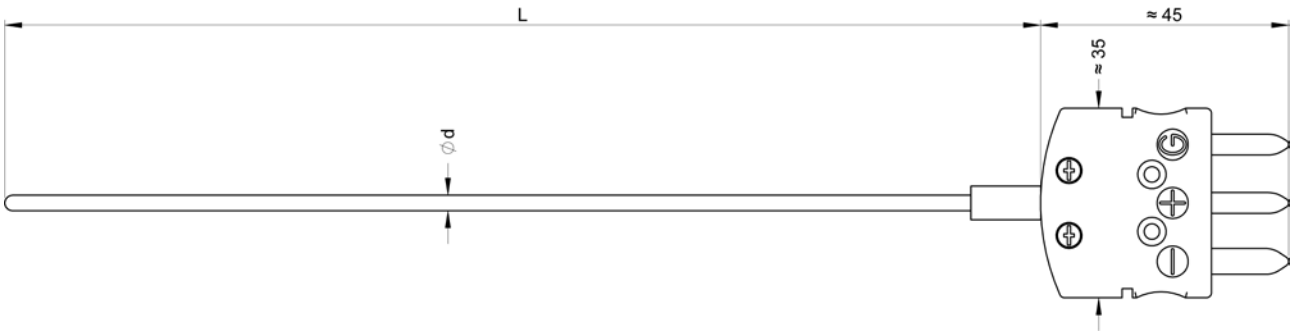
PT100 number	Mounting	Diameter	Length	Class A temperature	Max temperature	Configurator code
1	C	3	500	450	600	S41-450-C-3-500
1	C	3	1000	450	600	S41-450-C-3-1000
1	C	3	1500	450	600	S41-450-C-3-1500
1	C	4,5	500	450	600	S41-450-C-4,5-500
1	C	4,5	1000	450	600	S41-450-C-4,5-1000
1	C	4,5	1500	450	600	S41-450-C-4,5-1500
1	C	6	500	450	600	S41-450-C-6-500
1	C	6	1000	450	600	S41-450-C-6-1000
1	C	6	1500	450	600	S41-450-C-6-1500
2	E	3	500	450	600	S41-450-E-3-500
2	E	3	1000	450	600	S41-450-E-3-1000
2	E	3	1500	450	600	S41-450-E-3-1500
2	E	4,5	500	450	600	S41-450-E-4,5-500
2	E	4,5	1000	450	600	S41-450-E-4,5-1000
2	E	4,5	1500	450	600	S41-450-E-4,5-1500
2	E	6	500	450	600	S41-450-E-6-500
2	E	6	1000	450	600	S41-450-E-6-1000
2	E	6	1500	450	600	S41-450-E-6-1500

S40



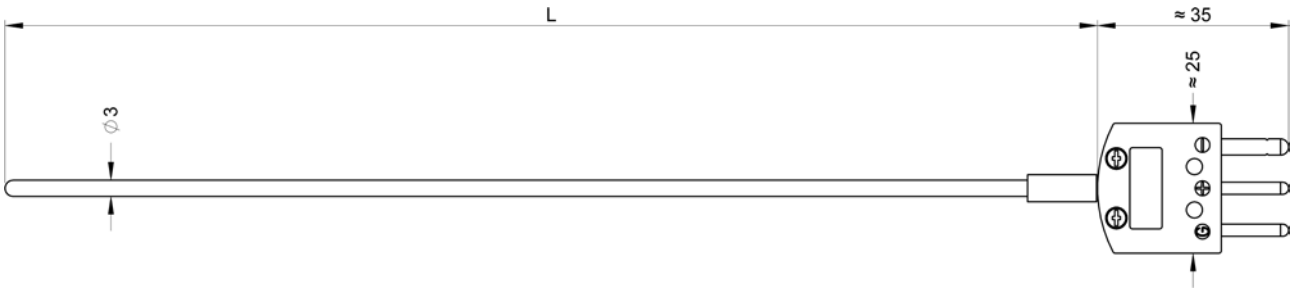
PT100 number	Mounting	Diameter	Length	Class A temperature	Max temperature	Configurator code
1	C	3	500	450	600	S40-450-C-3-500
1	C	3	1000	450	600	S40-450-C-3-1000
1	C	3	1500	450	600	S40-450-C-3-1500
1	C	4,5	500	450	600	S40-450-C-4,5-500
1	C	4,5	1000	450	600	S40-450-C-4,5-1000
1	C	4,5	1500	450	600	S40-450-C-4,5-1500
1	C	6	500	450	600	S40-450-C-6-500
1	C	6	1000	450	600	S40-450-C-6-1000
1	C	6	1500	450	600	S40-450-C-6-1500
2	E	3	500	450	600	S40-450-E-3-500
2	E	3	1000	450	600	S40-450-E-3-1000
2	E	3	1500	450	600	S40-450-E-3-1500
2	E	4,5	500	450	600	S40-450-E-4,5-500
2	E	4,5	1000	450	600	S40-450-E-4,5-1000
2	E	4,5	1500	450	600	S40-450-E-4,5-1500
2	E	6	500	450	600	S40-450-E-6-500
2	E	6	1000	450	600	S40-450-E-6-1000
2	E	6	1500	450	600	S40-450-E-6-1500

S44

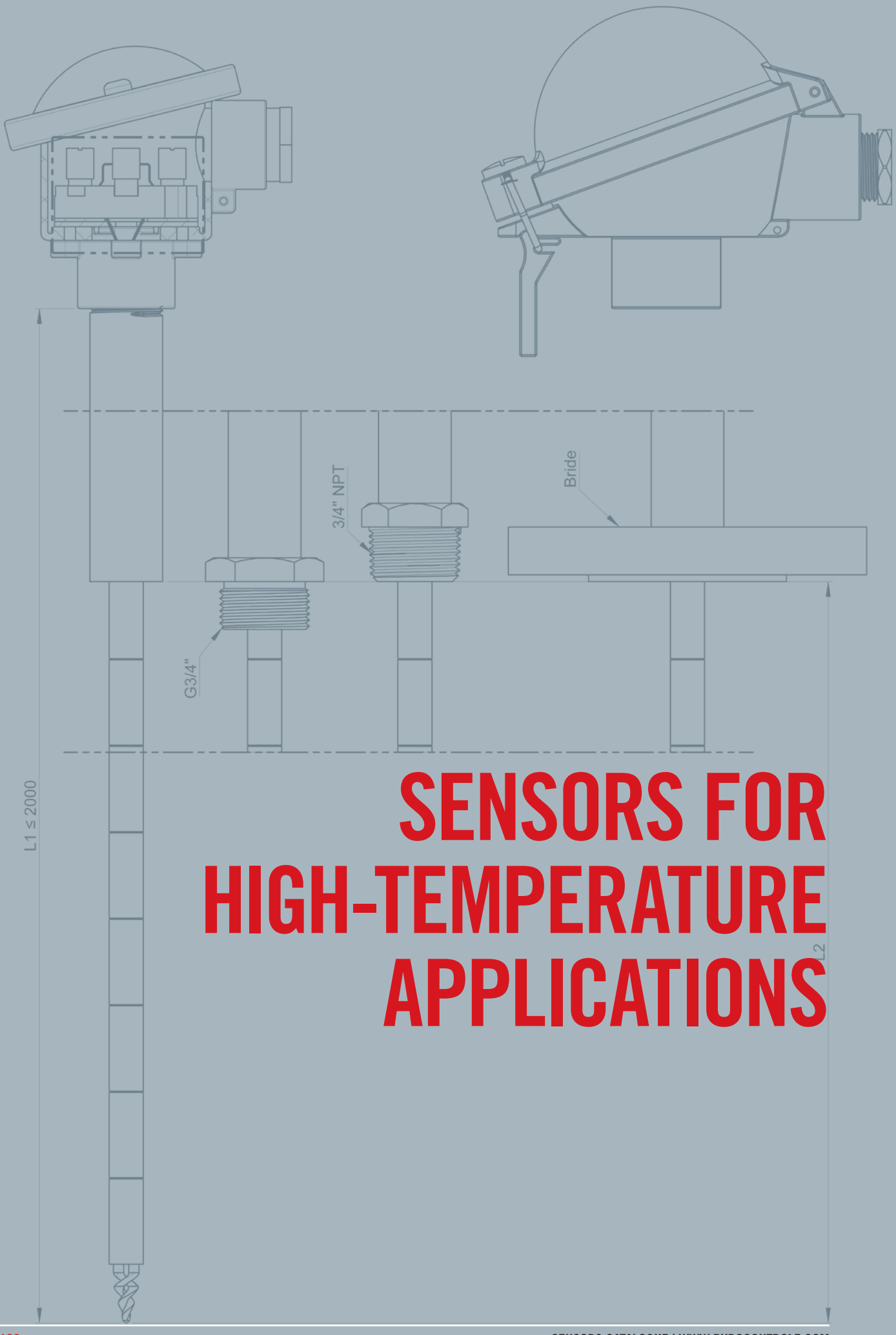


PT100 number	Diameter	Length	Class A temperature	Max temperature	Configurator code
1	3	500	450	600	S44-450-3-500
1	3	1000	450	600	S44-450-3-1000
1	3	1500	450	600	S44-450-3-1500
1	4,5	500	450	600	S44-450-4,5-500
1	4,5	1000	450	600	S44-450-4,5-1000
1	4,5	1500	450	600	S44-450-4,5-1500
1	6	500	450	600	S44-450-6-500
1	6	1000	450	600	S44-450-6-1000
1	6	1500	450	600	S44-450-6-1500

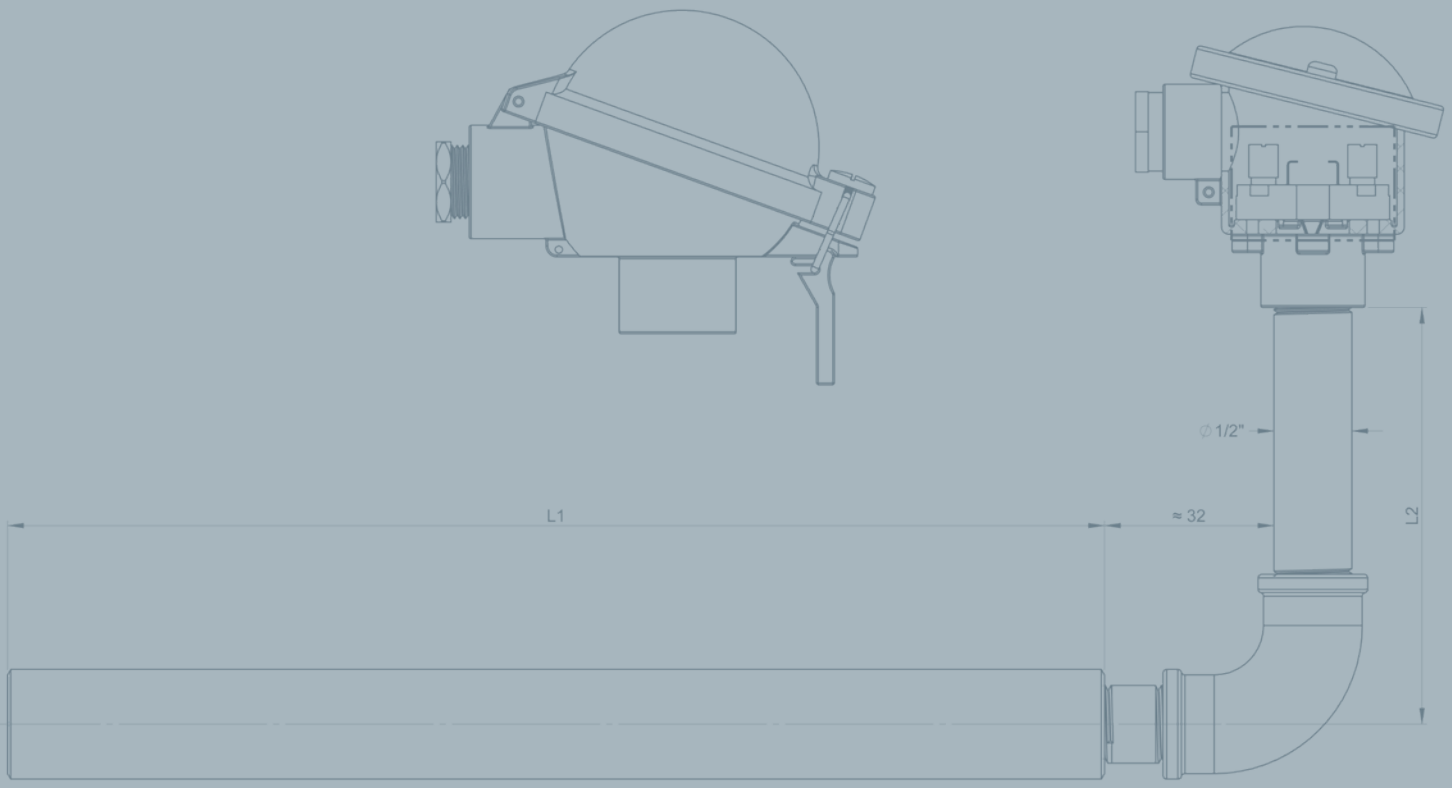
S43



PT100 number	Diameter	Length	Class A temperature	Max temperature	Configurator code
1	3	500	450	600	S43-500
1	3	1000	450	600	S43-1000
1	3	1500	450	600	S43-1500



SENSORS FOR HIGH-TEMPERATURE APPLICATIONS



STRAIGHT CADID ASSEMBLIES 108

A 108
B 110
C 112
D 114
E 116
H 118
J 120

DEMOUNTABLE STRAIGHT CADID ASSEMBLIES 122

F 122
G 124

DEMOUNTABLE ELBOWED CADID ASSEMBLIES 126

LB 126
LC 128
LD 130
LE 132

BENT CADID ASSEMBLIES 134

XB 134
XC 136
XD 138
XE 140

TEMPERATURE MEASUREMENT ASSEMBLIES

CADID RANGE



- **Applications** : temperature of baths, ovens, furnaces and incinerators in metallurgy and glass manufacturing.
- Manufactured with all the types of thermocouples frequently used for pyrometry, proposed with **single or duplex mounting.**
- Depending on the protective tube, they may be used in **neutral, reducing, oxidizing, corrosive, sulphurous or carburizing atmospheres.**
- **COMPLETE RANGE**
- **16 assembly models divided into 3 series:** normal, reinforced and high-temperature, defined according to the temperature and atmosphere. **Various profiles and protective tubes are available.**
- **Configurable assemblies:** wide choice of terminations to be defined (material, connecting head, etc.)

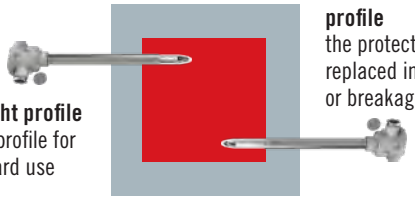
1 CHOOSE YOUR CADID ASSEMBLY » 2 CONFIGURE YOUR CADID ASSEMBLY » 3 COMMISSIONING GUIDE

CONFIGURATOR CODE

CADID Series	Operating conditions
NORMAL	General use
REINFORCED	Adapted for more corrosive atmospheres and/or higher temperatures (thicker protection without welds)
HIGH-TEMPERATURE	Adapted for high temperatures (alumina/ceramic protection)

CHOICE OF PROTECTIVE TUBE PROFILE

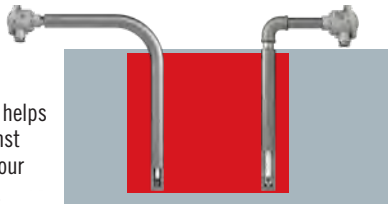
FOR FURNACES AND OVENS



Straight profile
basic profile for standard use

Demountable straight profile
the protective tube can be replaced in the event of wear or breakage

FOR BATHS



Bent profile
bending of the protective tube helps to protect against aggressive vapour above the bath.

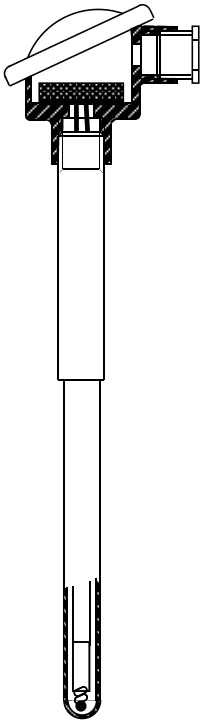
Demountable elbowed profile:
the protective tube is interchangeable

CADID ASSEMBLY SELECTION GUIDE

17 CADID assembly models are available with specific technical characteristics

Thermocouple protection \ Protective tube profile			Straight	Demountable straight	Demountable elbowed	Bent
Without protective tube			CADID A page 108	–	–	–
Normal series		Mechanically-welded protective tube	CADID B page 110	–	CADID LB page 126	CADID XB page 134
		With internal sheath	CADID C page 112	–	CADID LC page 128	CADID XC page 136
Reinforced series		Metal, drilled from bar stock	CADID D page 114	CADID F page 122	CADID LD page 130	CADID XD page 138
		With internal sheath	CADID E page 116	CADID G page 124	CADID LE page 132	CADID XE page 140
High-temperature series		Ceramic or alumina sheath	CADID H page 118	–	–	–
		With internal sheath	CADID J page 120	–	–	–

1 CHOOSE YOUR CADID ASSEMBLY » **2** **CONFIGURE YOUR CADID ASSEMBLY** » **3** COMMISSIONING GUIDE



For each CADID assembly model, various configurations need to be defined.



STEP 1: THERMOCOUPLE

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
J	Iron/ Copper-Nickel	- 40	+ 750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome / Nickel alloy	- 40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0
S	10% Rhodium-Platinum/ Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5
B	5% Rhodium-Platinum / 30% Rhodium-Platinum	+ 600	+ 1,700	1.5°C or 0.25% of t	0.35 0.5

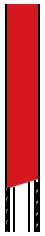
Advice for optimizing your thermocouple's life span

- Choose a thermocouple with a higher temperature withstand
- Increase the diameter of the thermocouple wires
- Protect the thermocouple with a 2nd alumina 710 sheath

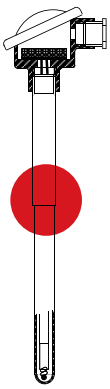
Temperature and voltage in mV, extract from the IEC584 correspondence table:

T°	Type of thermocouple						
	IEC584						ASTM E988
	T	J	k	N	R	B	WRe 3% -25%
-40°C	-1.475	-1.960	-1.527	-1.023	-0.188		
0°C	0	0	0	0	0	0	0
50°C	2.036	2.585	2.023	1.340	0.296	0,002	0.528
100°C	4.279	5.269	4.096	2.774	0.647	0,033	1.145
150°C	6.704	8.010	6.138	4.302	1.041	0,092	1.841
200°C	9.288	10.779	8.138	5.919	1.469	0,178	2.603
300°C	14.862	16.327	12.209	9.341	2.401	0,431	4.287
400°C	20.872	21.848	16.397	12.974	3.408	0,787	6.130
500°C		27.393	20.644	16.748	4.471	1,242	8.078
600°C		33.102	24.905	20.613	5.583	1,792	10.088
800°C			33.275	28.455	7.980	3,154	14.170
1000°C			41.276	36.256	10.506	4,834	18.230
1200°C			48.838	43.846	13.228	6,786	22.149
1400°C					16.040	8.956	25.882
1600°C					18.843	11.263	29.412
1800°C						13.591	32.712
2000°C							35.717

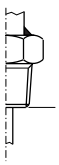
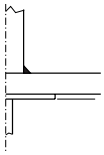
STEP 2: PROTECTIVE TUBE MATERIAL



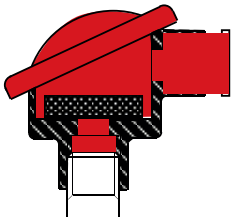
Series	Atmosphere	Max. temperature	Protective tube material
Normal	Neutral or oxidizing	800°C	AISI 304L
		1,050°C	AISI 316L
	Reducing	1,050°C	AISI 446
		1,100°C	Inconel 600
	Sulphurous or carburizing	1,050°C	AISI 446
	Corrosive	-	AISI 446
Reinforced	Neutral	800°C	Pure iron
		1,050°C	AISI 316L
	Neutral or oxidizing	1,050°C	AISI 446
		1,100°C	Inconel 600
	Reducing	1,050°C	AISI 446
		1,100°C	Inconel 600
	Sulphurous or carburizing	1,050°C	AISI 446
	Corrosive	-	Inconel 600
High-temperature	Neutral or oxidizing	1,400°C	AISI 446
		1,500°C	Inconel 600
	Reducing	1,050°C	AISI 304L
		1,100°C	AISI 316L
	Sulphurous or carburizing	1 350°C	Ceramic-alumina
		1,400°C	Double ceramic-alumina



STEP 3: FASTENING OF SENSOR

Fastening	Sleeve	Screwed fitting		Flange
Construction				
Technical characteristics	The sleeve is screwed or welded on the process.	G (gas) threading Parallel internal thread ensuring tightness via surfaces upstream of the threading (seal)	NPT threading as per ANSI B 1.20.1. It is designed according to an American standard for self-packing duct joints . Tightness is achieved by tightening the joint on the installation.	The flanges are defined according to the DIN or ANSI/ASME standards. They are distinguished by their material, nominal diameter and pressure withstand.

STEP 4:CONNECTING HEAD

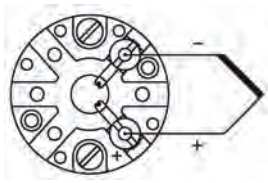


Model	DIN A	DIN B	DAN
Construction			
Technical characteristics	Screw-on cover	Screw-on cover	Captive pivoting cover
	3/4 sleeve max.	½ sleeve max.	½ sleeve max.
	Easy wiring	The smallest and the most economical	Quick opening/closing Cover part of base

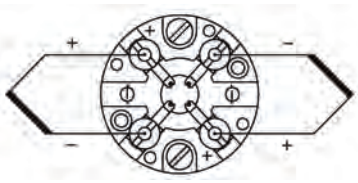
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ELECTRICAL CONNECTION

Thermocouple wiring DIAGRAM (MM)s



SINGLE



DUPLEX

EXTENSION AND COMPENSATION CABLES

Extension cables

Manufactured with wires of the same materials as the wires of the corresponding thermocouples.
They are identified by the letter “X” placed after the code of the thermocouple, e.g. “KX”.

Compensation cables

Manufactured with wires of different materials from the corresponding thermocouple wires.
They are identified by the letter “C” placed after the code of the thermocouple.

TC code	Extension code	Compensation code	NFC 42323 Feb. 1985	IEC 584-3 July 90 NFC 42324 Dec. 93
T	TX	TC		
J	JX	JC		
E	EX	EC		
K	KX	KC		
N	NX	NC		
R-S		KC/SCA		
B		BC		

Installation recommendations

- CADID assemblies must be handled with care.
- The assemblies with alumina/ceramic sheaths cannot withstand any shocks or bending.
- For the first time a new furnace is heated: raise by 100°C max. per hour. If it is necessary to mount the assembly when it is hot, insert the assembly in several stages, particularly if the assembly has an alumina sheath.

COMMISSIONING

Cold mounting is recommended to avoid thermal shock.



CADID A
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type A	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		200 to 1,500 mm	
Sleeve	Material	stainless steel	
	Length	100 to 500 mm	
	Diameter	1/2"	
Fastening		None / stainless-steel fitting / flange	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables, EBA flanges	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	LENGTH L1 (mm)	FASTENING	LENGTH L2 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	A	1J	3,0	DAN	1,000	001	200	A	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B: DIB DAN: DAN	300 to 2,000	Without: 000 G3/4": 001 3/4"NPT: 002 Flange: as per table below	200 to 1,500	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C		Tolerance values	Ø of wires (mm)
		Mini	Maxi		
J	Iron / Copper-Nickel	-40	+750	1.5°C or 0.4% of t	1.5
K	Nickel Chrome/ Nickel	0	+1200	1.5°C or 0.4% of t	1.5 2.3 3.0

FASTENING

4

Flange code	Material	EN1092-1		
		DN	PN	Face
405	316L	25	10/40	B1
400	316L	40	10/40	B1
413	316L	50	10/40	B1

TRANSMITTER (1 TC ONLY) - OPTION

6

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP

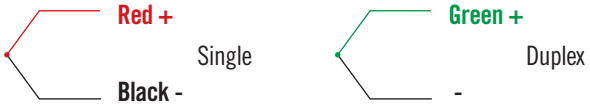
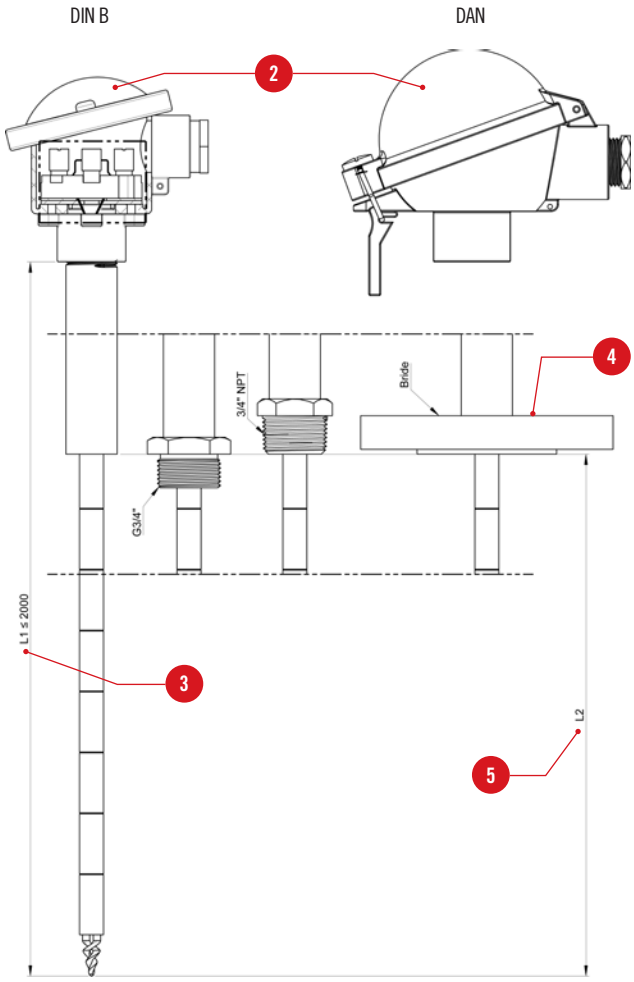


DIAGRAM (MM)



For any other configuration, please contact us.



CADID B
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type B	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		200 to 1,500 mm	
Protective tube		Necked welded	
	Material	304L / 310 / 316 / 446 / INCONEL 600	
	Diameter	3/8" - 1/2"	
Fastening		None / stainless-steel fitting / flange	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables, EBA flanges	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	ø WIRE	HEAD	PROTECTIVE TUBE	ø PROT.	LENGTH L1 (mm)	FASTENING	LENGTH L2 (mm)	OPTION TRANSMITTER	OPTION TRANSMITTER SCALE
CADID	B	2K	1,5	DIB	AB	1/2"	1,000	003	500	B	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	8	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B : DIB DAN : DAN	304L : AB 310 : BA 316L : AC 446 : BB Inconel 600 : CM	3/8" 1/2"	300 to 2,000	Without: 000 G1/2": 003 G3/4": 001 1/2"NPT: 004 3/4"NPT: 002 Flange: as per table below	200 to 1,500	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	ø of wires (mm)
J	Iron/Copper-Nickel	-40	+750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome/ Nickel alloy	-40	+1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

FASTENING

6

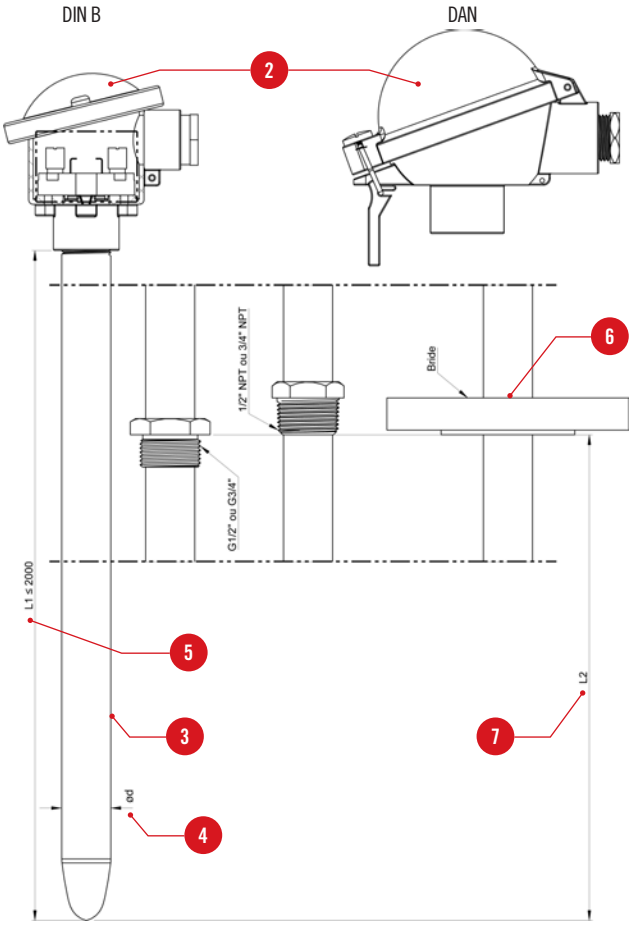
Flange code	Material	EN1092-1 DN	EN1092-1 PN	EN1092-1 Face
405	316L	25	10/40	B1
400	316L	40	10/40	B1
413	316L	50	10/40	B1

TRANSMITTER 1 TC ONLY- OPTION

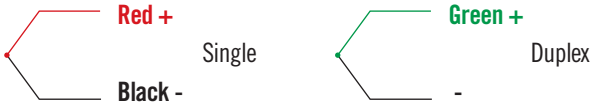
8

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

DIAGRAM (MM)



CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.



CADID C
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type C	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		S	
Class		1	
Wire diameter (mm)		0.35 / 0.5	
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		200 to 1,500 mm	
Internal sheath		Ceramic 610 Diam.10x1.5 mm	
Protective tube		Necked welded	
	Material	310 / 446 / INCONEL 600	
	Diameter	1/2"	
Fastening		None / stainless-steel fitting / flange	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables, EBA flanges	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	FASTENING	LENGTH L2 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	C	2S	0.5	DAN	BB	500	000	200	A	0/200
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	
Possible choice		1S 2S	0.35 0.5	DIN B: DIB DAN: DAN	310: BA 446: BB Inconel 600: CM	300 to 2,000	Without: 000 G3/4": 001 3/4"NPT: 002 Flange: as per table below	200 to 1,500	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
S	10 % rhodium-platinum/ Platinum	0	+1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5

FASTENING

4

Flange code	Material	EN1092-1 DN	EN1092-1 PN	EN1092-1 Face
405	316L	25	10/40	B1
400	316L	40	10/40	B1
413	316L	50	10/40	B1

TRANSMITTER (1 TC ONLY) - OPTION

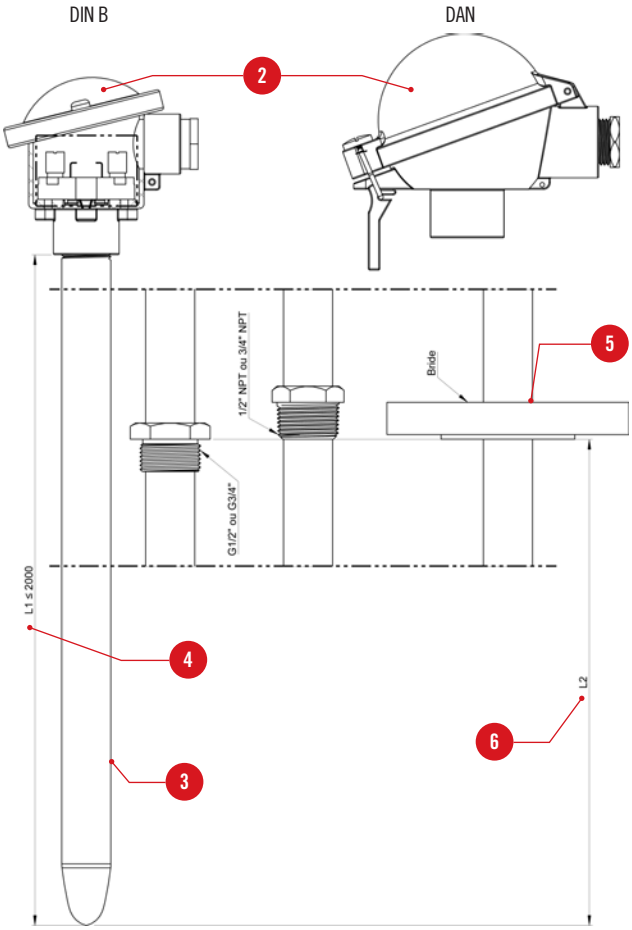
7

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



DIAGRAM (MM)



For any other configuration, please contact us.



CADID D
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1100°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type D	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Protective tube		Metal, drilled from bar stock	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables, EBA flanges	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	D	1K	3.0	DAN	BB	800	C	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B: DIB DAN: DAN	310: BA 446: BB Inconel 600: CM Pure iron: FF	300 to 2,000	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
J	Iron/Copper-Nickel	-40	+750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome/Nickel	-40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

TRANSMITTER (1 TC ONLY) - OPTION

5

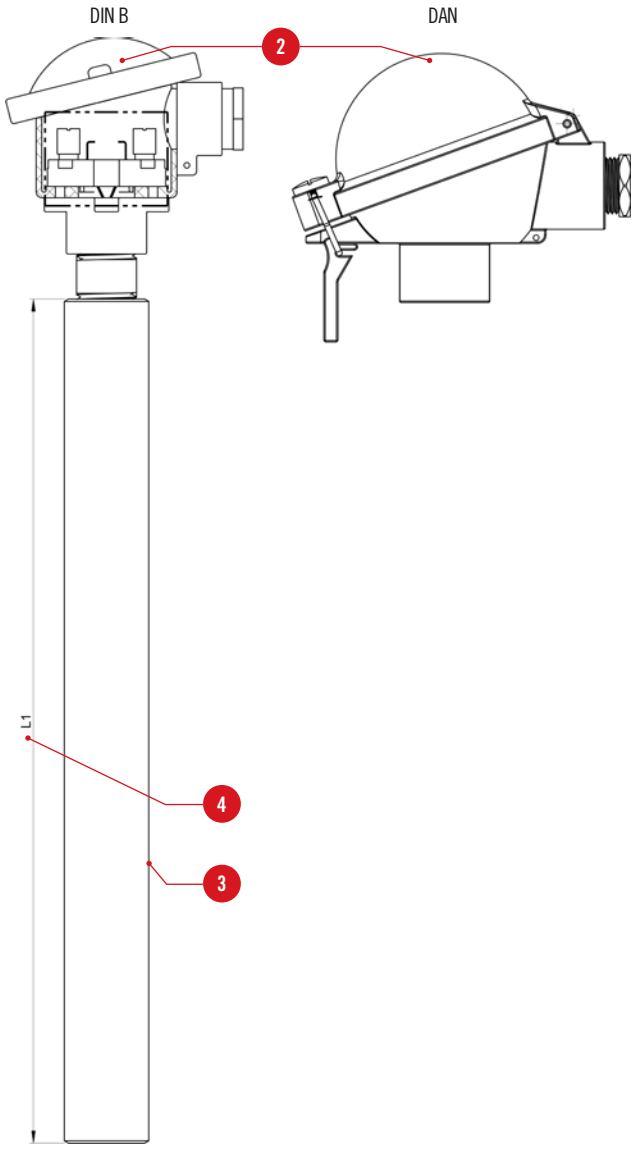
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)





CADID E
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1100°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type E	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	S
Class		1	
Wire diameter (mm)		1.5	0.35 / 0.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Protective tube		Metal, drilled from bar stock	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Internal sheath	Material	Ceramic 610	
	Diameter	15 x 2 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	E	2S	0.35	DIB	BA	1,200	B	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	
Possible choice		1K 1S 2K 2S	0.35 0.5 1.5	DIN B: DIB DAN: DAN	310: BA 446: BB Inconel 600: CM Pure iron: FF	300 to 2,000	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER 1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
K	Nickel-Chrome/ Nickel	-40	+ 1,000	1.5°C or 0.4% of t	1.5
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5

TRANSMITTER (1 TC ONLY) - OPTION 5

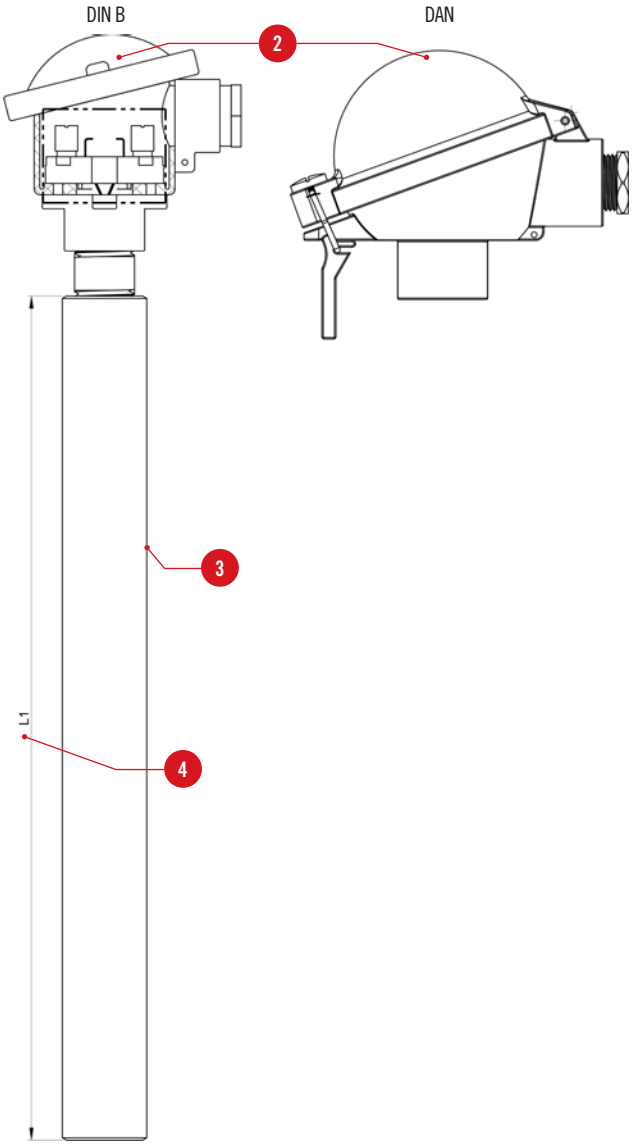
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)





CADID H
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1500°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type H		
Compliance with standards		IEC 584-1 / NF EN 60584-1		
Type		K	S	B
Class		1		2
Wire diameter (mm)		2.3	0.35/0.5	0.5
TC		Single / Duplex		
TC mounting		Beaded, ceramic beads		
Length L1 Min/Max (mm)		300 to 2,000 mm		
Sealing sleeve		Stainless steel, diam.1/2", length 80mm		
Sheath	Material	Ceramic 610	Alumina 710	
	Diameter	15 x 2 mm	15 x 2.5 mm	
Output	Head type	DAN	DIN B	
	Material	Light alloy		
	Output	1 cable gland M20x1.5		
	Cable diam.	5.5 to 7.5 mm		
	Equipment	Ceramic terminal strip		
	IP	IP54		
Accessories (p. 338)		Extension cables, compensation cables		

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TYPE		TC		Ø WIRE		HEAD		SHEATH		LENGTH L1 (mm)		LENGTH LM (mm)		FASTENING		LENGTH L2 (mm)
CADID	-	H	-	1K	-	2.3	-	DAN	-	FP	-	850	-	80	-	001	-	500
Référence tableau et schéma				1		1		2		3		4		5		6		7
Choix possible				1K 1S 1B 2K 2S 2B		0.35 0.5 2.3		DIN B : DIB DAN : DAN		Ceramic 610: FP Alumina 710: FQ		300 to 2,000		LM > 80mm LM Standard: 80 mm		Without: 000 G3/4": 001 3/4"NPT: 002 Flange: as per table below		200 to 1,500

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C		Tolerance values	Ø of wires (mm)
		Min.	Max.		
K	Nickel-Chrome/ Nickel	- 40	+ 1,000	1°C or 0.4% of t	2.3
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t- 1100)] for t > 1100°C	0.35 0.5
B	10% rhodium-platinum / 30% rhodium-platinum	+ 600	+ 1,700	1.5°C or 0.25% of t	0.5

FASTENING

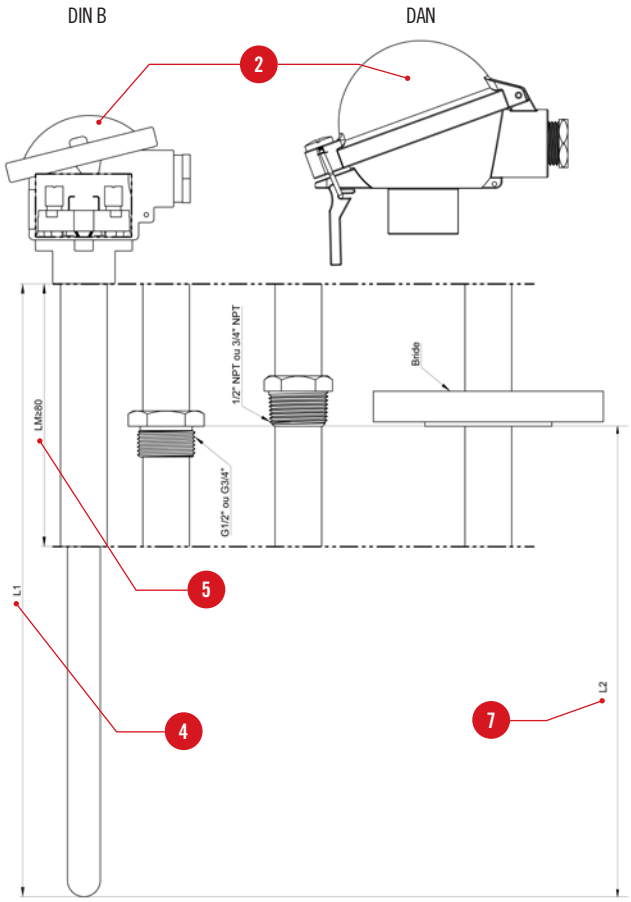
6

Flange code	Material	EN1092-1		
		DN	PN	Face
405	316L	25	10/40	B1
400	316L	40	10/40	B1
413	316L	50	10/40	B1

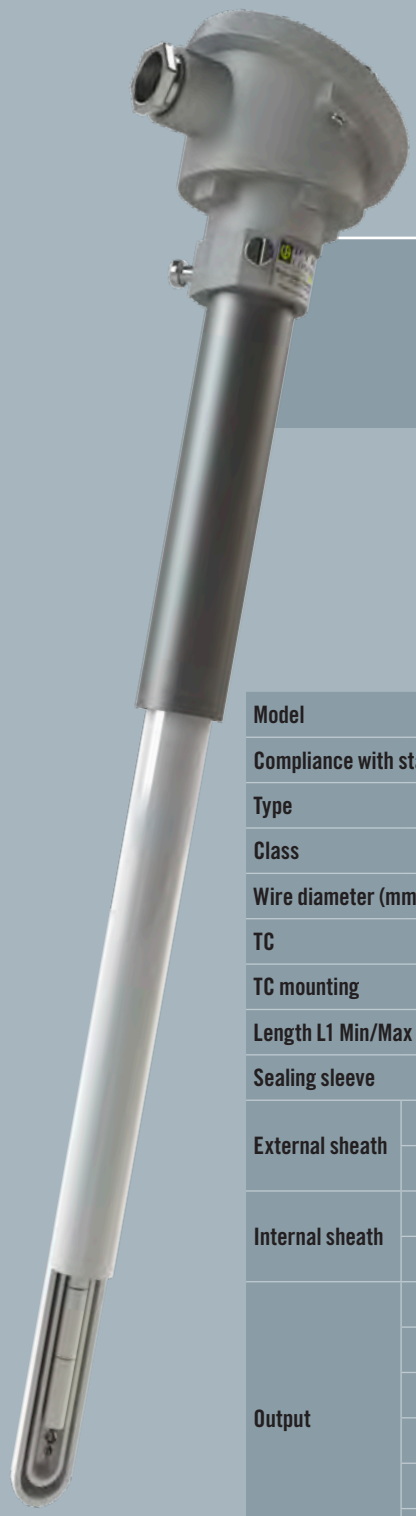
CONNECTION ON TERMINAL STRIP



DIAGRAM (MM)



For any other configuration, please contact us.



CADID J
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1500°C

DESCRIPTION

Straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type J			
Compliance with standards		IEC 584-1 / NF EN 60584-1			
Type		S		B	
Class		1		2	
Wire diameter (mm)		0.35 / 0.5			
TC		Single / Duplex			
TC mounting		Beaded, ceramic beads			
Length L1 Min/Max (mm)		300 to 2,000 mm			
Sealing sleeve		Stainless steel, diam.32 x 2mm, length 150mm			
External sheath	Material	Metal-Ceramic	Ceramic 610	Ceramic 530	Ceramic 710
	Diameter	22x 3 mm	24 x 2.5 mm	26 x 4 mm	24 x 3 mm
Internal sheath	Material	Ceramic 610		Alumina 710	
	Diameter	15 x 2 mm		15 x 2.5 mm	
Output	Head type	DIN A			
	Material	Light alloy			
	Output	1 cable gland M20x1.5			
	Cable diam.	5.5 to 7.5 mm			
	Equipment	Ceramic terminal strip			
	IP	IP54			
Accessories (p. 338)		Extension cables, compensation cables			

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TCW	Ø WIRE	EXTERNAL SHEATH	LENGTH L1 (mm)	INTERNAL SHEATH	LENGTH LM (mm)	FASTENING	LENGTH L2 (mm)
CADID	J	1S	0.5	GD	1,000	FQ	200	001	500
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7
Possible choice		1S 1B 2S 2B	0.35 0.5	Metal-Ceramic: GD Ceramic 610: FP Ceramic 530: FR Alumina 710: FQ	300 to 2,000	Ceramic 610: FP Alumina 710: FQ	LM > 150mm LM Standard: 200 mm	Without: 000 G3/4": 001 3/4"NPT: 002 Flange: as per table below	200 to 1,500

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C		Tolerance values	Ø of wires (mm)
		Min.	Max.		
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t- 1100)] for t > 1100°C	0.35 0.5
B	10% rhodium-platinum / 30% rhodium-platinum	+ 600	+ 1,700	1.5°C or 0.25% of t	0.35 0.5

FASTENING

6

Flange code	Material	EN1092-1		
		DN	PN	Face
405	316L	25	10/40	B1
400	316L	40	10/40	B1
413	316L	50	10/40	B1

CONNECTION ON TERMINAL STRIP

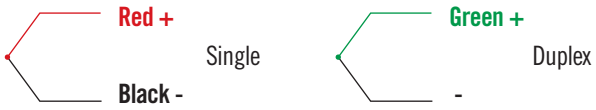
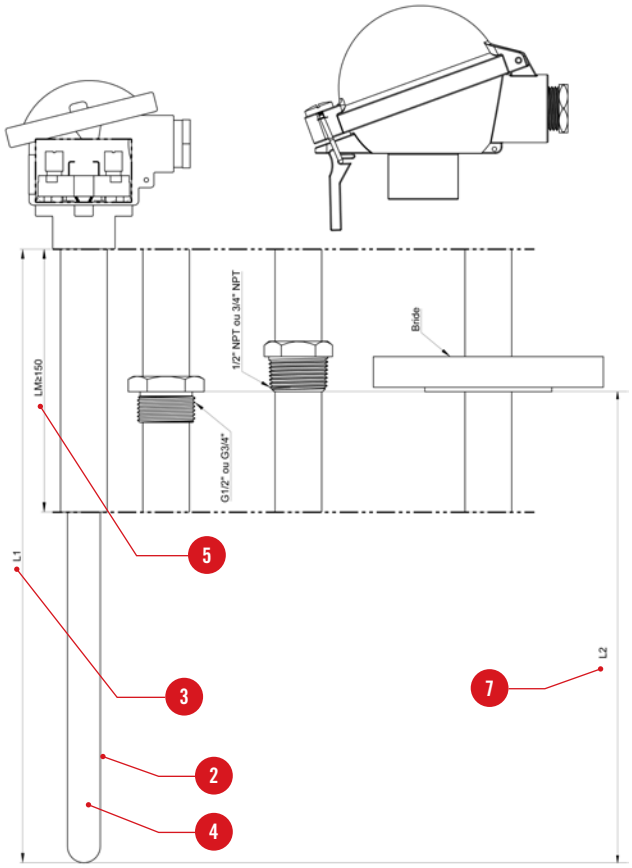


DIAGRAM (MM)



For any other configuration, please contact us.



CADID F
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Demountable straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type F	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
TC mounting		Beaded, ceramic beads	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Sleeve		Stainless steel, diam.1/2", length 200 mm	
Protective tube		Metal, drilled from bar stock	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	F	2J	1.5	DB	FF	450	C	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B: DIB DAN: DAN	Pure iron: FF 310: BA 446: BB Inconel 600: CM	300 to 2,000	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
J	Iron/ Copper-Nickel	-40	+750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome/ Nickel alloy	-40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

TRANSMITTER (1 TC ONLY) - OPTION

5

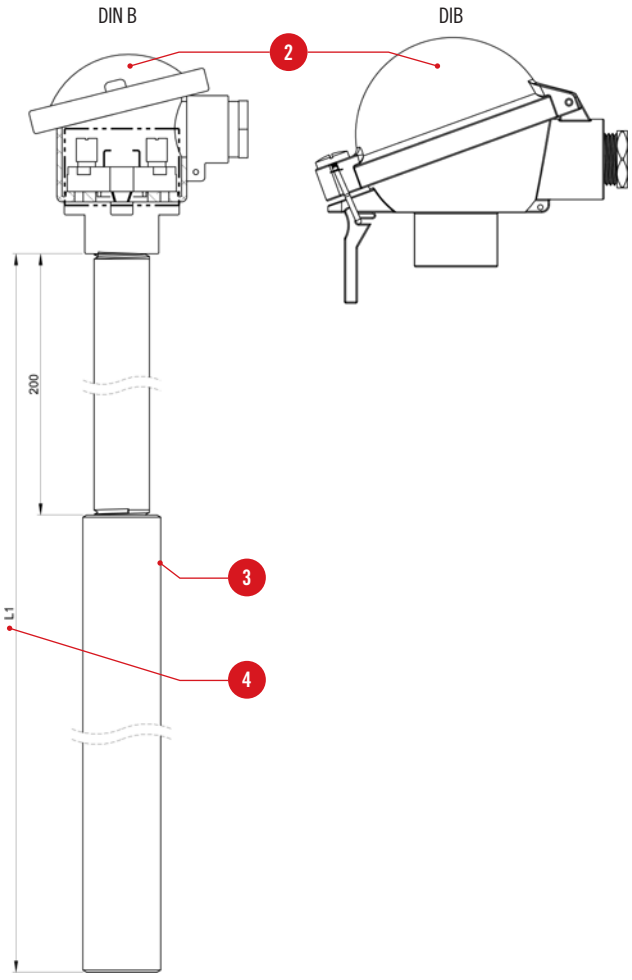
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)





CADID G
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Demountable straight temperature measurement assembly

SPECIFICATIONS

Model		CADID Type G	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	S
Class		1	
Wire diameter (mm)		1.5	0.35 / 0.5
TC		Single / Duplex	
TC mounting		Beaded, ceramic beads	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Sleeve		Stainless steel, diam.1/2", length 200mm	
Protective tube		Metal, drilled from bar stock	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Internal sheath	Material	Ceramic 610	
	Diameter	15 x 2 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	G	1S	0.35	DAN	BA	850	B	0/200
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	
Possible choice		1K 1S 2K 2S	0.35 0.5 2.3	DIN B: DIB DAN: DAN	Pure iron: FF 310: BA 446: BB Inconel 600: CM	300 to 2,000	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
K	Nickel-Chrome / Nickel alloy	- 40	+ 1,000	1.5°C or 0.4% of t	1.5
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t- 1100)] for t > 1100°C	0.35 0.5

TRANSMITTER (1 TC ONLY) - OPTION

5

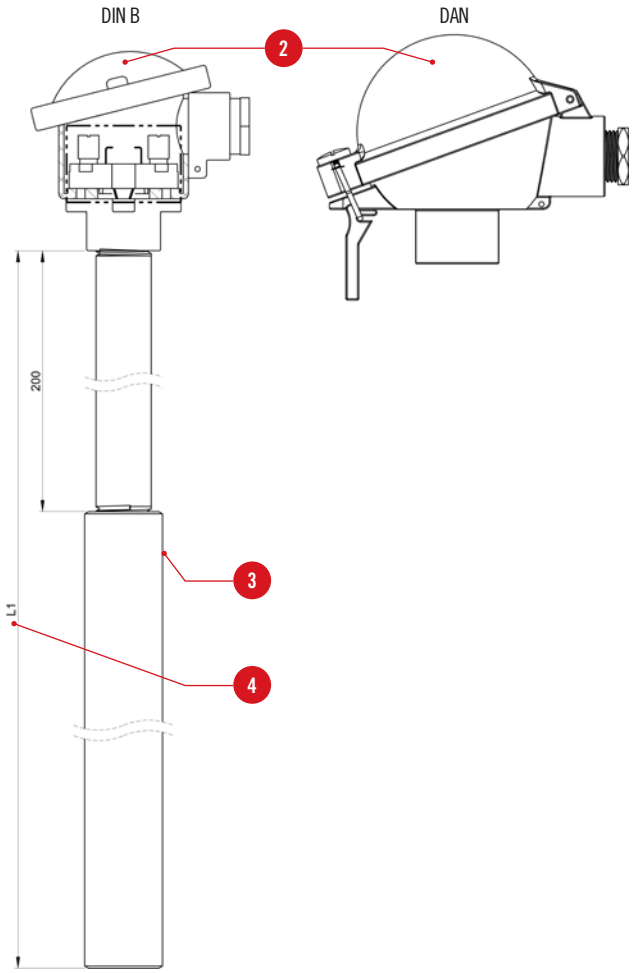
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)



CADID LB
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Demountable elbowed temperature measurement assembly

SPECIFICATIONS

Model		CADID Type LB	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		150 to 1,000 mm	
Support tube		Stainless steel, diam.1/2".	
Protective tube		Necked welded	
	Material	304L / 310 / 316 / 446 / INCONEL 600	
	Diameter	1/2" - 3/4"	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	Ø PROT.	LENGTH L1 (mm)	LENGTH L2 (mm)	OPTION: TRANSMITTER	OPTION: EXCH. TRANSMIT.
CADID	LB	1J	3.0	DIB	AB	1/2"	1,200	800	A	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B: DIB DAN: DAN	304L: AB 310: BA 316L: AC 446: BB Inconel 600: CM	1/2" 3/4"	300 to 2,000	150 to 1,000	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
J	Iron / Copper-Nickel	- 40	+ 750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome / Nickel alloy	- 40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

TRANSMITTER (1 TC ONLY-WIRE 1.5 MM MAX) - OPTION

7

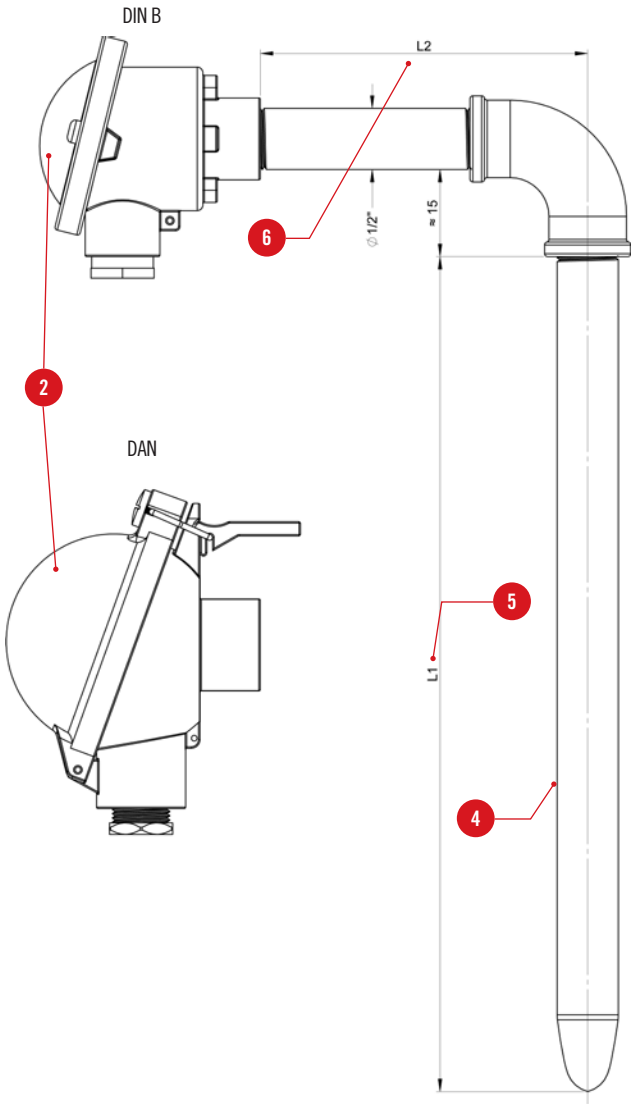
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)



CADID LC
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Demountable elbowed temperature measurement assembly

SPECIFICATIONS

Model		CADID Type LC	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		S	
Class		1	
Wire diameter (mm)		0.35 / 0.5	
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		150 to 1,000 mm	
Support tube		Stainless steel, diam.1/2"	
Internal sheath		Ceramic 610 Diam.10x1.5 mm	
Protective tube		Necked welded	
	Material	446 / INCONEL 600	
	Diameter	1/2" - 3/4"	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	Ø PROT.	LENGTH L1 (mm)	LENGTH L2 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	- LC	- 1S	- 0.5	- DAN	- BA	- 1/2"	- 570	- 450	- A	- 0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	
Possible choice		1S 2S	0.35 0.5	DIN B: DIB DAN: DAN	310: BA 446: BB Inconel 600: CM	1/2" 3/4"	300 to 2,000	150 to 1,000	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

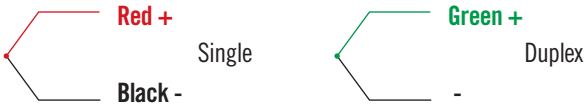
Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5

TRANSMITTER (1 TC ONLY) - OPTION

7

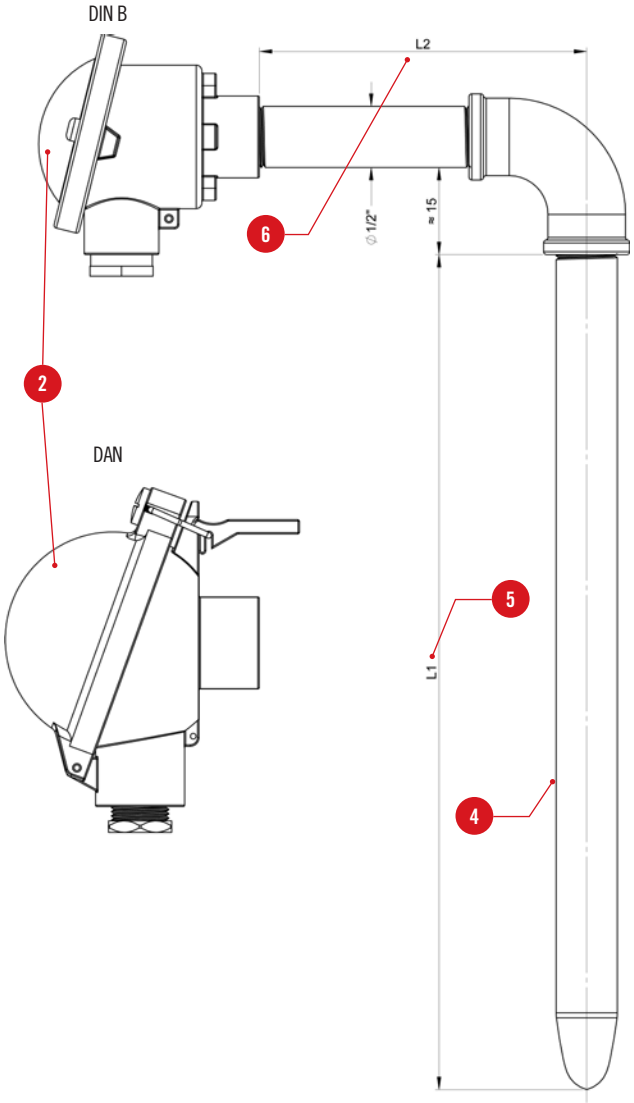
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP

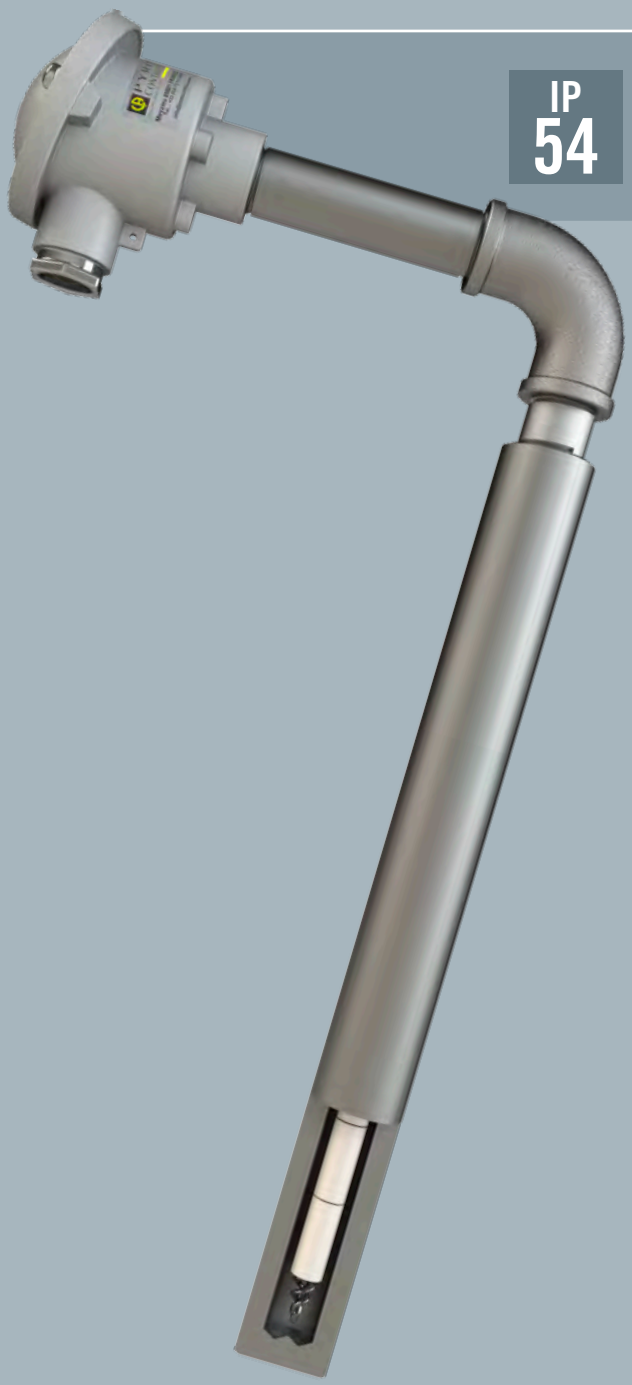


For any other configuration, please contact us.

DIAGRAM (MM)



CADID LD
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1100°C

DESCRIPTION

Demountable elbowed temperature measurement assembly

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Model		CADID Type LD	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		150 to 1,000 mm	
Support tube		Stainless steel, diameter 1/2"	
Protective tube		Metal, drilled from bar stock	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TYPE		TC		Ø WIRE		HEAD		PROTECTIVE TUBE		LENGTH L1 (mm)		LENGTH L2 (mm)	OPTION: TRANSMITTER		OPTION: TRANSMITTER SCALE
CADID	-	LD	-	1K	-	3.0	-	DIB	-	BA	-	590	-	150	-	B	-	0/150
Reference in table and DIAGRAM (MM)				1		1		2		3		4		5		6		
Possible choice				1J / 1K 2J / 2K		1.5 2.3 3.0		DIN B: DIB DAN: DAN		310: BA 446: BB Inconel 600: CM Pure iron: FF		300 to 2,000		100 to 1,000		LC5334A-100: A LC5331A-321: B LC5335A-100: C		

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

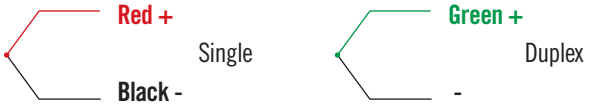
Conductor type		Conductor type °C		Tolerance values	Ø of wires (mm)
		Min.	Max.		
J	Iron / Copper-Nickel	- 40	+ 750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome / Nickel	- 40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

TRANSMITTER (1 TC ONLY) - OPTION

6

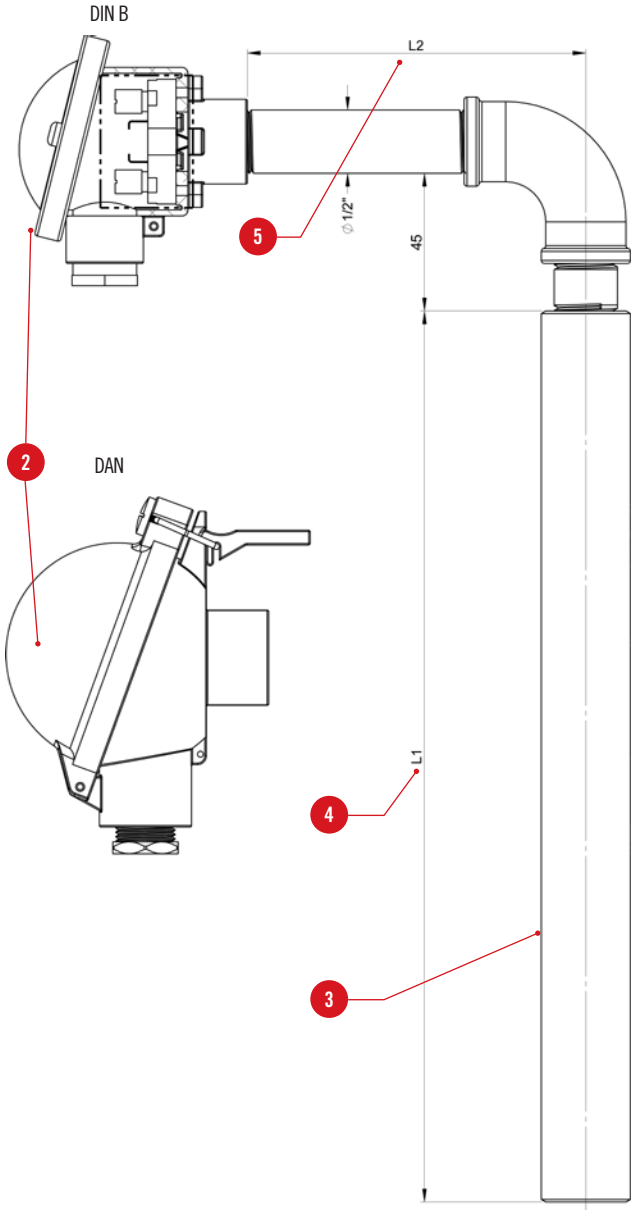
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP

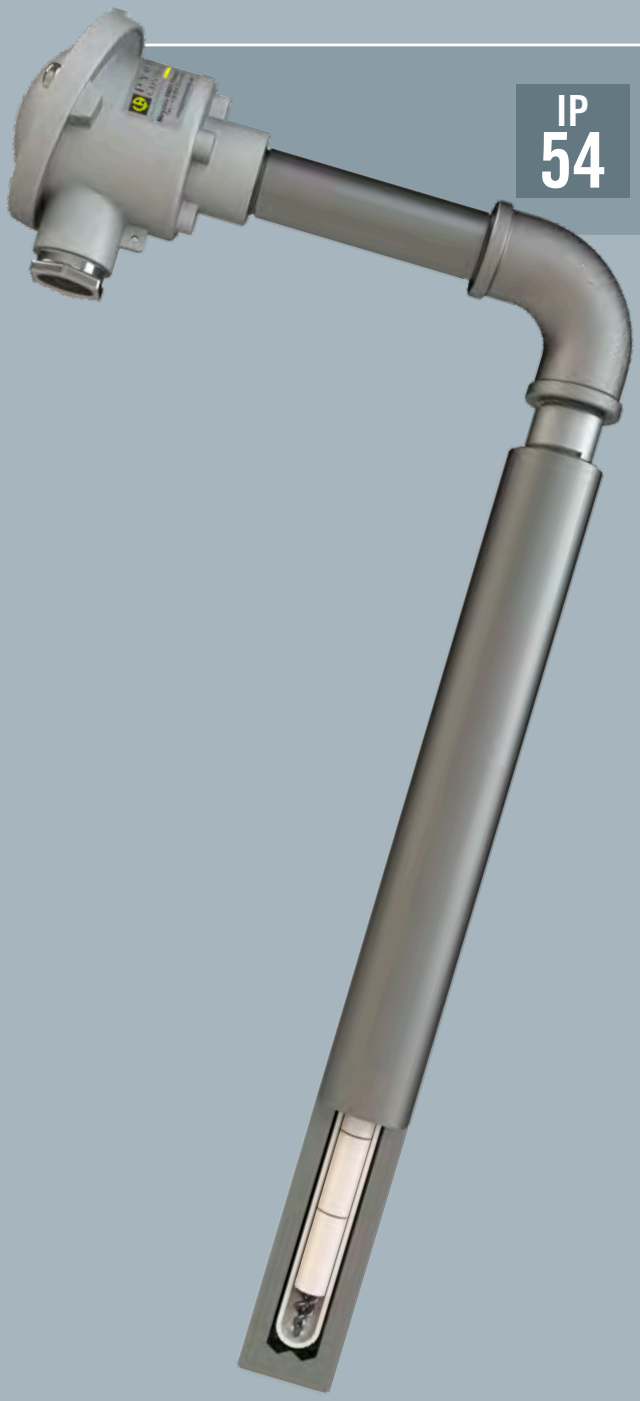


For any other configuration, please contact us.

DIAGRAM (MM)



CADID LE
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1100°C

DESCRIPTION

Demountable elbowed temperature measurement assembly

SPECIFICATIONS

Model		CADID Type LE	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	S
Class		1	
Wire diameter (mm)		1.5	0.35 / 0.5
TC		Single / Duplex	
TC mounting		Beaded, ceramic beads	
Length L1 Min/Max (mm)		300 to 2,000 mm	
Length L2 Min/Max (mm)		150 to 1,000 mm	
Support tube		Stainless steel, diameter 1/2"	
Protective tube		Metal, drilled from bar stock	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Internal sheath	Material	Ceramic 610	
	Diameter	15 x 2 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TYPE		TC		Ø WIRE		HEAD		PROTECTIVE TUBE		LENGTH L1 (mm)		LENGTH L2 (mm)		OPTION TRANSMITTER		OPTION TRANSMITTER SCALE
CADID	-	LE	-	2S	-	0.35	-	DAN	-	BB	-	1,800	-	300	-	-	-	-
Reference in table and DIAGRAM (MM)				1		1		2		3		4		5		6		7
Possible choice				1K 1S 2K 2S		0.35 0.5 1.5		DIN B: DIB DAN: DAN		Pure iron: FF 310: BA 446: BB Inconel 600: CM		300 to 2,000		150 to 1,000		LC5334A-100: A LC5331A-321: B LC5335A-100: C		

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
K	Nickel-Chrome / Nickel	- 40	+ 1,000	1.5°C or 0.4% of t	1.5
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5

TRANSMITTER (1 TC ONLY) - OPTION

6

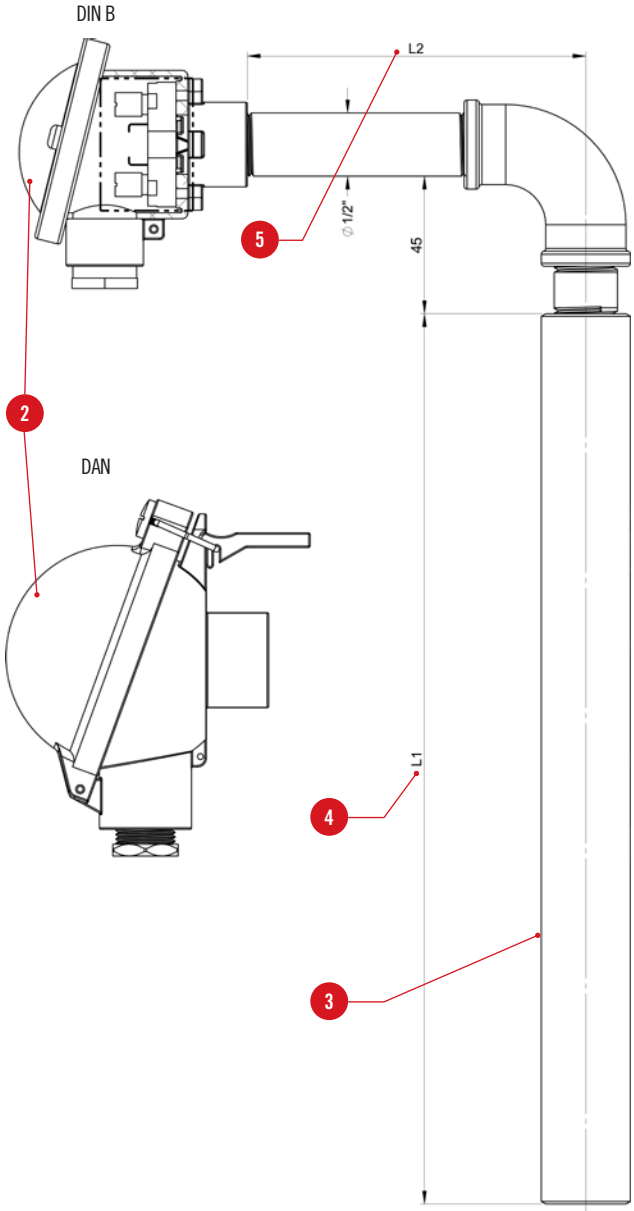
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)



CADID XB
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Bent temperature measurement assembly

SPECIFICATIONS

Model		CADID Type XB	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 1,000 mm	
Length L2 Min/Max (mm)		250 to 400 mm	
Length L3 Min/Max (mm)		0 (protective tube diam. 1/2" only) to 505 mm	
Support tube		Stainless steel, diam.1/2".	
Protective tube		Necked, welded and bent	
	Bending radius	R=45 for tube diam.1/2" ; R=60 for tube diam.3/4"	
	Bending angle	90°	
	Material	304L / 310 / 446 / INCONEL 600	
	Diameter	1/2" - 3/4"	
Sortie	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessoires (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	Ø PROT.	LENGTH L1 (mm)	LENGTH L2 (mm)	LENGTH L3 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	XB	1J	1.5	DAN	AB	1/2"	720	290	200	A	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	8	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B: DIB DAN: DAN	304L: AB 310: BA 316: AC 446: BB Inconel 600: CM	1/2" 3/4"	300 to 1,000	250 to 400	0 to 505	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
J	Iron / Copper-Nickel	- 40	+ 750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome / Nickel	- 40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

TRANSMITTER (1 TC ONLY) - OPTION

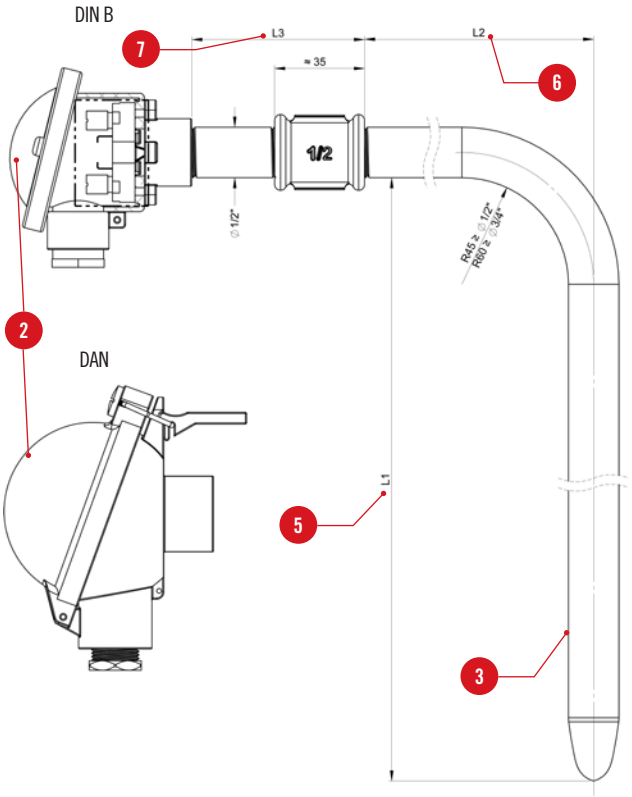
8

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP



DIAGRAM (MM)



For any other configuration, please contact us.



CADID XC
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Bent temperature measurement assembly

SPECIFICATIONS

Model		CADID Type XC	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		S	
Class		1	
Wire diameter (mm)		0.35 / 0.5	
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 1,000 mm	
Length L2 Min/Max (mm)		250 to 400 mm	
Length L3 Min/Max (mm)		0 (protective tube diam.1/2" only) to 505 mm	
Support tube		Stainless steel, diam.1/2".	
Internal sheath		Ceramic 610, diam.10x1.5 mm	
Protective tube		Necked, welded and bent	
	Bending radius	R=45 for tube diam.1/2" ; R=60 for tube diam.3/4"	
	Bending angle	90°	
	Material	310 / 446 / INCONEL 600	
	Diameter	1/2" - 3/4"	
Sortie	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessoires (p. 338)		Câbles d'extension, câbles de compensation	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	Ø PROT.	LENGTH L1 (mm)	LENGTH L2 (mm)	LENGTH L3 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	XC	1S	0.5	DIB	BB	3/4"	700	300	200	C	0/200
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	8	
Possible choice		1S 2S	0.35 0.5	DIN B: DIB DAN: DAN	310: BA 446: BB Inconel 600: CM	1/2" 3/4"	300 to 1,000	250 to 400	0 to 505	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5

TRANSMITTER (1 TC ONLY) - OPTION

8

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP

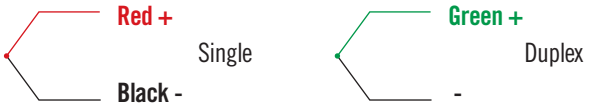
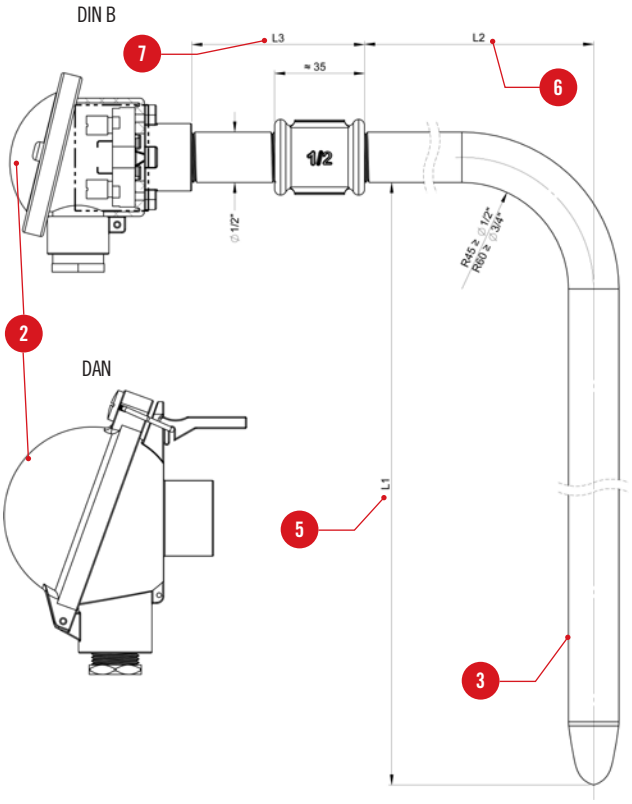


DIAGRAM (MM)



For any other configuration, please contact us.



CADID XD
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Bent temperature measurement assembly

SPECIFICATIONS

Model		CADID Type XD	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	J
Class		1	
Wire diameter (mm)		1.5/ 2.3 / 3.0	1.5
TC		Single / Duplex	
Length L1 Min/Max (mm)		300 to 1,000 mm	
Length L2 Min/Max (mm)		250 to 400 mm	
Length L3 Min/Max (mm)		40 to 470 mm	
Support tube		Stainless steel, diam.1/2".	
Protective tube		Bored and bent	
	Bend radius	R=70	
	Bend angle	90°	
	Material	Pure IRON / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	LENGTH L2 (mm)	LENGTH L3 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	XD	1J	2.3	DAN	FF	450	300	70	A	0/150
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	
Possible choice		1J 1K 2J 2K	1.5 2.3 3.0	DIN B: DIB DAN: DAN	PURE IRON: FF 310: BA 446: BB Inconel 600: CM	300 to 1,000	250 to 400	40 to 470	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
J	Iron / Copper-Nickel	- 40	+ 750	1.5°C or 0.4% of t	1.5
K	Nickel-Chrome / Nickel	- 40	+ 1,000	1.5°C or 0.4% of t	1.5 2.3 3.0

TRANSMITTER (1 TC ONLY) - OPTION

7

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTION ON TERMINAL STRIP

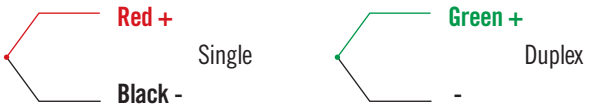
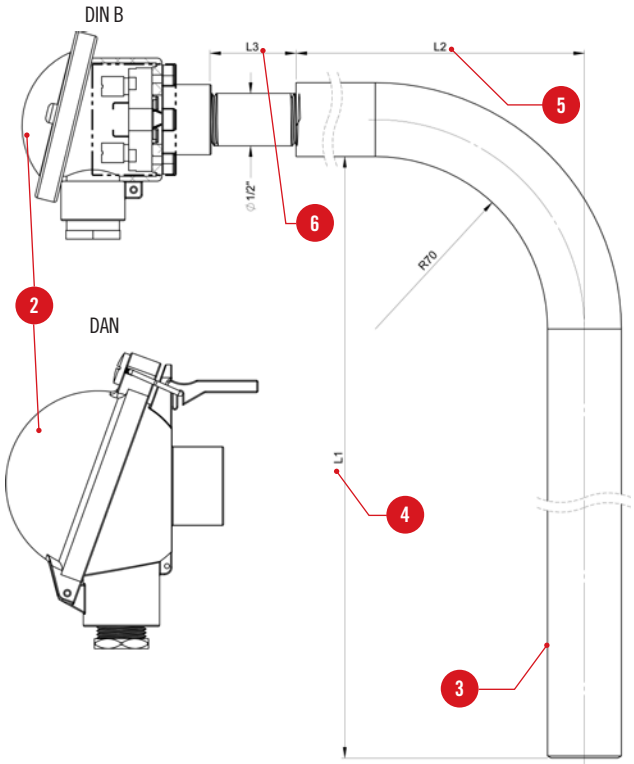


DIAGRAM (MM)



For any other configuration, please contact us.

CADID XE
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 1050°C

DESCRIPTION

Bent temperature measurement assembly

SPECIFICATIONS

Model		CADID Type XE	
Compliance with standards		IEC 584-1 / NF EN 60584-1	
Type		K	S
Class		1	
Wire diameter (mm)		1.5	0.35 / 0.5
TC		Single / Duplex	
TC mounting		Beaded, ceramic beads	
Length L1 Min/Max (mm)		300 to 1,000 mm	
Length L2 Min/Max (mm)		250 to 400 mm	
Length L3 Min/Max (mm)		40 to 470 mm	
Support tube		Stainless steel, diam.1/2".	
Protective tube		Metal, drilled from bar stock	
	Bend radius	R=70	
	Bend angle	90°	
	Material	Pure iron / 310 / 446 / INCONEL 600	
	Diameter	30 x 7 mm	
Internal sheath	Material	Ceramic 610	
	Diameter	15 x 2 mm	
Output	Head type	DAN	DIN B
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) Transmitter	
	IP	IP54	
Accessories (p. 338)		Extension cables, compensation cables	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	TYPE	TC	Ø WIRE	HEAD	PROTECTIVE TUBE	LENGTH L1 (mm)	LENGTH L2 (mm)	LENGTH L3 (mm)	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
CADID	XE	1K	1.5	DAN	FF	720	300	50	B	0/200
Reference in table and DIAGRAM (MM)		1	1	2	3	4	5	6	7	
Possible choice		1K 1S 2K 2S	0.35 0.5 1.5	DIN B: DIB DAN: DAN	Pure IRON: FF 310: BA 446: BB Inconel 600: CM	300 to 1,000	250 to 400	40 to 470	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

1

Conductor type		Conductor type °C Min.	Conductor type °C Max.	Tolerance values	Ø of wires (mm)
K	Nickel-Chrome / Nickel	- 40	+ 1,000	1.5°C or 0.4% of t	1.5
S	10% rhodium-platinum / Platinum	0	+ 1,600	1°C for t < 1100°C [1 + 0.003 x (t-1100)] for t > 1100°C	0.35 0.5

TRANSMITTER (1 TC ONLY) - OPTION

7

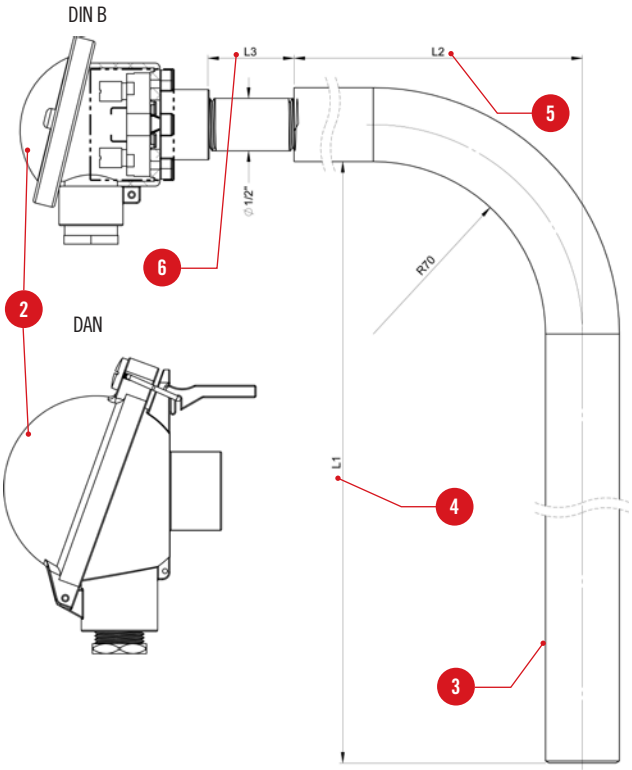
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

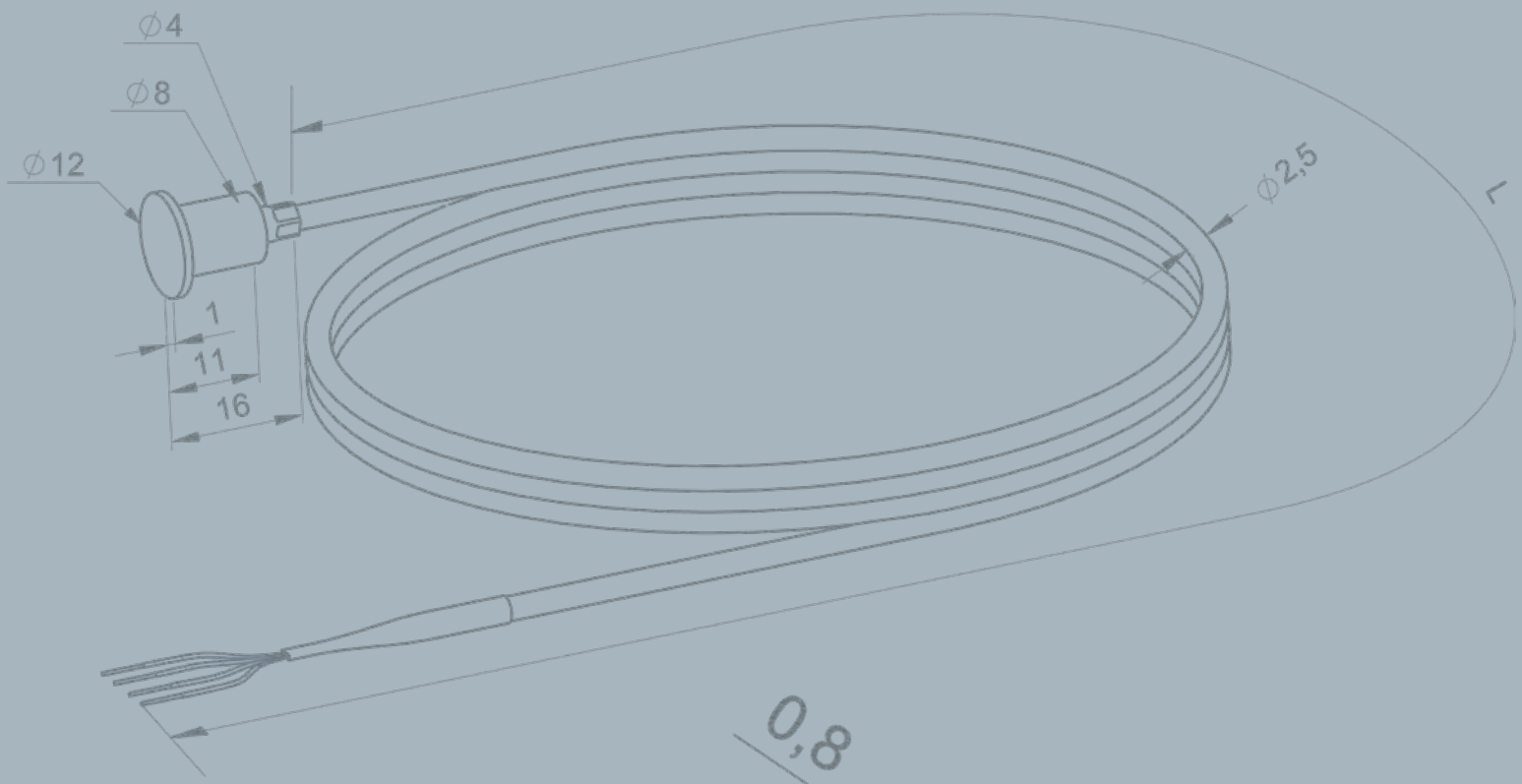
CONNECTION ON TERMINAL STRIP

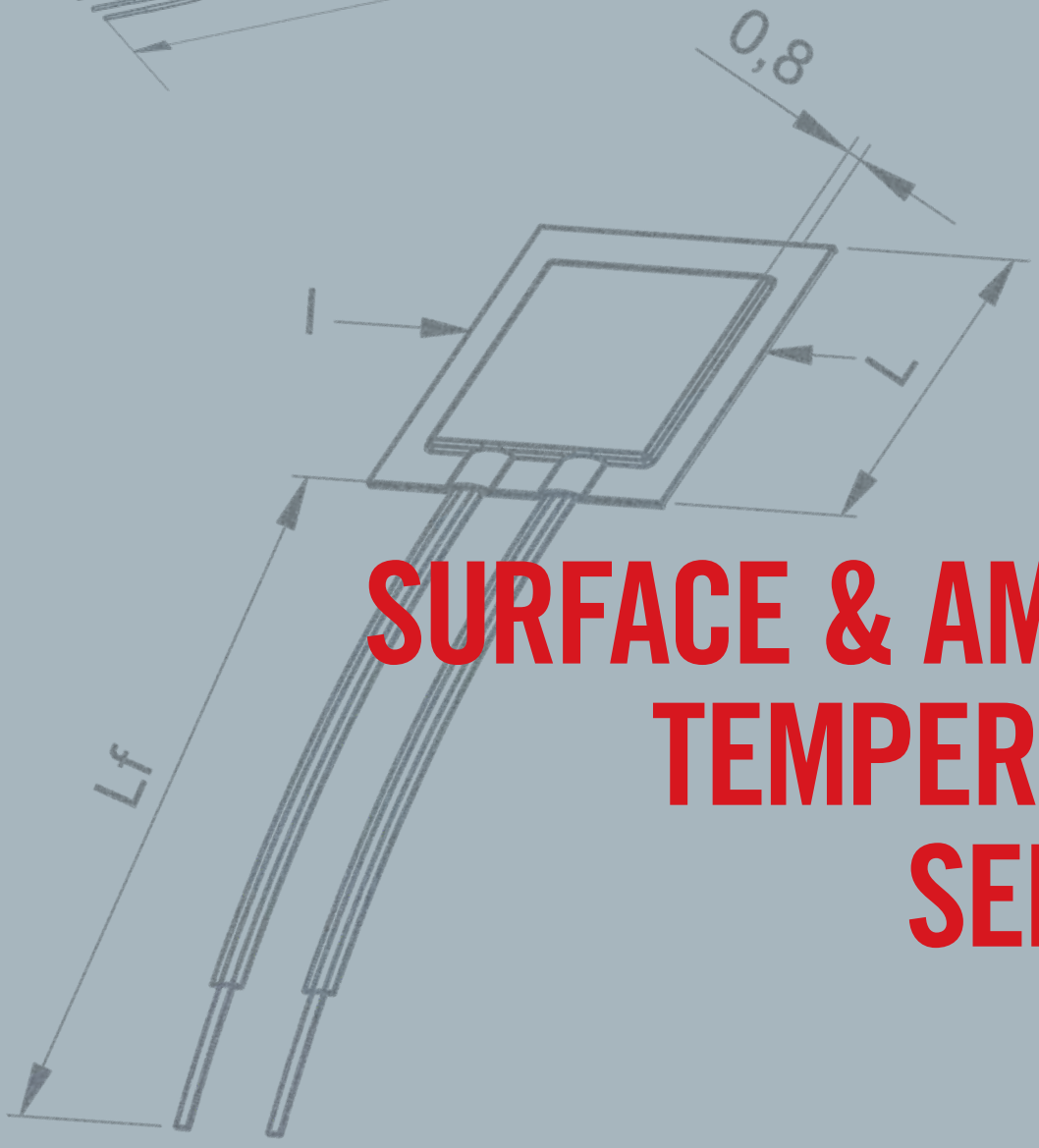


For any other configuration, please contact us.

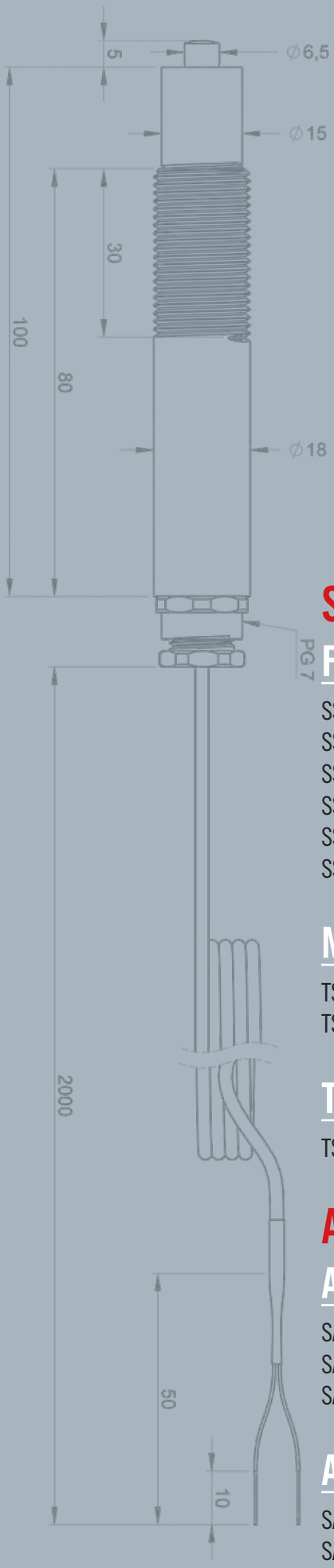
DIAGRAM (MM)

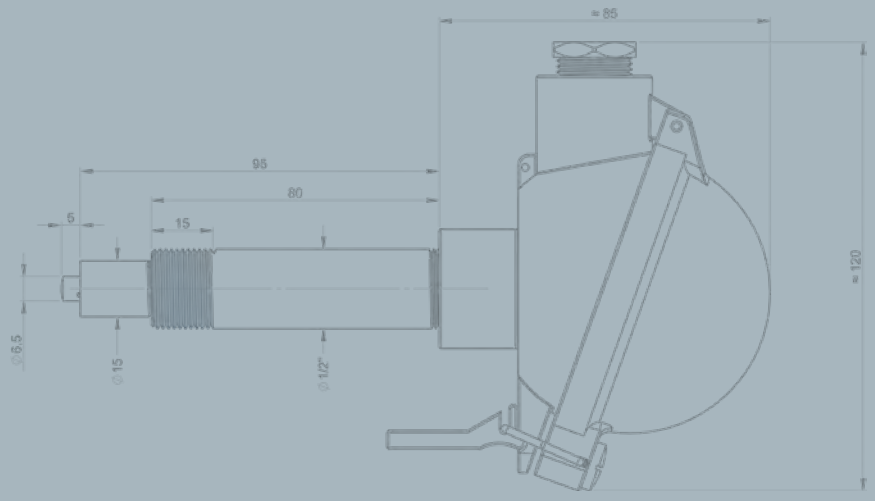






SURFACE & AMBIENT TEMPERATURE SENSORS





SURFACE TEMPERATURE SENSORS

FIXED MOUNTING 144

SS1 144
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SS3 148
SS4 150
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SS6 154

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TS2 156
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TS1 160

AMBIENT SENSORS

AMBIENT SENSORS 162

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SA2 - INDOOR WALL MOUNTING 164
SA3 - OUTDOOR WALL MOUNTING 166

ATEX AMBIENT SENSORS 168

SA4 - ATEX d 168
SA5 - ATEX ia 170

SS1
Pt100



CLASS B | IEC 60751 | DURAL PLATE | up to 200°C

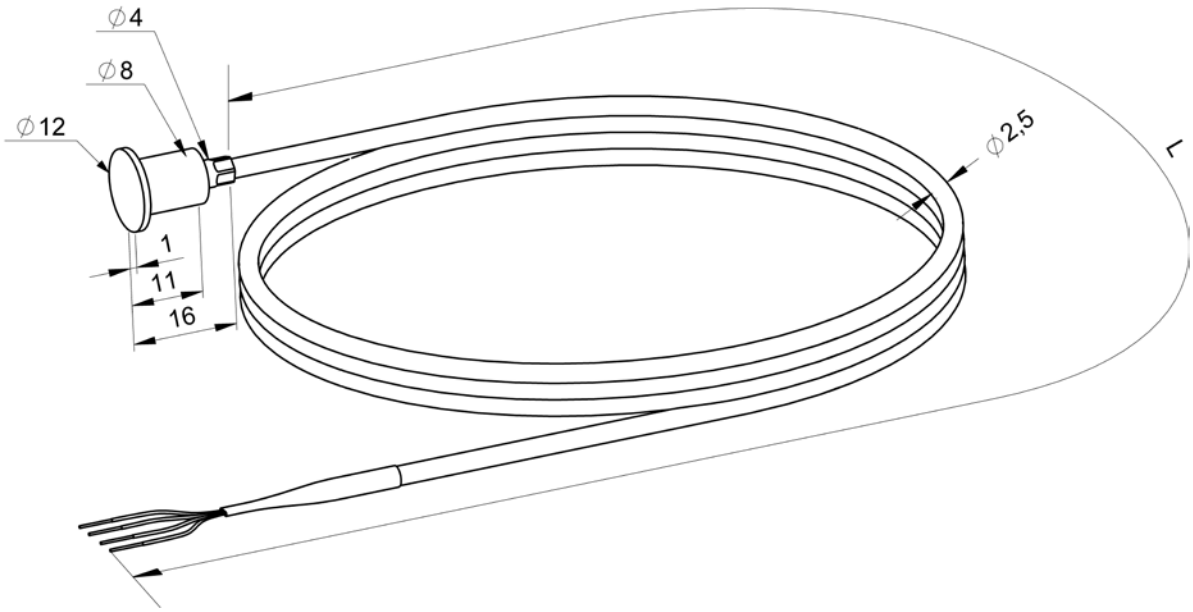
DESCRIPTION

Pt100 sensor, Class B, 4 wires, as per IEC 60751, on Dural plate, output via FEP cable, for temperature measurement up to 200°C. Fastening by gluing or insertion in the material.

SPECIFICATIONS

Model		SS1
Compliance with standards		IEC 60751
Type		Pt100 Ω
Material		Dural plate, diam.12 mm
Class		B
Mounting / Construction		1x4 wires
Max. surface temp. (°C) (without flow) (theoretical)		200°C
Output	Sheath	FEP
	Diameter (mm)	2.5 mm
	Max. temperature	200°C
	Conductors	4 x 0.05 mm² copper
	Length L (mm)	1,000 / 2,000 / 5,000 mm
	Termination	Insulated bare wires
Fastening		By gluing on the surface or insertion in the material.

DIAGRAM (MM)

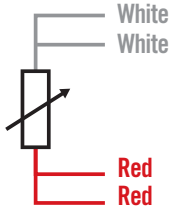


TO ORDER

Cable length L (mm)	Reference
1000	P07604120
2000	P07604121
5000	P07604122

For any other configuration, please contact us.

CONNECTIONS





SS2

Pt100

CLASS B | IEC 60751 | up to 200°C

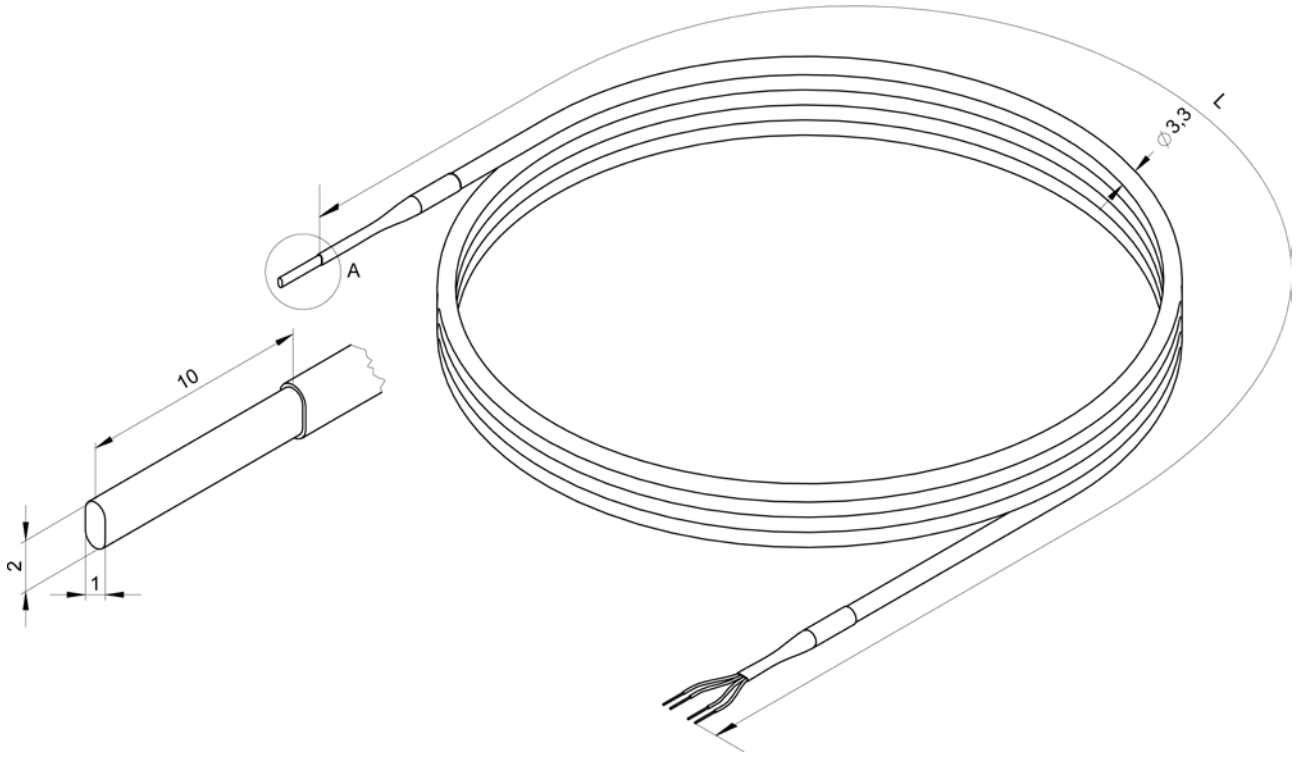
DESCRIPTION

Pt100 sensor, Class B, 4 wires, as per IEC 60751, on alumina substrate, output via FEP cable, for temperature measurement up to 250°C. Fastening by gluing.

SPECIFICATIONS

Model		SS2
Compliance with standards		IEC 60751
Type		Pt100 Ω
Material		Alumina substrate (10x2x1 mm) (Lxwxh)
Class		B
Mounting / Construction		1x4 wires
Max. surface temp. (°C) (without flow) (theoretical)		250°C
Output	Sheath	FEP
	Diameter (mm)	3.3 mm
	Max. temperature	200°C
	Conductors	4 x 0.22 mm², copper
	Length L (mm)	1,000 / 2,000 / 5,000 mm
	Termination	Insulated bare wires
Fastening		By gluing on the surface

DIAGRAM (MM)

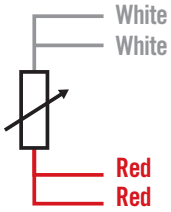


TO ORDER

Cable length L (mm)	Reference
1000	P07604115
2000	P07604116
5000	P07604117

For any other configuration, please contact us.

CONNECTIONS





SS3

Pt100

CLASS B | IEC 60751 | DURAL PLATE | up to 200°C

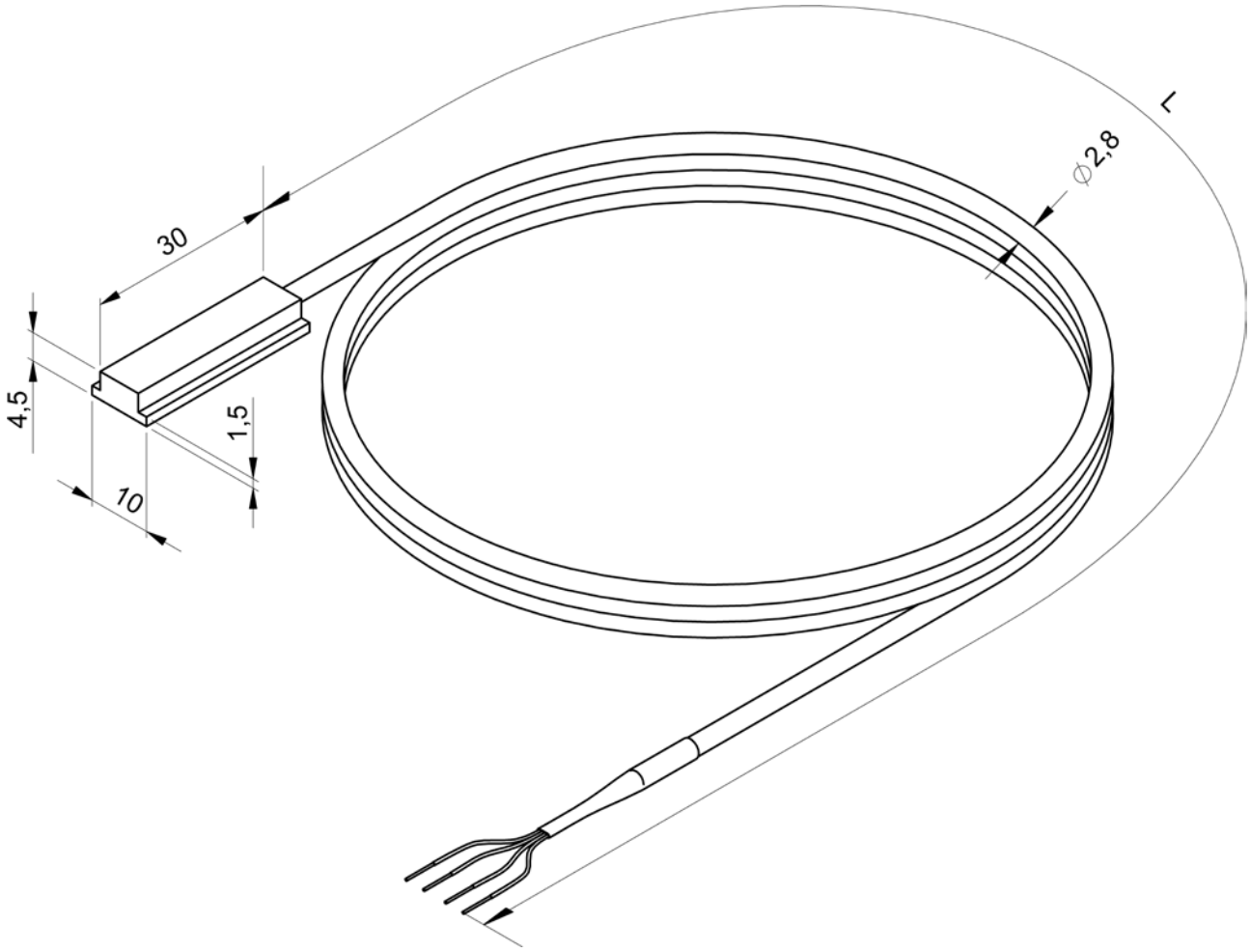
DESCRIPTION

Pt100 sensor, Class B, 4 wires, as per IEC 60751, on Dural plate, output via FEP cable, for temperature measurement up to 200°C. Fastening by gluing or with clamping screw.

SPECIFICATIONS

Model		SS3
Compliance with standards		IEC 60751
Type		Pt100 Ω
Material		Dural plate, 30x10x4.5mm (Lxwxh)
Class		B
Mounting / Construction		1x4 wires
Max. surface temp. (°C) (without flow) (theoretical)		200°C
Output	Sheath	FEP
	Diameter (mm)	2.8 mm
	Max. temperature	200°C
	Conductors	4 x 0.22 mm², copper
	Length L (mm)	1,000 / 2,000 / 5,000 mm
	Termination	Insulated bare wires
Fastening		By gluing on surface or with clamping screw.

DIAGRAM (MM)

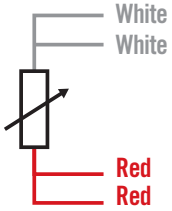


TO ORDER

Cable length L (mm)	Reference
1000	P07604123
2000	P07604124
5000	P07604125

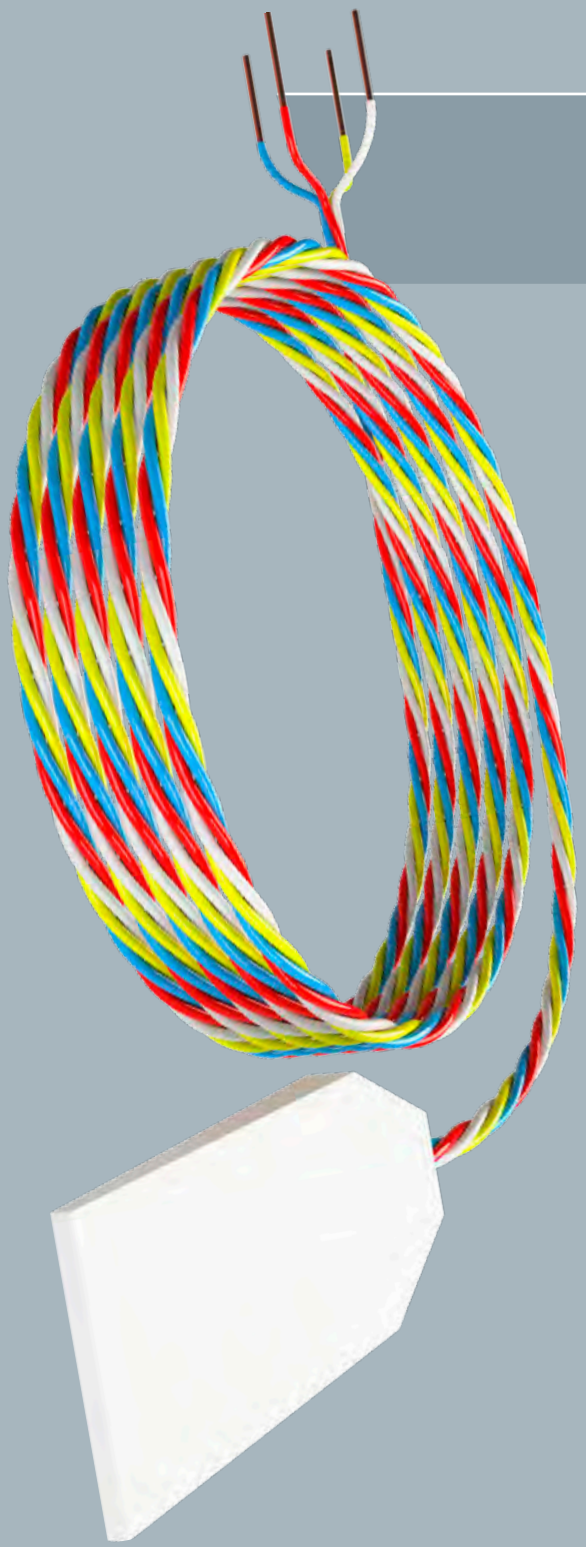
For any other configuration, please contact us.

CONNECTIONS



SS4

Pt100



CLASS B

IEC 60751

up to 200°C

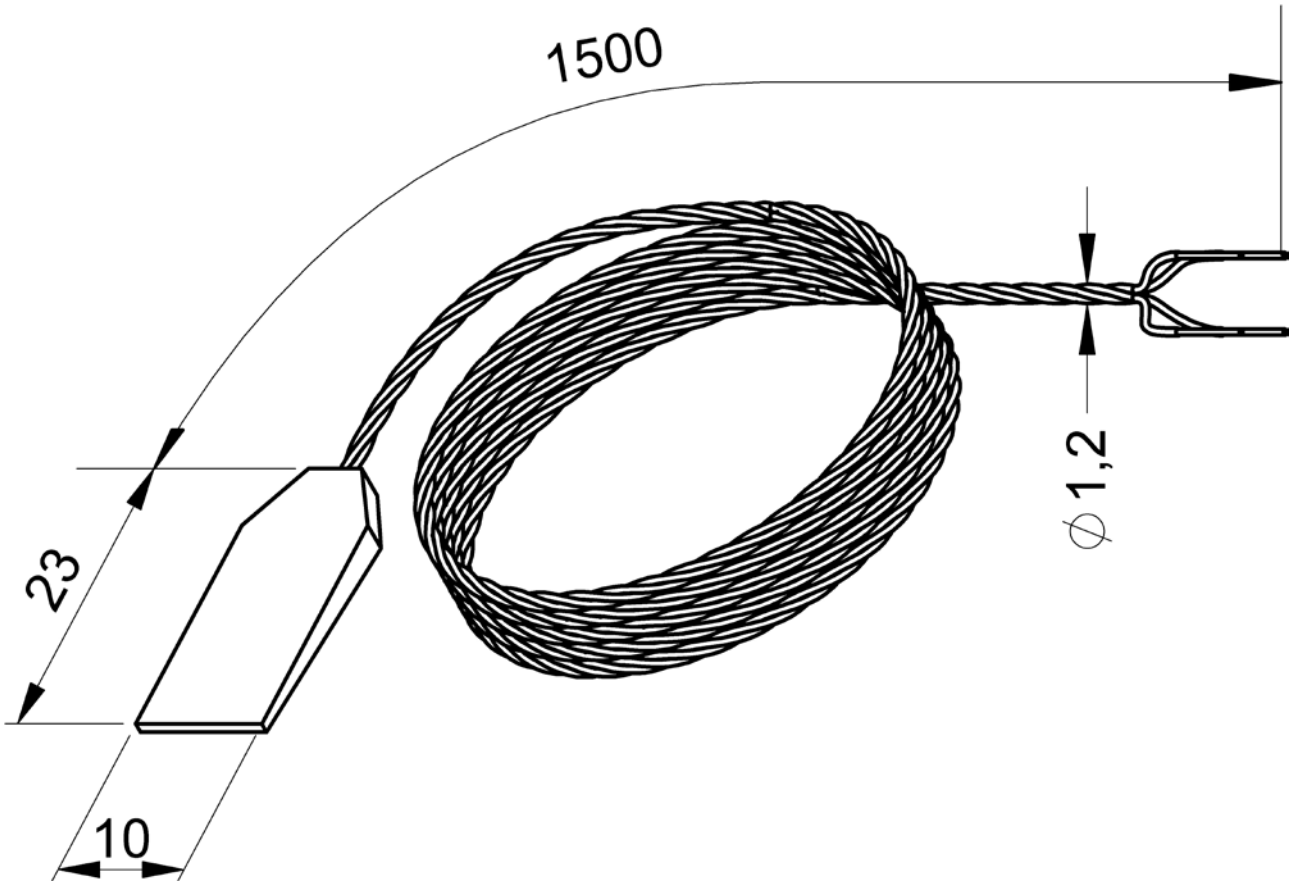
DESCRIPTION

Flat, flexible Pt100 sensor, class B, 4 wires, as per IEC 60751, fastening by gluing.

SPECIFICATIONS

Model		SS4
Compliance with standards		IEC 60751
Type		Pt100 Ω
Material		Silicone elastomer coating, 23x10mm (Lxw)
Class		B
Mounting / Construction		1x4 wires
Max. surface temp. (°C) (without flow) (theoretical)		-70° to +200°C
Output	Sheath	PTFE / conductor
	Max. temperature	200°C
	Conductors	4 x 0.055 mm², silver-plated copper
	Length L (mm)	1,500 mm
	Termination	Insulated bare wires
Fastening		By gluing

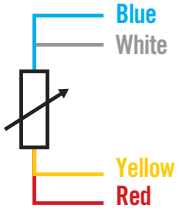
DIAGRAM (MM)

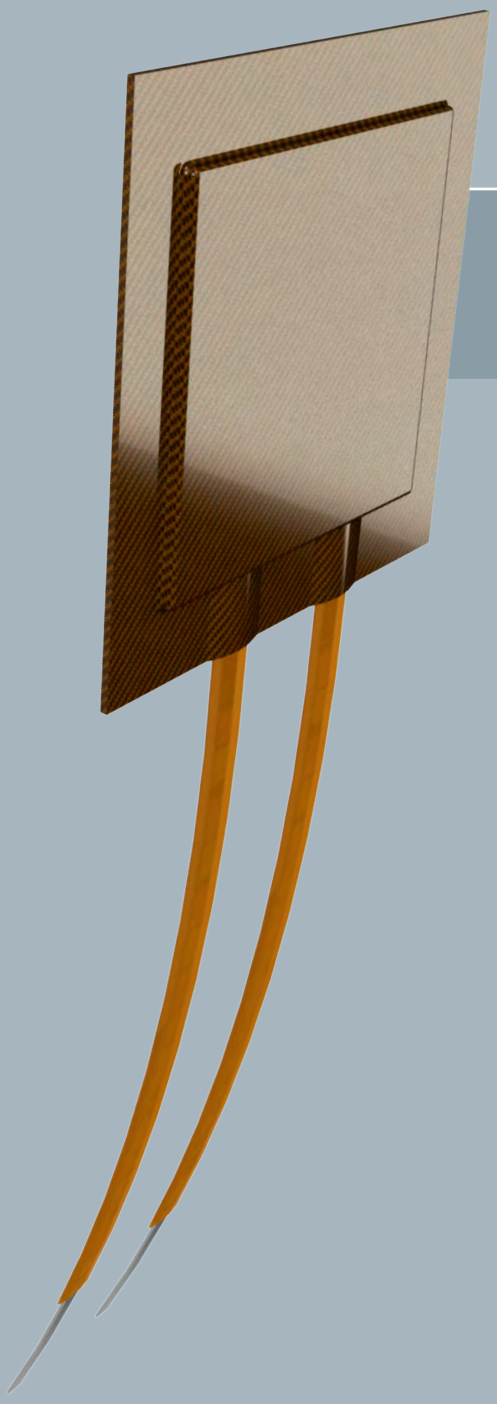


TO ORDER

Cable length (mm)	Reference
1500	L061822-000

CONNECTIONS





SS5

Pt100

CLASS B

IEC 60751

up to 250°C

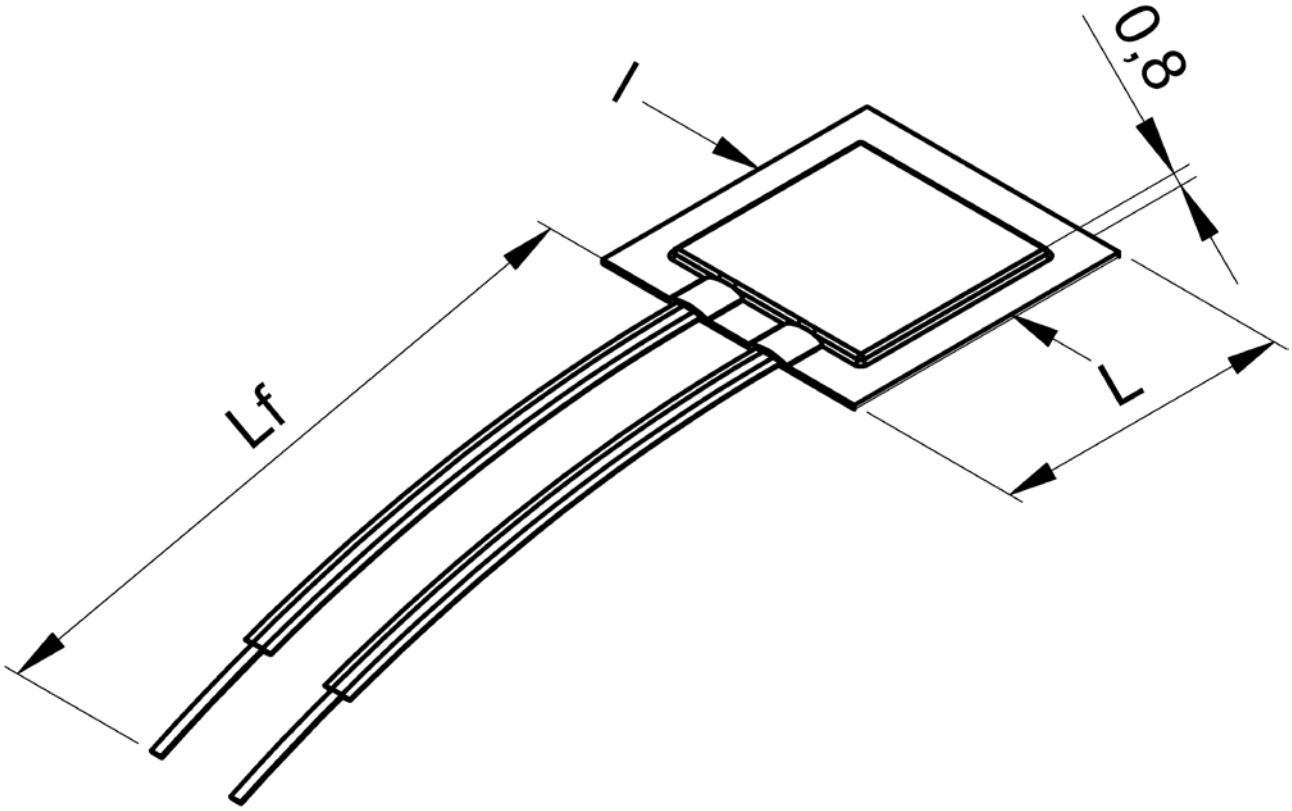
DESCRIPTION

Flat, flexible Pt100 sensor, class B, 2 wires, as per IEC 60751, fastening by gluing.

SPECIFICATIONS

Model	SS5
Compliance with standards	IEC 60751
Type	Pt100 Ω
Material	Glued glass silk coating
Class	B
Mounting / Construction	1x2 wires
Max. surface temp. (°C) (without flow) (theoretical)	-80° to +250°
Output	Silver wire
Fastening	By gluing
Accessories (p. 338)	TBD

DIAGRAM (MM)



TO ORDER

Dimensions (Lxwxh)	Length Lf (mm)	Reference
20x20x0.8 mm	40 mm	L061300-000
10x12x0.8 mm	20 mm	L062300-000

For any other configuration, please contact us.



SS6

Pt100

CLASS B | IEC 60751 | up to 250°C

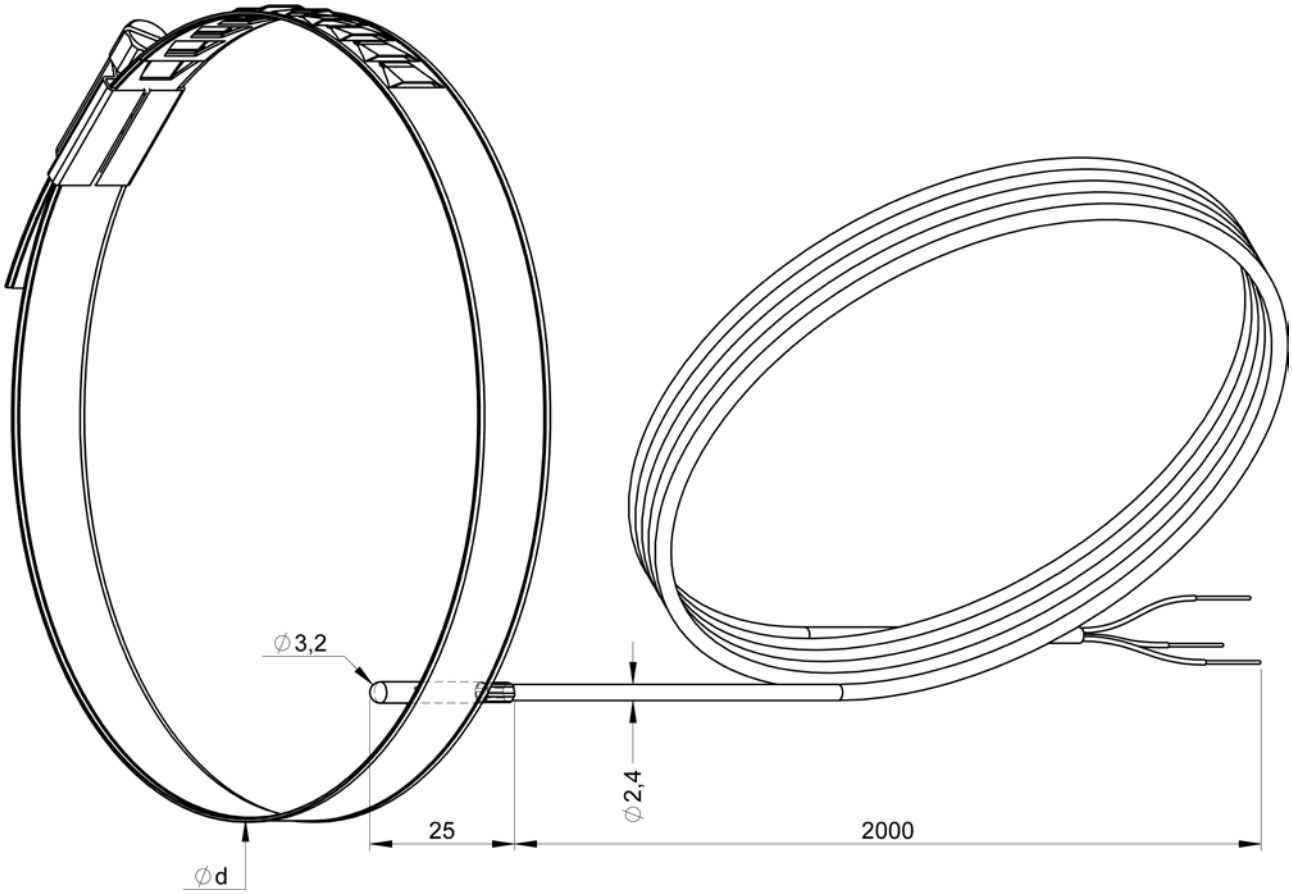
DESCRIPTION

Pt100 sensor, Class B, 3 wires, as per IEC 60751, in stainless-steel 316L sheath, output via PFA cable 2 metres long, for temperature measurement up to 250°C. Fastening on pipe with Serflex clip (supplied).

SPECIFICATIONS

Model		SS6
Compliance with standards		IEC 60751
Type		Pt100 Ω
Material		Stainless-steel 316L tube, diam.3.2 x 25 mm
Class		B
Mounting / Construction		1x3 wires
Max. surface temp. (°C) (without flow) (theoretical)		250°C
Output	Sheath	PFA
	Diameter (mm)	2.4 mm
	Max. temperature	200°C
	Conductors	3 x 0.05 mm², copper
	Length L (mm)	2,000 mm
	Termination	Insulated bare wires
Fastening		By stainless-steel Serflex clip

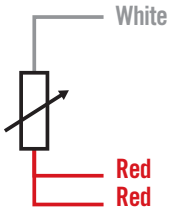
DIAGRAM (MM)



TO ORDER

Pipe diam. (mm)	Reference
10 < d < 15	L918515-001
16 < d < 22	L918515-002
20 < d < 26	L918515-003
26 < d < 34	L918515-004
34 < d < 50	L918515-005
49 < d < 65	L918515-006
64 < d < 80	L918515-007
79 < d < 95	L918515-008

CONNECTIONS



For any other configuration, please contact us.



TS2
THERMOCOUPLE

CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 250°C

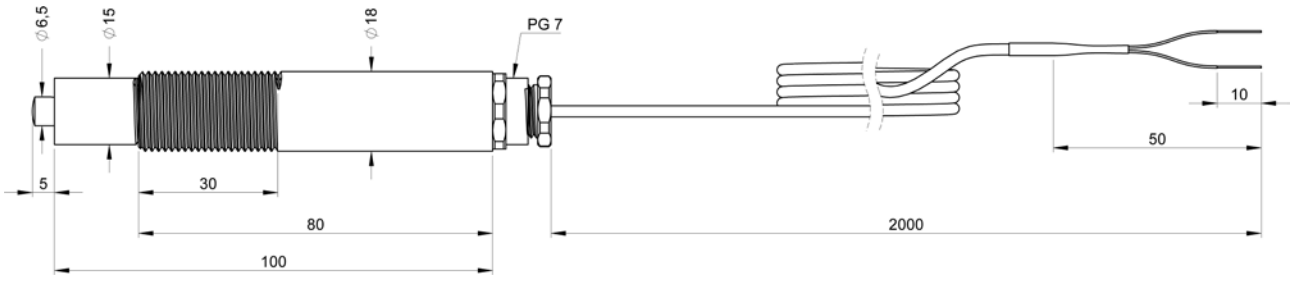
DESCRIPTION

J, K or T thermocouple under brass end-piece and Teflon coating for measurement of moving surface temperatures up to 250°C and a max. linear speed of 5 m/s.

SPECIFICATIONST

Model		TS2		
Compliance with standards		IEC 584-1 / NF EN 60584-1		
Type		J	K	T
Class		1		
Mounting		Brass end-piece diam.7 mm with compression spring (max. travel 5mm) + Teflon coating diam.15 mm. Anti-rotation locking of sensing element.		
Hot junction		Insulated		
Max. surface temp. (°C) (without flow, theoretical)		250°C		
Process connection		Dural extension, diam. 18 mm, length 70 mm.		
Output	Type of cable	Extension		
	Cable sheath	PVC, diam.5 mm		
	Max. temperature	105°C		
	Conductors	2 x 0.2 mm², PVC insulation		
	Length Lc (mm)	2,000 mm		

DIAGRAM (MM)



TO ORDER

Thermocouple	Reference
J	P07602313
K	P07602567
T	P07602203

CONNECTIONS

K J T



For any other configuration, please contact us.



TS3
THERMOCOUPLE

CLASS 1 | IEC 584-1 | NF EN 60584-1 | up to 250°C

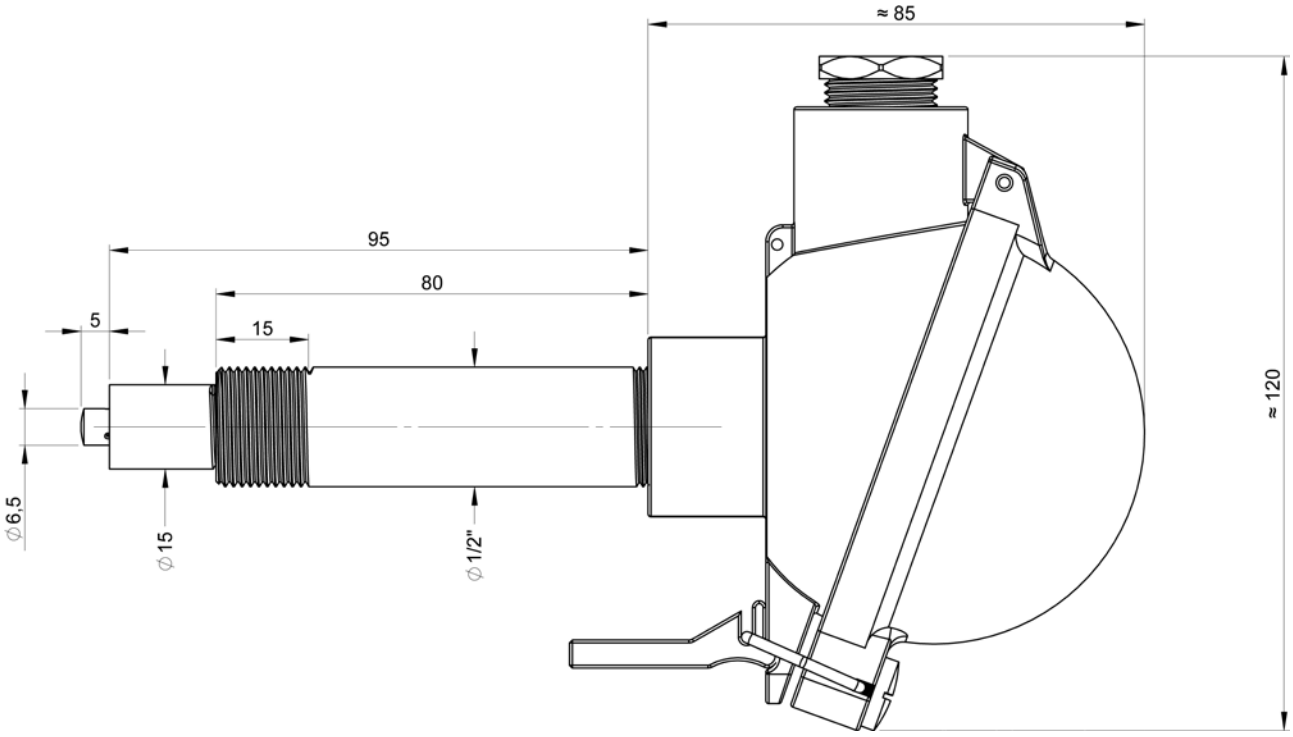
DESCRIPTION

J, K or T thermocouple under brass end-piece with Teflon coating for measurement of moving surface temperatures up to 250°C and a max. linear speed of 5 m/s.

SPECIFICATIONS

Model		TS3		
Compliance with standards		IEC 584-1 / NF EN 60584-1		
Type		J	K	T
Class		1		
Mounting		Brass end-piece, diam. 6.5 mm with compression spring (max. travel 5mm) + Teflon coating diam. 15 mm. Anti-rotation locking of sensing element.		
Hot junction		Insulated		
Max. surface temp. (°C) (without flow, theoretical)		250°C		
Process connection		Dural extension, diam. 21.3 mm, length 80 mm, 1/2"G thread		
Electrical connection	Head type	DAN		
	Material	Light alloy		
	Output	1 cable gland M 20 x 1.5		
	Cable diam.	5.5 mm to 7.5 mm		
	Equipment	Ceramic terminal strip		
	IP	IP54		

DIAGRAM (MM)



TO ORDER

Thermocouple	Reference
J	P07602311
K	P07602565
T	P07602201

CONNECTIONS



For any other configuration, please contact us.

TS1
THERMOCOUPLE



ATEX | NF EN 60584-1 | IEC 584-1 | up to 1150°C

DESCRIPTION

Designed to withstand severe environments, this sensor can be used for accurate measurement of the surface temperature of pipes and thereby deduce the temperature of the fluid flowing in it. This non-intrusive contact temperature sensor is equipped with exclusive technology allowing the sensor's sensing element to be changed without unsoldering the blade-shaped support.

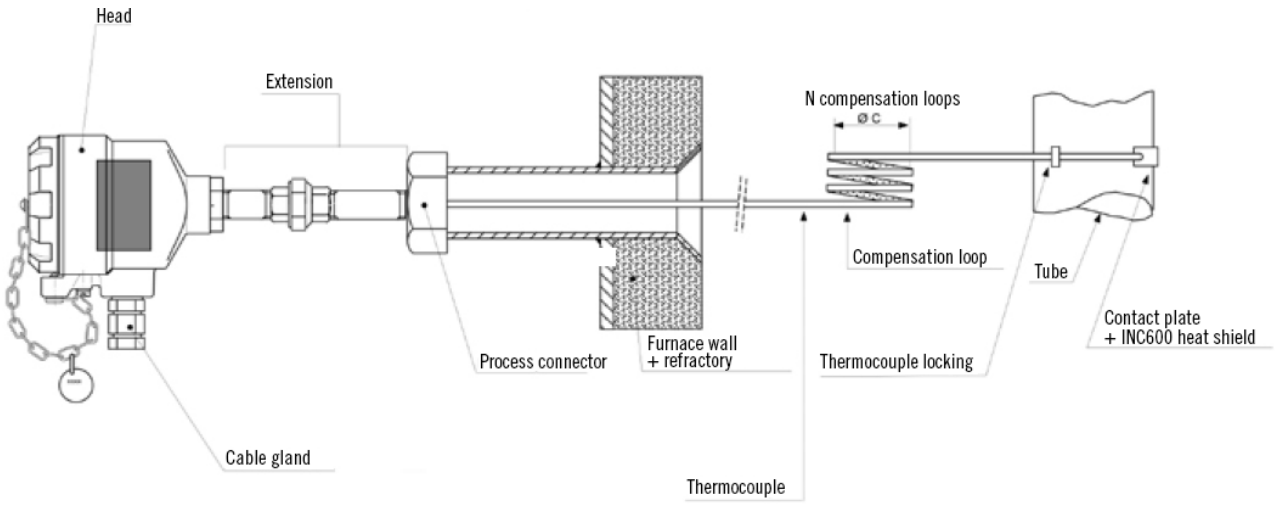
SPECIFICATIONS

Model		TS1
Compliance with standards		IEC 584-1 / NF EN 60584-1
Measurement		By contact
Operating temperature		Up to 1,150°C
Interchangeable measuring element	Sensor type	Type-K thermocouple
	Sheath metal	Inconel 600
	Protective sheath	Ceramic thimble
	Electrical connection	Transmitter 4/20 mA, Hart®
Connecting head	Head	LSX ADF, made of light alloy and epoxy
	Certification	Complies with ATEX, safety d
	Cable gland	ADF ¾ NPT
Extension	Sleeve	Type M , stainless steel 316L and union joint
	Cable gland	ADF ¾ NPT
Set-up on tube	Protection of sensing element	Contact plate + heat shield
	Locking of sensing element	Hasp - Cable guide

FURNACE AND BOILER APPLICATIONS

For furnaces and boilers requiring this type of sensor, we propose removable systems: the thermocouple is not welded to the contact plate to avoid damaging it when the plate is welded to the surface to be measured. The sensors may be ATEX-compliant, so that they can be used directly in gas furnaces, and are equipped with an insulating protective cover to protect the thermocouple from direct flames and insulate it from the ambient temperature to avoid disturbing the surface measurement. Lastly, we can provide compensation loops to prevent breakage of the sensor when the temperature in the furnace is raised: during heating, the compensation loop expands and the expansion pieces are there to avoid the mechanical stresses linked to this procedure. Our teams of experts are at your disposal to help you design your sensor so that it meets your needs.

SCHEMATIC DIAGRAM (MM)

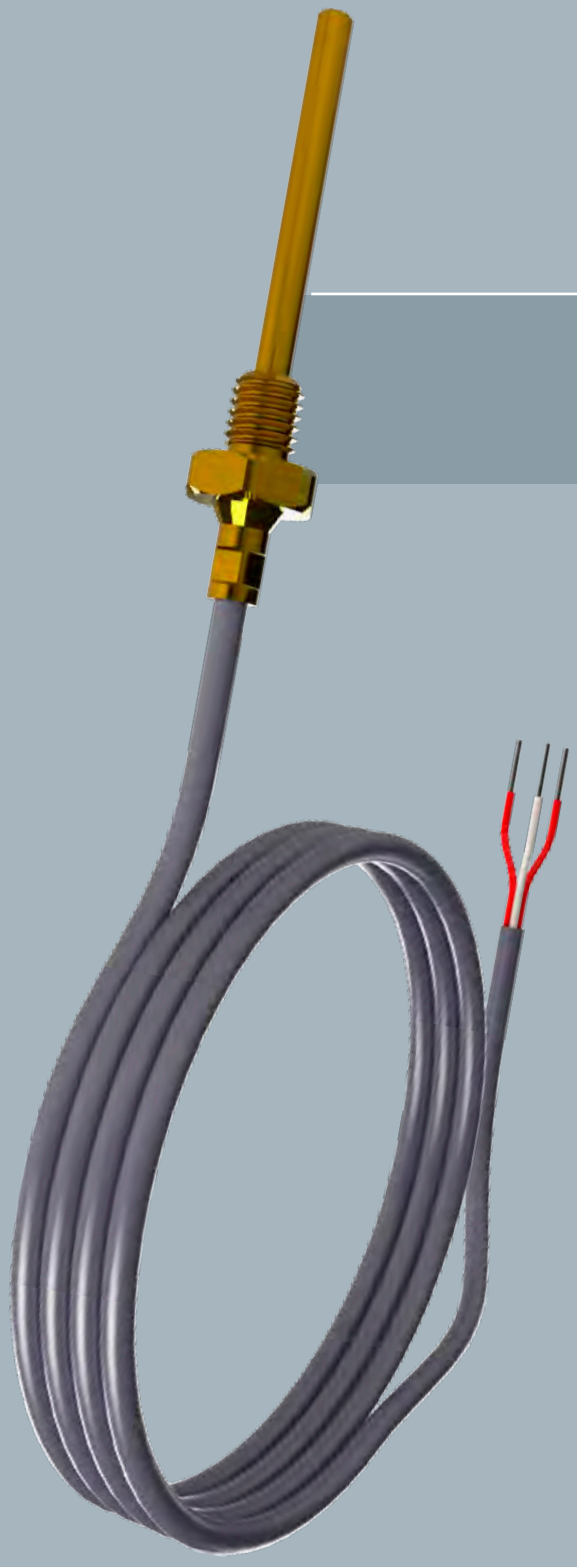


OTHER VERSIONS

Depending on the application, we offer a range of combinations adapted to your requirements, covering the type of measuring element (Type J or N thermocouple), single or duplex mounting, the sheath material (316L, Pyrosil, etc.), the connecting head, etc.

Our R&D team can also develop tailored temperature sensors to match your specifications.

For any other configuration, please contact us.



SA1
Pt100

CLASS A | IEC 60751 | up to 70°C

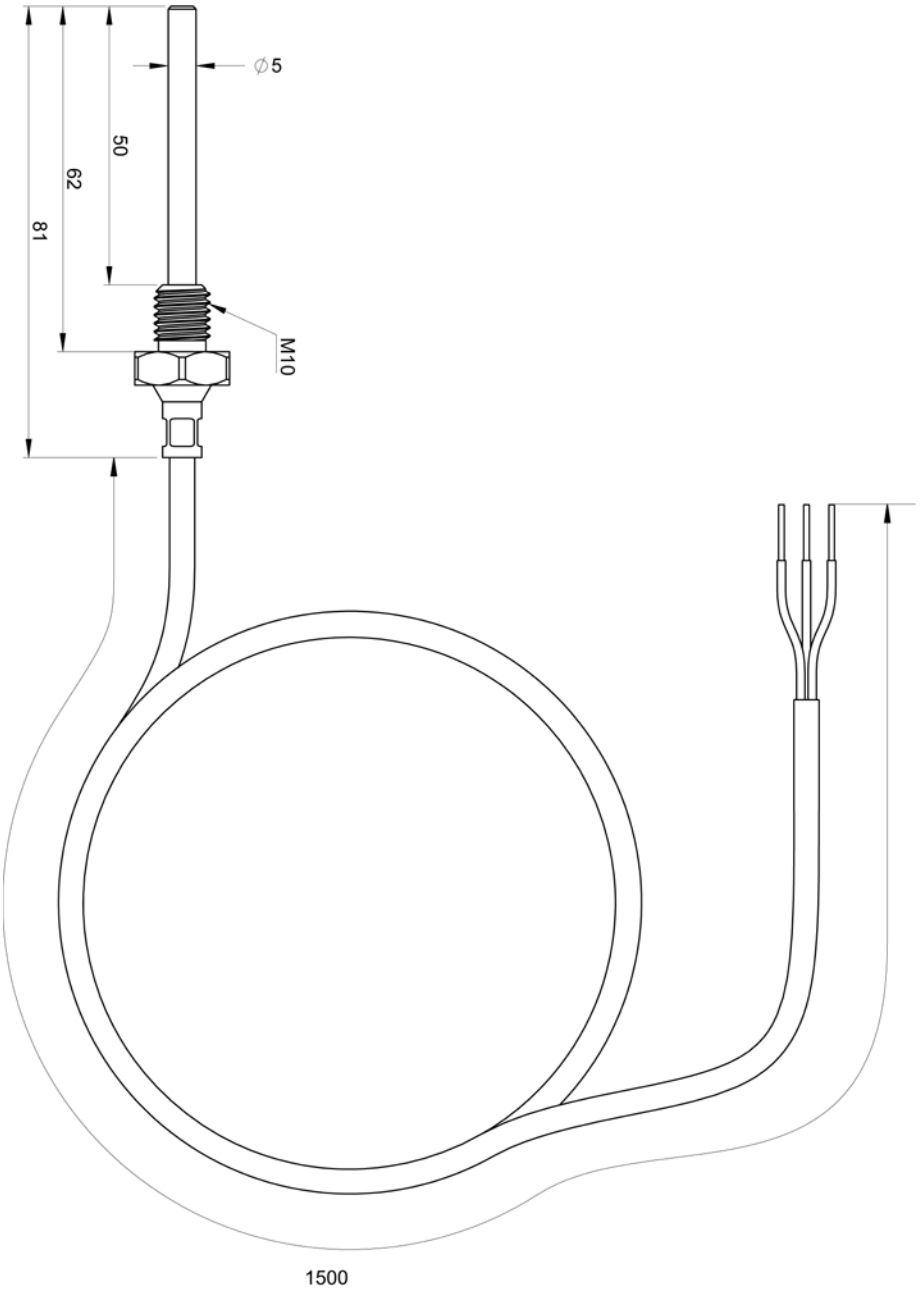
DESCRIPTION

Ambient temperature sensor with cable output.

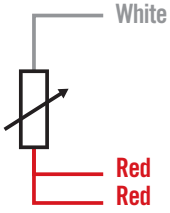
SPECIFICATIONS

Model		SA1
Compliance with standards		IEC 60751
Type		Pt100 Ω
Class		A
Mounting / Construction		1x3 wires
Protective tube	Material	Brass
	Diameter (mm)	5
	Length L (mm)	50
Operating temp. (°C)		-30…+70°C
Output	Sheath	PVC
	Diameter (mm)	4.2 mm
	Max. temperature	105°C
	Conductors	3 x 0.22 mm²
	Length L (mm)	2,000
	Termination	Insulated bare wires
Fastening		Fitting M10x1.5

DIAGRAM (MM)



CONNECTIONS



TO ORDER

Model	Reference
SA1	L919254-001

For any other configuration, please contact us.

SA2
Pt100



CLASS A | IEC 60751 | up to 70°C | WALL MOUNTING

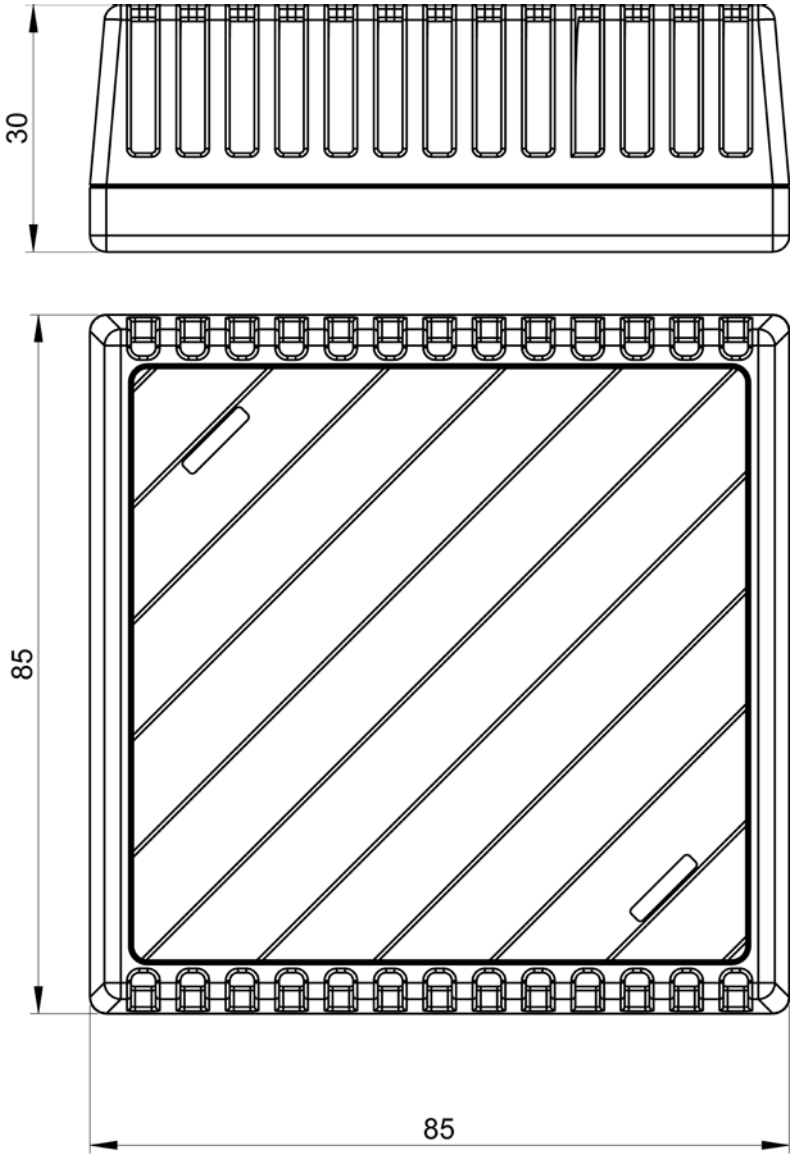
DESCRIPTION

Ambient temperature sensor in wall-mounted box for indoor use.

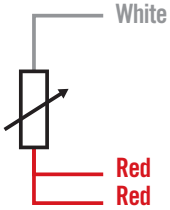
SPECIFICATIONS

Model		SA2
Compliance with standards		IEC 60751
Type		Pt100 Ω
Class		A
Mounting / Construction		1x3 wires
Operating temp. (°C)		-30…+70°C
Casing	Material	Plastic
	Dimensions (Lxwxd) (mm)	85 x 85 x 30 mm
	Connection	Screw terminal strip
	Fastening	Wall-mounting
	Option	Version with transmitter, 4-20mA output (scale: -30°C / +70°C)

DIAGRAM (MM)



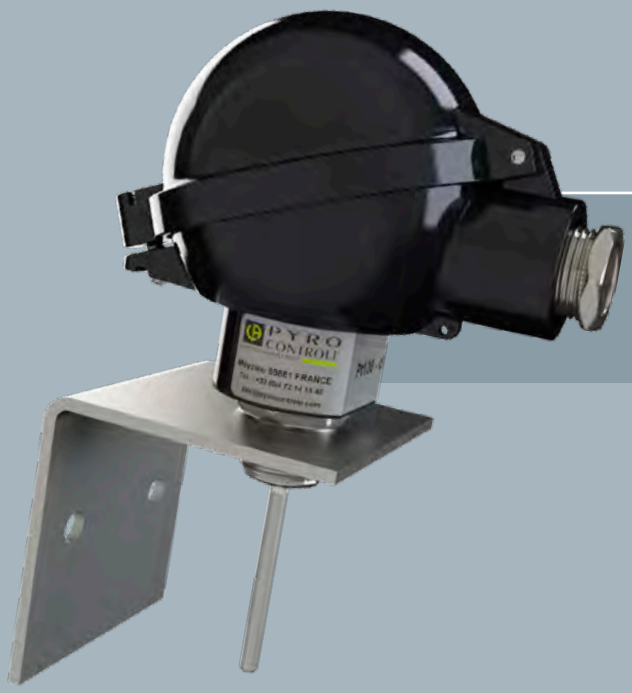
CONNECTIONS



TO ORDER

	Reference
Without transmitter	L915461-000
With transmitter	L918856-001

For any other configuration, please contact us.



SA3

Pt100

CLASS A | IEC 60751 | IP 65 | up to 70°C

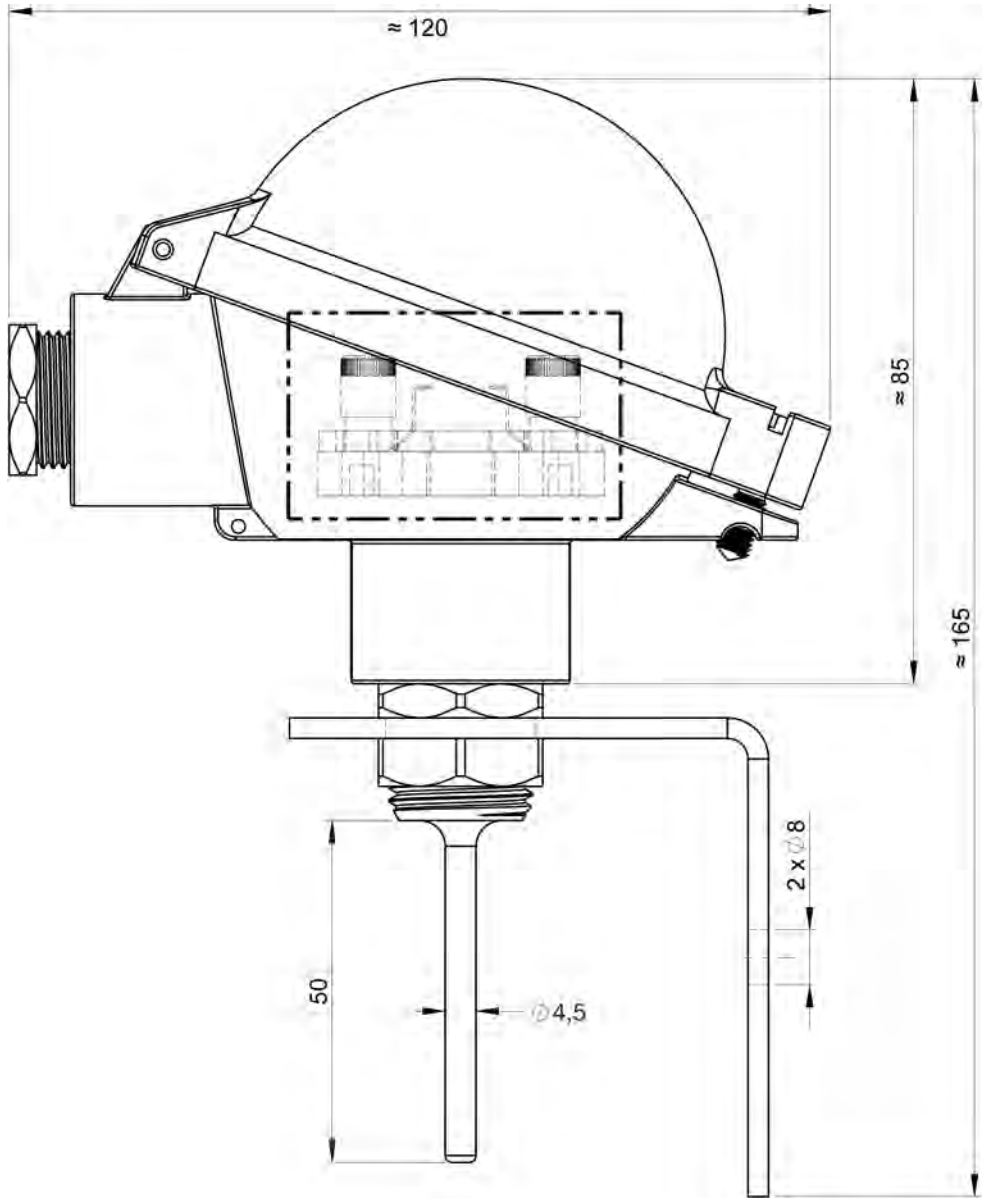
DESCRIPTION

Ambient temperature sensor in IP65 head for outdoor use.

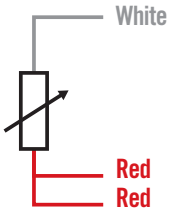
SPECIFICATIONS

Model		SA3
Compliance with standards		IEC 60751
Type		Pt100 Ω
Class		A
Mounting / Construction		1x3 wires
Operating temp. (°C)		-30…+70°C
Protective tube	Material	Stainless steel 316L
	Diameter (mm)	4.5mm
	Length L (mm)	50 mm
Head	Type	DAN-V, light alloy, IP65
	Output	Cable gland M20x1.5
	Connection	Ceramic terminal strip, 3 wires
	Fastening	Wall-mounting with stainless-steel bracket with 2 holes 8 mm in diameter
	Option	Version with transmitter, 4-20mA output (scale: -30°C / +70°C)

DIAGRAM (MM)



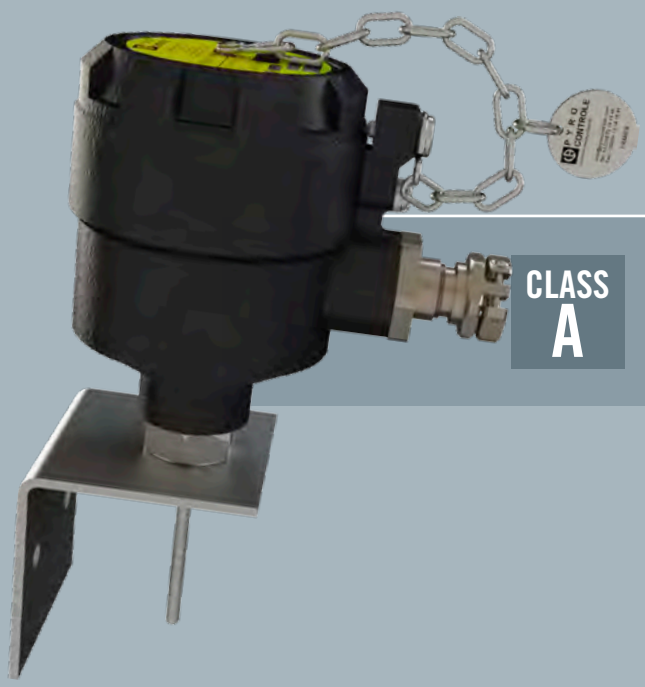
CONNECTIONS



TO ORDER

	Reference
Without transmitter	L915461-000
With transmitter	L918856-001

For any other configuration, please contact us.



SA4

Pt100

CLASS A | IEC 60751 | IP 65 | ADF | up to 70°C

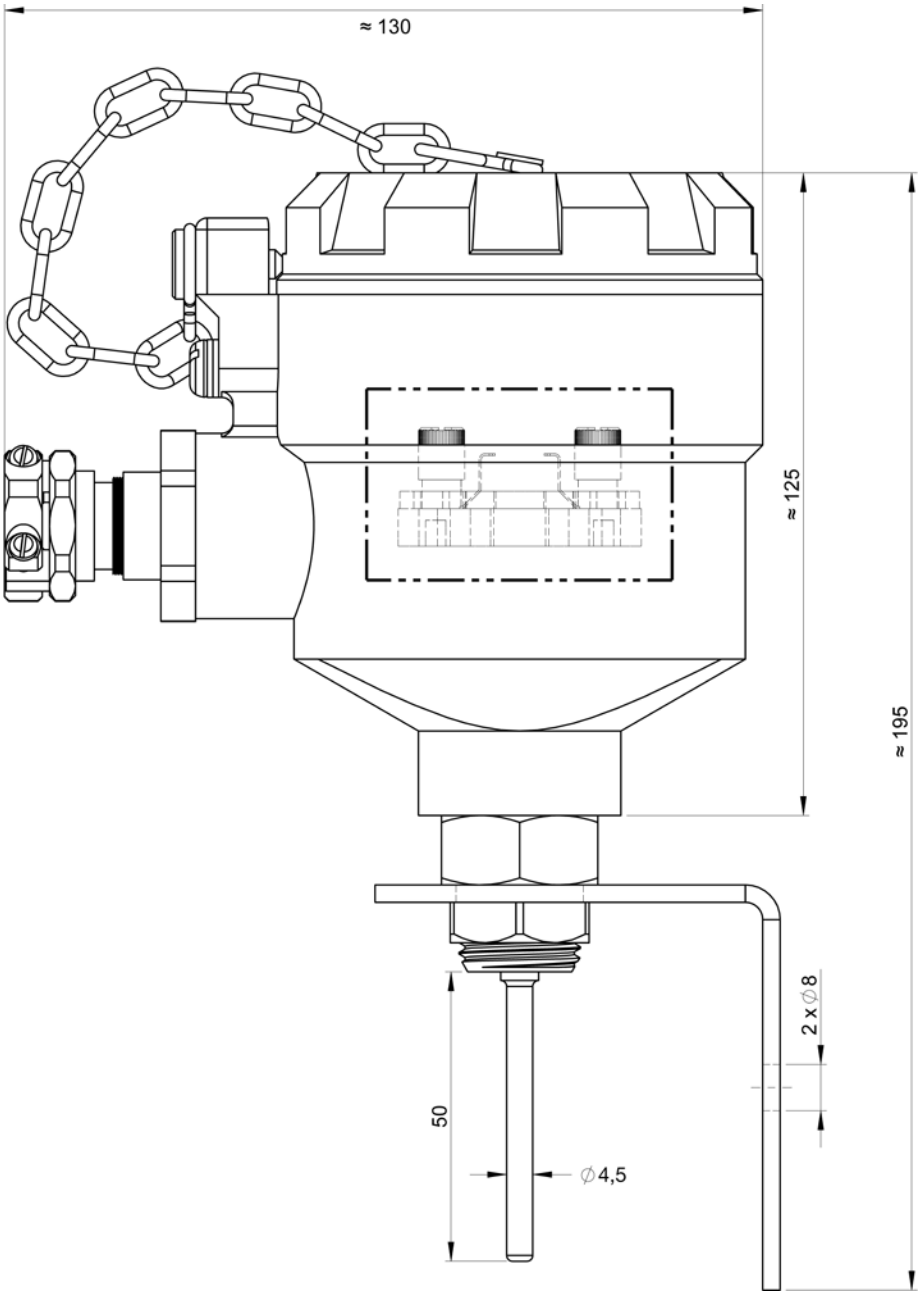
DESCRIPTION

Ambient temperature sensor in IP65 head for outdoor use.

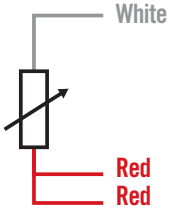
SPECIFICATIONS

Model		SA4
Compliance with standards		IEC 60751 / EN 60079-0 : 2012 + A11:2013
Marking as per directive 2014/34/EU		Ex II 2 GD - Ex db IIC T6 Gb Ex tb IIIC T85°C Db IP.6X Do not open when live. Do not open in dusty atmospheres
CE type inspection certificate		LCIE 15ATEX3007 X IECEx LCIE 15.0015 X
Type		Pt100 Ω
Class		A
Mounting / Construction		1 x 3 wires
Operating temp. (°C)		-30…+70°C
Protective tube	Material	Stainless steel 316L
	Diameter (mm)	4.5mm
	Length L (mm)	50 mm
Head	Type	PSX, light alloy, IP65
	Output	Cable gland ATEX M 20 x 1.5
	Connection	Ceramic terminal strip, 3 wires
	Fastening	Wall-mounting with stainless-steel bracket with 2 holes 8 mm in diameter
	Option	Version with transmitter, output 4-20mA (scale: -30°C / +70°C)

DIAGRAM (MM)



CONNECTIONS

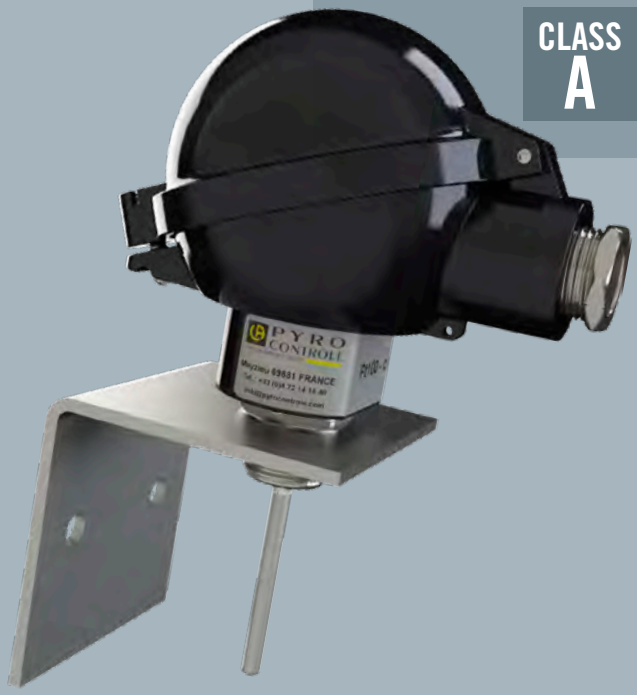


TO ORDER

	Reference
Without transmitter	L915461-000
With transmitter	L918856-001

For any other configuration, please contact us.

SA5
Pt100



CLASS A | IEC 60751 | IP 65 | WALL MOUNTING | INTRINSIC SAFETY | up to 70°C

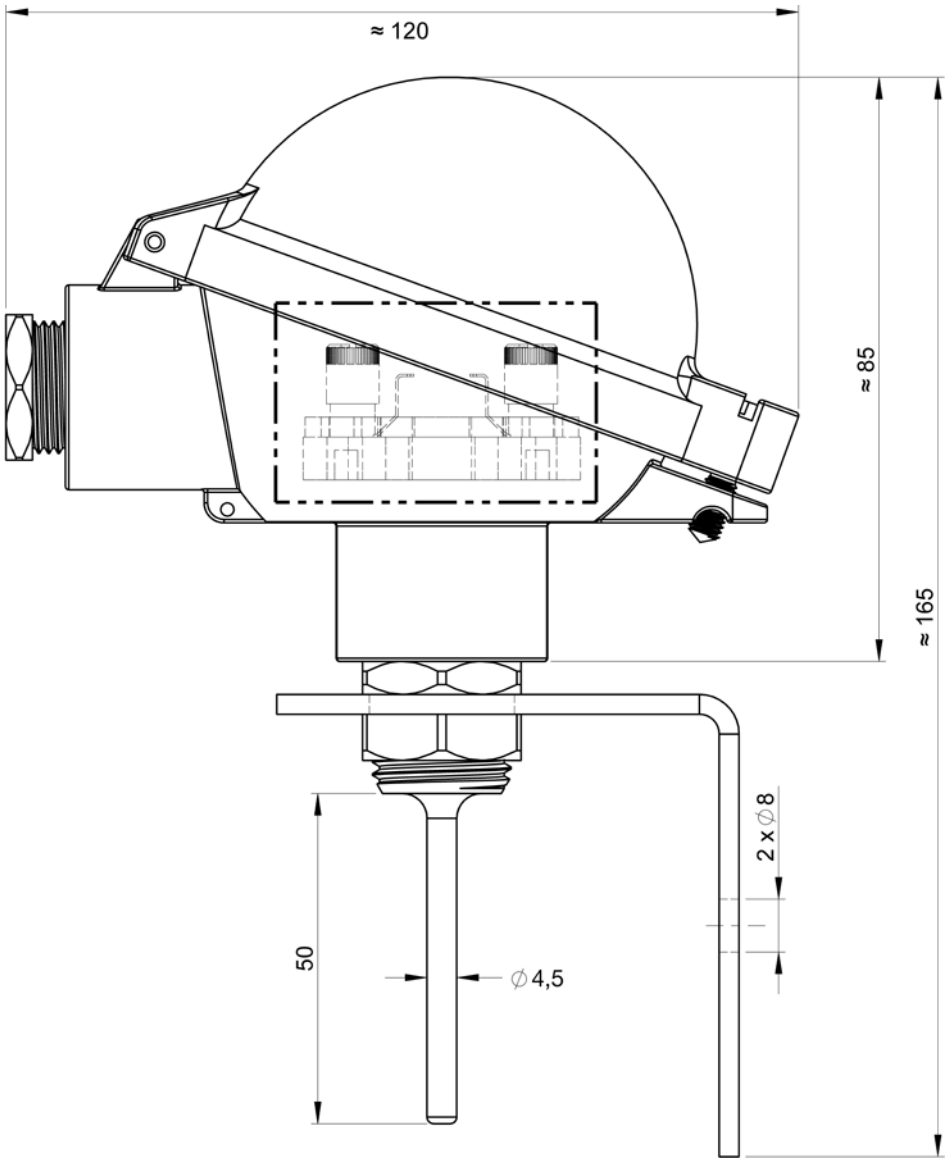
DESCRIPTION

Ambient temperature sensor in ATEX (Ex ia) IP65 head for indoor/outdoor use and use in presence of explosive atmospheres.

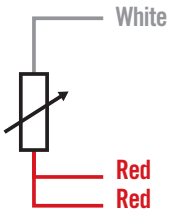
SPECIFICATIONS

Model		SA5
Compliance with standards		IEC 60751 / EN 60079-0 : 2012 + A11:2013
Marking as per directive 2014/34/EU		Ex II 1 GD Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da
CE type inspection certificate		LCIE 15ATEX3007 X IECEx LCIE 15.0015 X
Type		Pt100 Ω
Class		A
Mounting / Construction		1 x 3 wires
Operating temp. (°C)		-30…+70°C
Protective tube	Material	Stainless steel 316L
	Diameter (mm)	4.5mm
	Length L (mm)	50 mm
Head	Type	DAN-Vi, light alloy, IP65
	Output	Cable gland ATEX M 20 x 1.5
	Connection	Ceramic terminal strip, 3 wires
	Fastening	Wall-mounting with stainless-steel bracket with 2 holes 8 mm in diameter
	Option	Version with transmitter, output 4-20mA (scale: -30°C / +70°C)

DIAGRAM (MM)



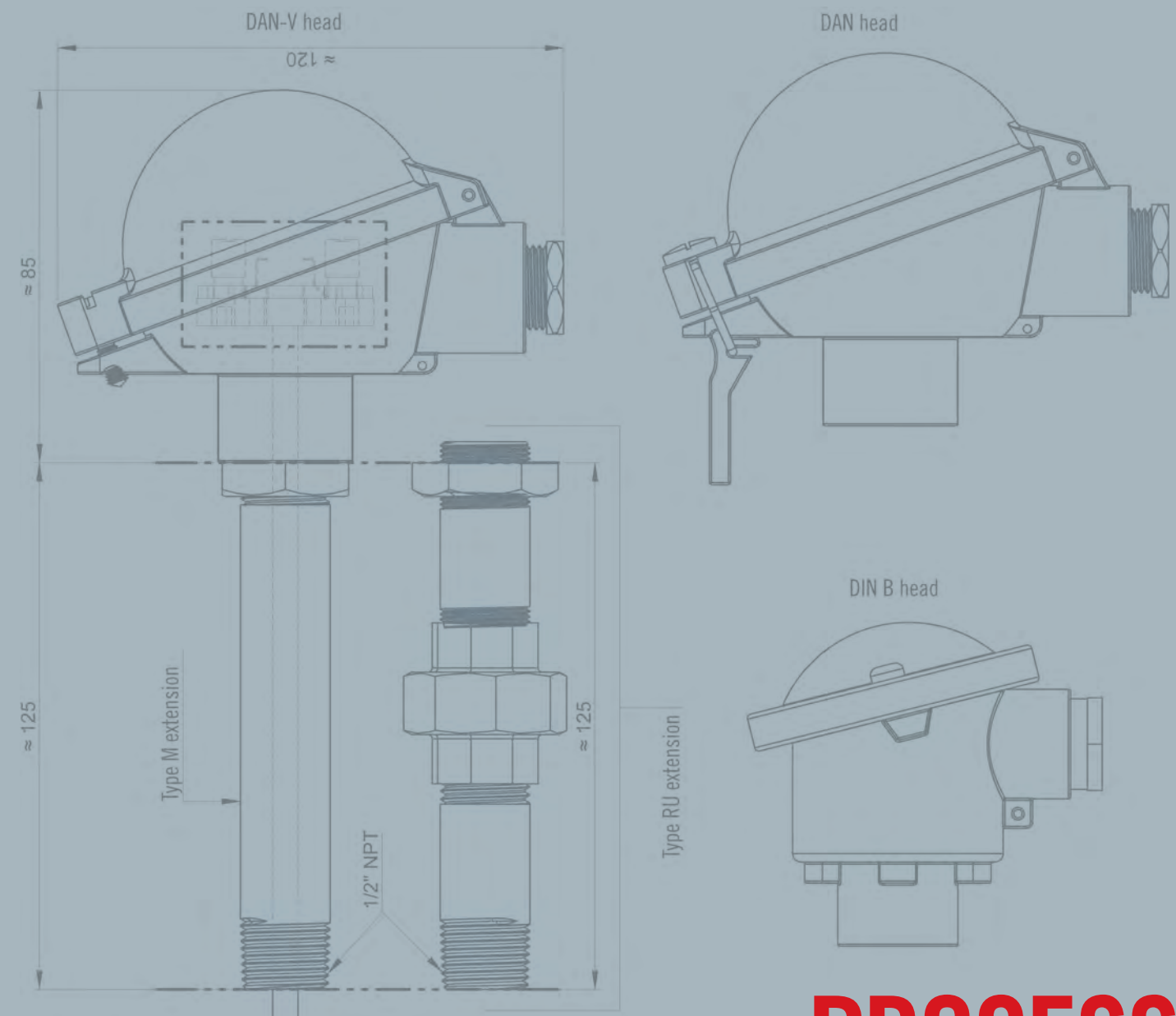
CONNECTIONS



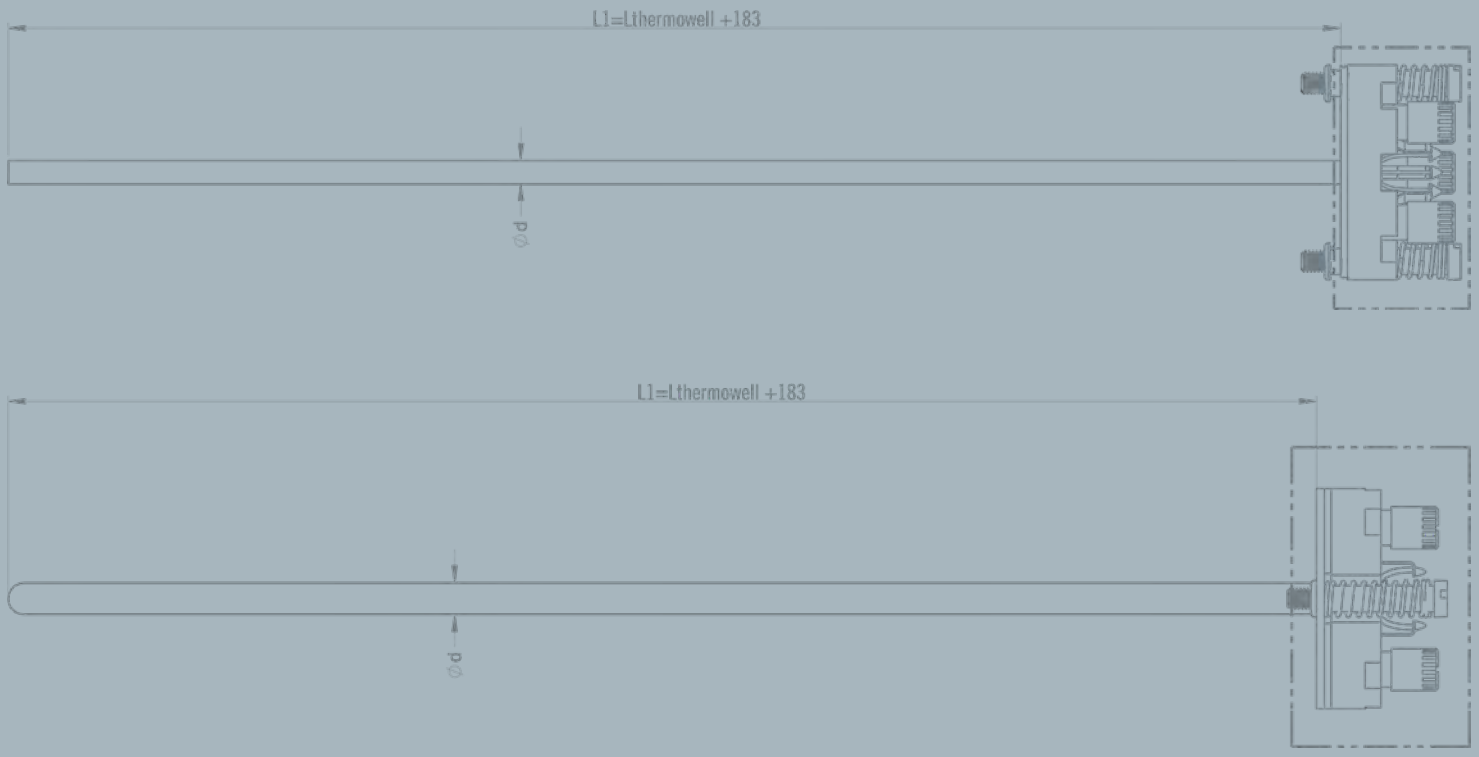
TO ORDER

	Reference
Without transmitter	L915461-000
With transmitter	L918856-001

For any other configuration, please contact us.



PROCESS SENSORS WITH INTERCHANGEABLE ELEMENTS

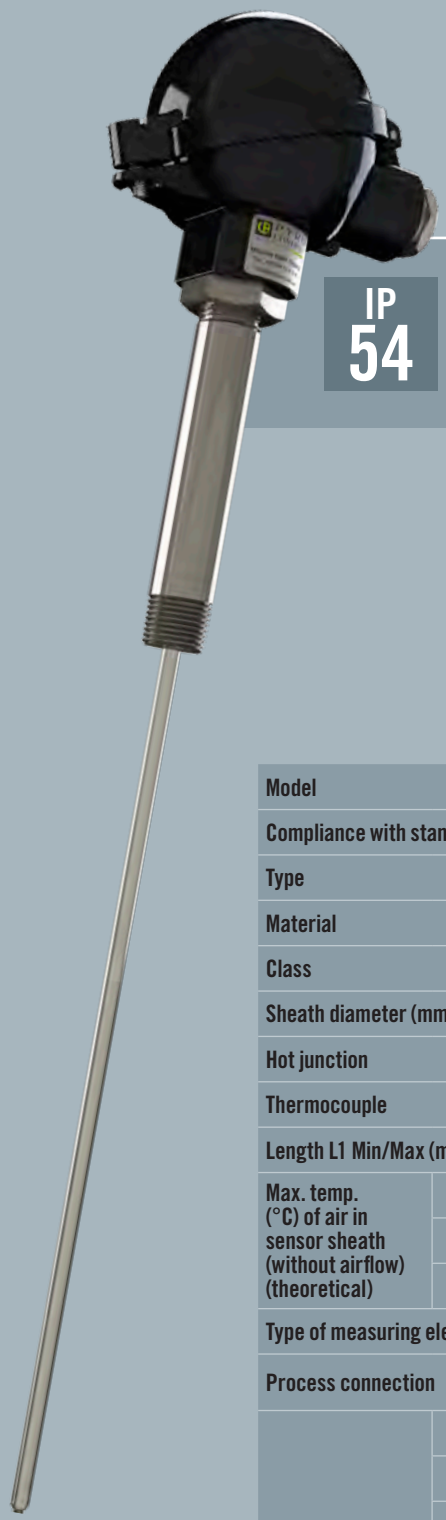


TPS: THERMOCOUPLE 174

SPS: Pt100 176

DG / TG: INTERCHANGEABLE THERMOCOUPLE ELEMENTS 178

DS / TS: INTERCHANGEABLE PT100 ELEMENTS 180



TPS
THERMOCOUPLE

IP 54 | IP 65 | CLASS 1 | IEC 584-1 | SINGLE OR DUPLEX | up to 1150°C

DESCRIPTION

Process sensor for non-hazardous zones, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		TPS				
Compliance with standards		IEC 584-1 / NF EN 60584-1				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		1	1	
Sheath diameter (mm)		4.5 - 6 - 8				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L1 Min/Max (mm)		120 to 1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Type of measuring element		DG… / TG…				
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: 1/2"NPT. Stainless steel.				
Output	Head type	DAN		DAN-V	DIN B	
	Material	Light alloy				
	Output	1 cable gland M20x1.5				
	Cable diam.	5.5 to 7.5 mm				
	Equipment	Ceramic terminal strip (standard) or Transmitter				
	IP	IP54		IP65	IP54	
Accessories (p. 338)		Measuring element, thermowell, cable gland				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC TYPE	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	HOT JUNCTION	EXTENSION	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
TPS	DIB	1T	AC	6	1,000	I	M	A	0/150
Reference in table and diagram	1	2	3	4	5		6	7	
Possible choice	DAN: DAN DAN-V: DAV DIN B: DIB	1T 1J 1K 1N 2K 2J	316L: AC INCONEL 600: CM PYROSIL: DB	4.5 6 8	120 to 1,500 mm	Insulated: I (standard) Earthed: M	Type M: M Type RU: R	LC5334A-100: A LC5331A-321: B LC5335A-100: C	

TABLE OF POSSIBLE ASSOCIATIONS

2 Class 1 thermocouple type	Sheath diameter (mm) 6	8 (4)
T (class2)	316L	316L
J	316L	316L
K	INCONEL600	INCONEL600
N	INCONEL600	- (3)
	PYROSIL	PYROSIL
2J	316L	316L
2K	INCONEL600	INCONEL600

TRANSMITTER INFORMATION

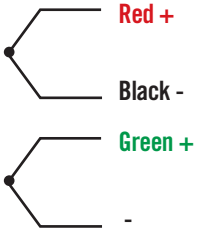
(7)

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

Not compatible with duplex version

CONNECTION ON TERMINAL STRIP

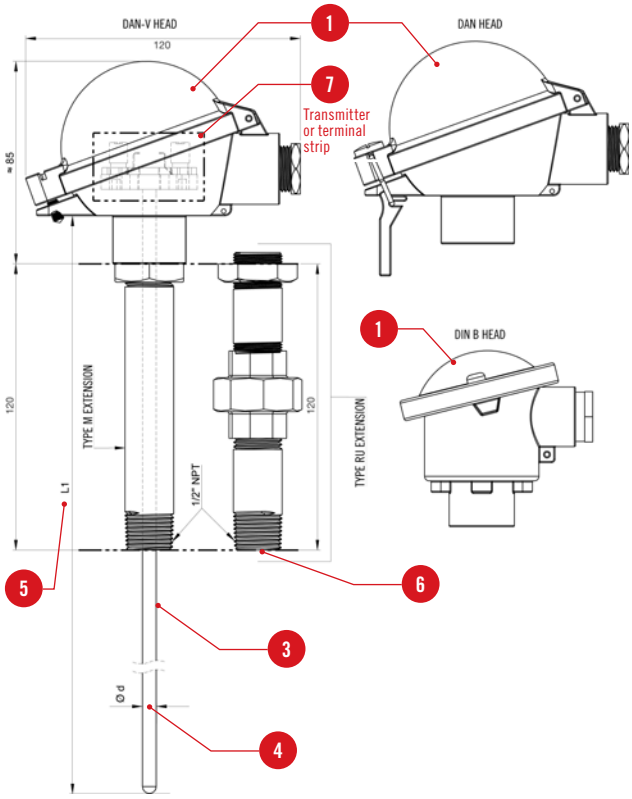
Duplex thermocouple



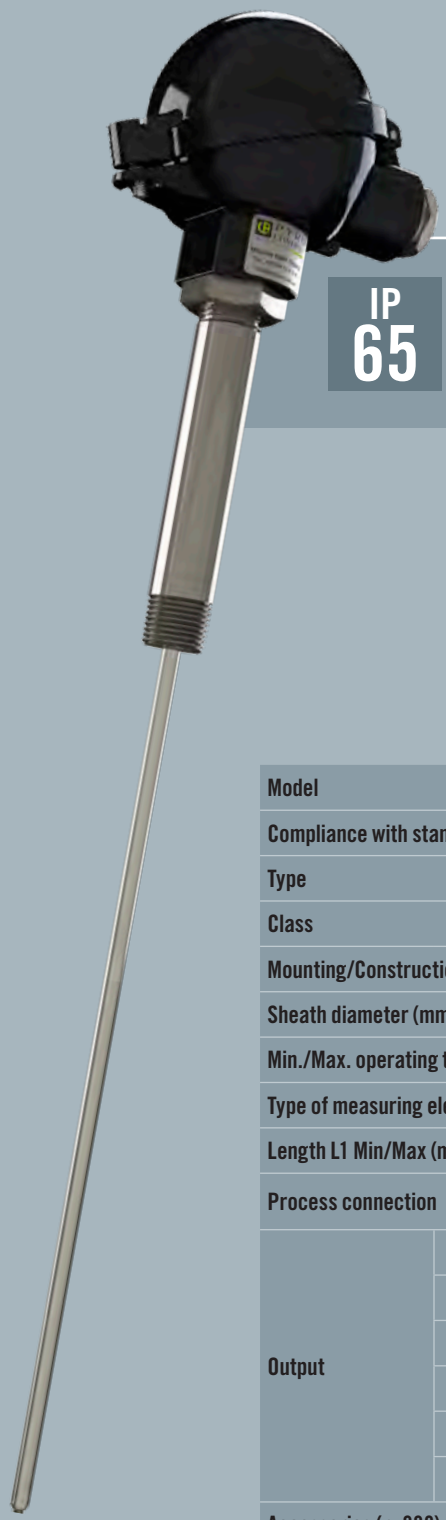
Single thermocouple



DIAGRAM (MM)



For any other configuration, please contact us.



SPS

Pt100

IP 65 | IP 54 | CLASS A | IEC 60751 | SINGLE OR DUPLEX | up to 600°C

DESCRIPTION

Process sensor for non-hazardous zones, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		SPS		
Compliance with standards		IEC 60751		
Type		Pt100		
Class		A: up to 450°C - B: from 450°C to 600°C		
Mounting/Construction		1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires		
Sheath diameter (mm)		4.5 - 6 - 8		
Min./Max. operating temp. (°C)		-40…+600°C		
Type of measuring element		DS… / TS…		
Length L1 Min/Max (mm)		120 to 1,500		
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: 1/2"NPT. Stainless steel.		
Output	Head type	DAN	DAN-V	DIN B
	Material	Light alloy		
	Output	1 cable gland M20x1.5		
	Cable diam.	5.5 to 7.5 mm		
	Equipment	Ceramic terminal strip (standard) or Transmitter		
	IP	IP54	IP65	IP54
Accessories (p. 338)		Measuring element, thermowell, cable gland		

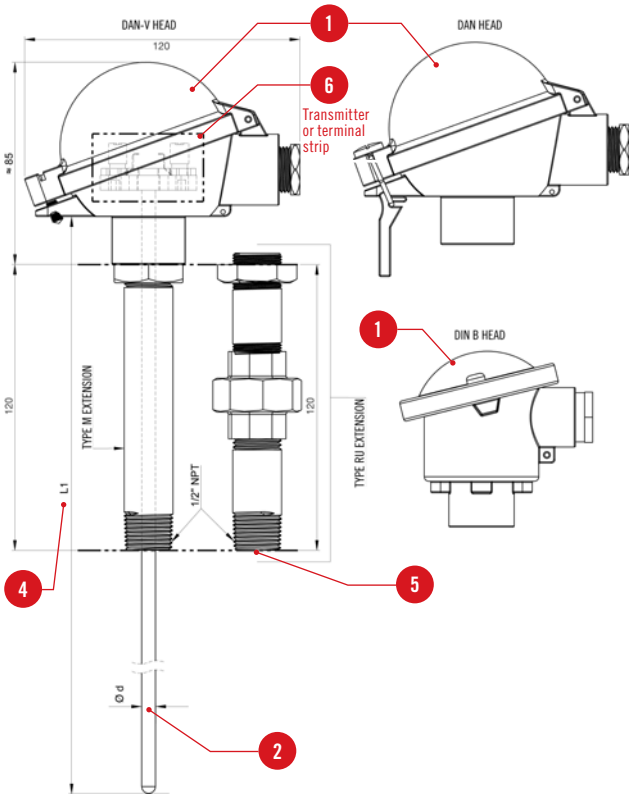
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	DIAMETER (mm)	MOUNTING	LENGTH L1 (mm)	EXTENSION	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
SPS	DAV	6	B	890	R	C	0/150
Reference in table and DIAGRAM (MM)	1	2	3	4	5	6	
Possible choice	DAN: DAN DAN-V: DAV DIN B: DIB	4.5 6 8	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	120 to 1,500 mm	Type M: M Type RU: R	LC5333A-100: D LC5331A-321: B LC5335A-100: C	

DIAGRAM (MM)



TRANSMITTER INFORMATION

6

Transmitter			
Input	Output	Galvanic insulation	Reference
Pt100	4-20mA	NONE	LC5333A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

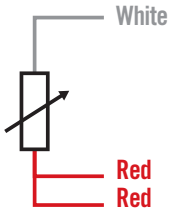
Not compatible with duplex version

For any other configuration, please contact us.

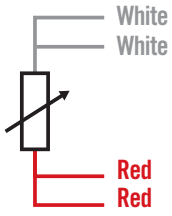
CONNECTIONS

3

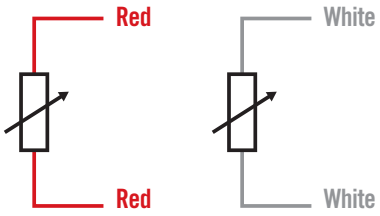
Connection 1 Pt100 Ω
1x3 wires



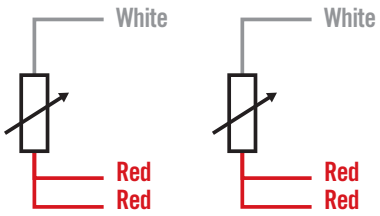
Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



Connection 2 Pt100 Ω
2x3 wires





DG/TG
THERMOCOUPLE

CLASS 1 | IEC 584-1 | SINGLE OR DUPLEX | up to 1150°C

DESCRIPTION

Interchangeable thermocouple element for use in TPS sensors. Equipped with support springs for anti-vibration mounting.

SPECIFICATIONS

Model		DG... / TG...				
Compliance with standards		IEC 584-1 / NF EN 60584-1				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		1	1	
Sheath diameter (mm)		4.5 - 6 - 8				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L1 Min/Max (mm)		120 to 1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1100°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

	TYPE OF TERMINAL STRIP	ELEMENT TYPE		DIAMETER (mm)		TC TYPE		SHEATH TYPE		LENGTH L1 (MM)		HOT JUNCTION	OPTION TRANSMITTER		TRANSMITTER SCALE
	T	G1	-	6	-	K	-	AC	-	800	-	I	N	-	-
Reference in table and DIAGRAM (MM)	1			2		3		4		5			6		
Possible choice	DIN ceramic terminal strip: D Socket for integrated transmitter: T	Single thermocouple: G1 Duplex thermocouple: G2		4.5 6 8		K J T N		316L: AC INCONEL 600: CM PYROSIL: DB		120 to 1,500 mm		Insulated: I (standard) Earthed: M	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C WITHOUT : N* *Socket delivered with wires unconnected (85 mm) without terminal strip or transmitter		

DIAGRAM (MM)

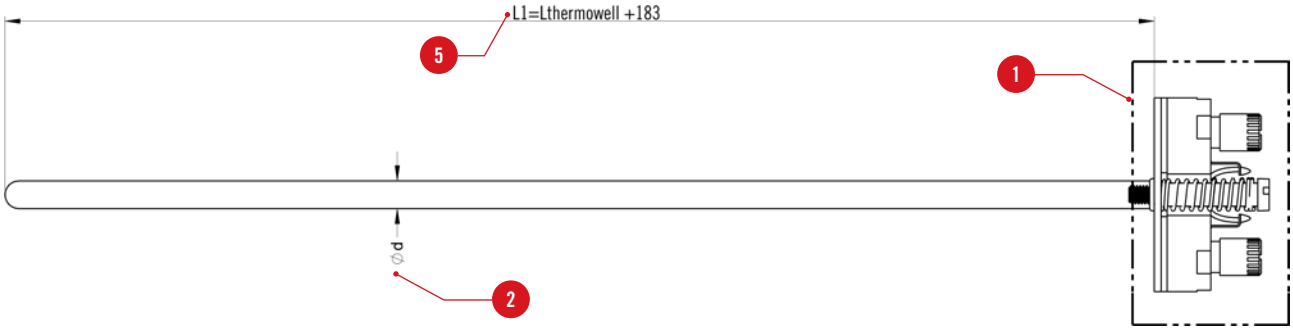


TABLE OF POSSIBLE ASSOCIATIONS

3 Class 1 thermocouple type	Sheath diameter (mm) 6	8 (2)
T (class 2)	316L	316L
J	316L	316L
K	INCONEL600	INCONEL600
N	INCONEL600	-
	PYROSIL	PYROSIL
2J	316L	316L
2K	INCONEL600	INCONEL600

4

TRANSMITTER INFORMATION

6

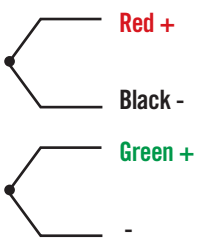
Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

Not compatible with duplex version

For any other configuration, please contact us.

CONNECTION

Duplex thermocouple



Single thermocouple





DS/TS

Pt100

CLASS A | IEC 60751 | SINGLE OR DUPLEX | up to 600°C

DESCRIPTION

Interchangeable Pt100 element for use in TPS/SPS sensors. Equipped with support springs for anti-vibration mounting.

SPECIFICATIONS

Model	DS... / TS...
Compliance with standards	IEC 60751
Type	Pt100
Class	A: up to 450°C - B: from 450°C to 600°C
Mounting/Construction	1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires
Sheath diameter (mm)	4.5 - 6 - 8
Min./Max. operating temp. (°C)	-40...+450°C
Sheath material	316L
Length L1 Max (mm)	1,500

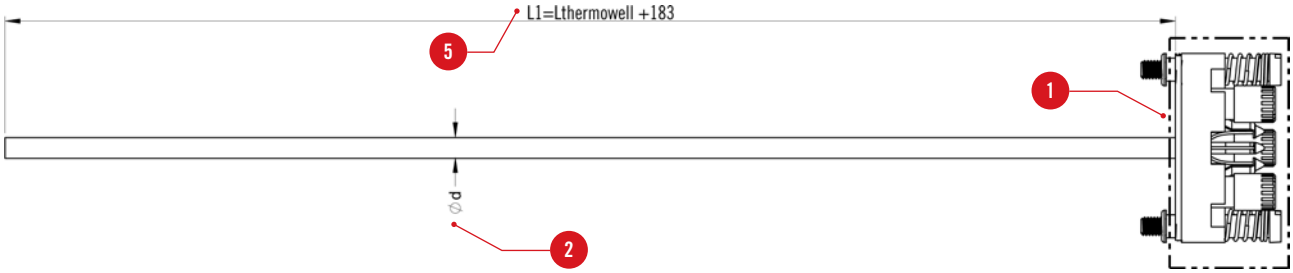
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

	TYPE OF TERMINAL STRIP		ELEMENT TYPE		Ø (mm)	MOUNTING	LENGTH L1 (mm)	EN OPTION TRANSMITTER	EN OPTION TRANSMITTER SCALE
	D	-	S1	-	8	4	900	A	0/150
Reference in table and DIAGRAM (MM)	1		2		3	4	5	6	
Possible choice	DIN ceramic terminal strip: D Socket for integrated transmitter: T		Single Pt100: S1 Duplex Pt100: S2		4.5 6 8	2x2 wires: 2 1x3 or 2x3 wires: 3 1x4 wires: 4	Max. 1,500 mm	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C WITHOUT : N* *Socket delivered with wires unconnected (85 mm) without terminal strip or transmitter	

DIAGRAM (MM)



TRANSMITTER INFORMATION

6

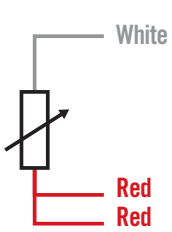
Transmitter			
Input	Output	Galvanic insulation	Reference
Pt100	4-20mA	NONE	LC5333A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

Not compatible with duplex version

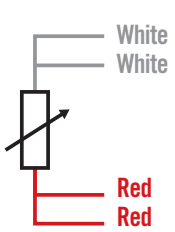
CONNECTIONS

2 4

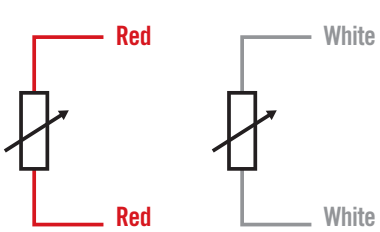
Connection 1 Pt100 Ω 1x3 wires



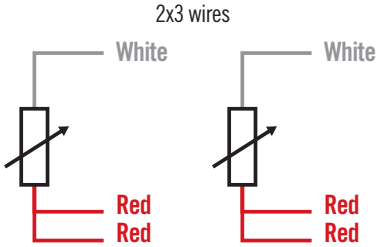
Connection 1 Pt100 Ω 1x4 wires



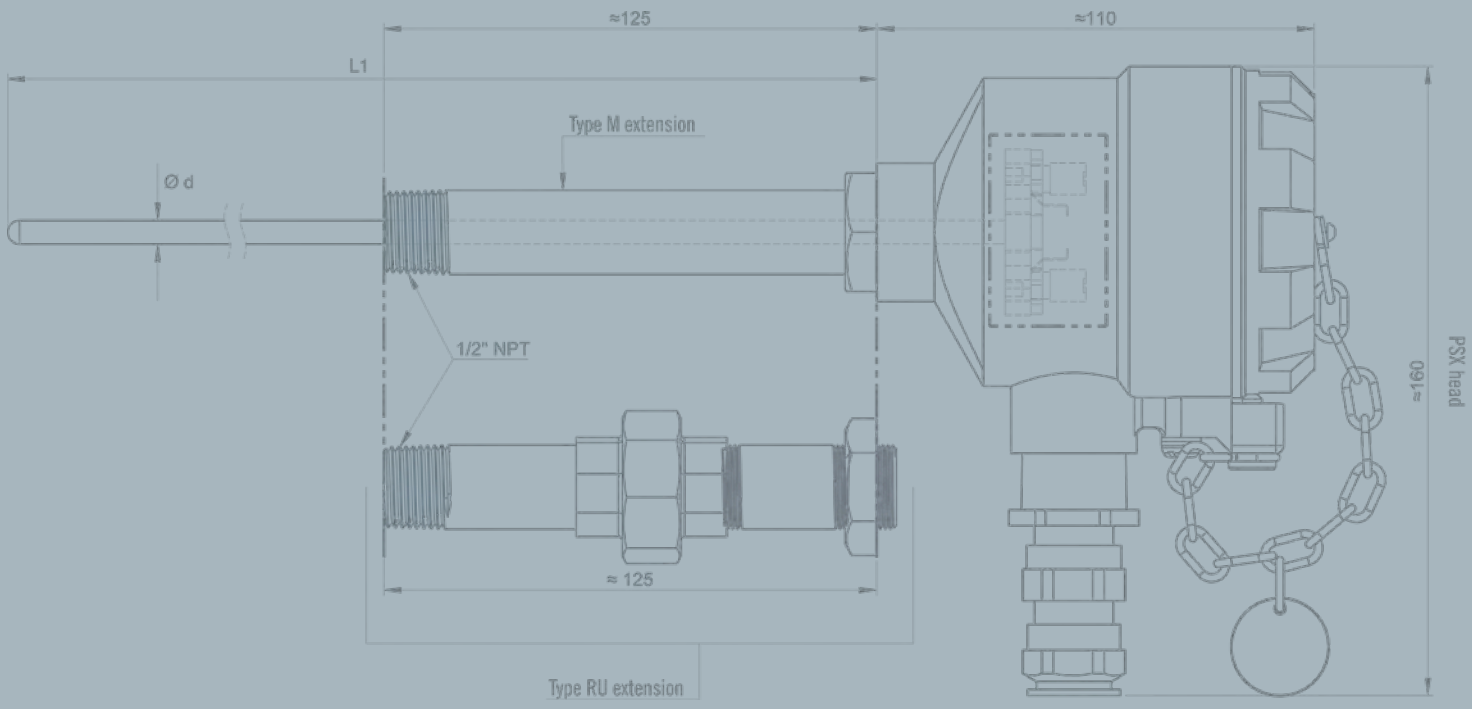
Connection 2 Pt100 Ω 2x2 wires

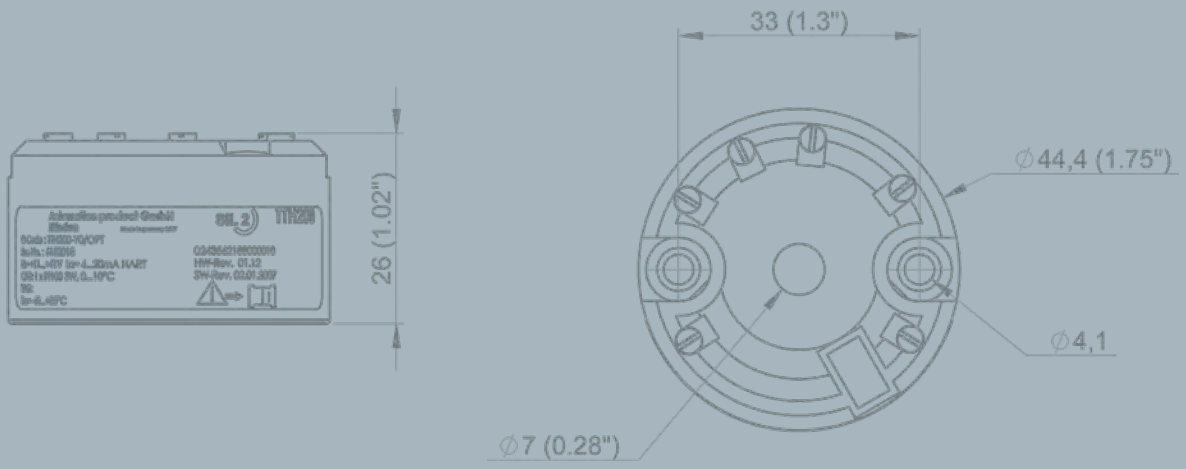


Connection 2 Pt100 Ω 2x3 wires

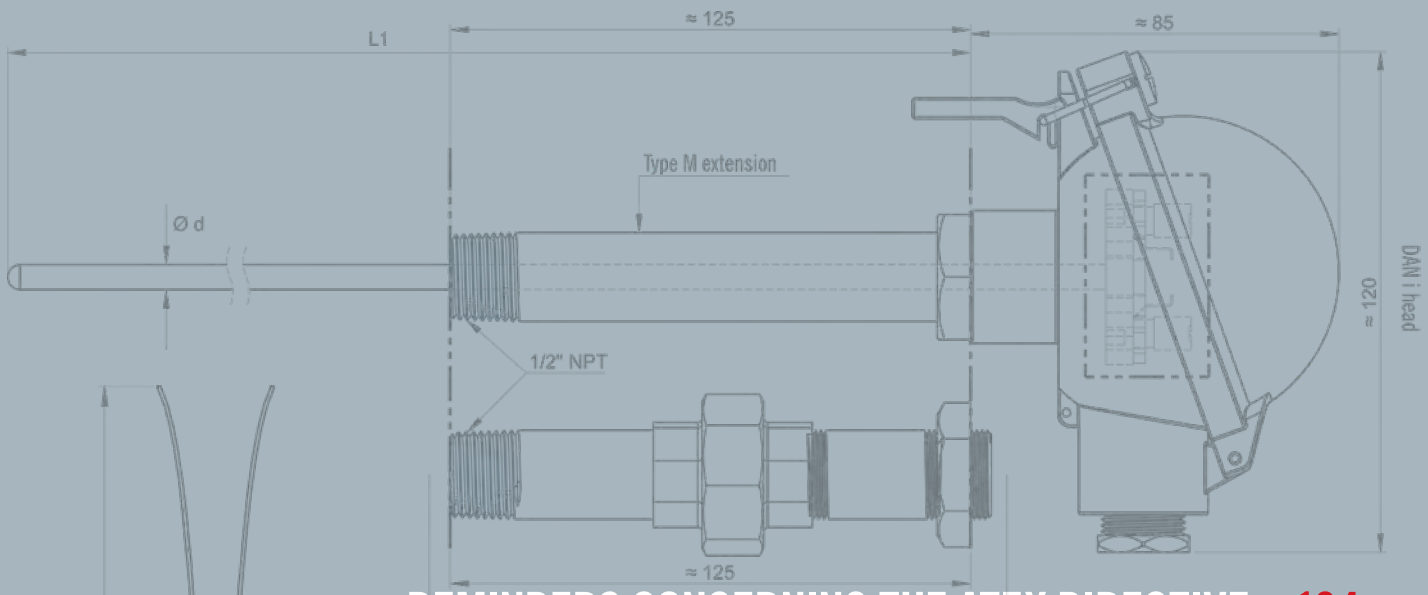


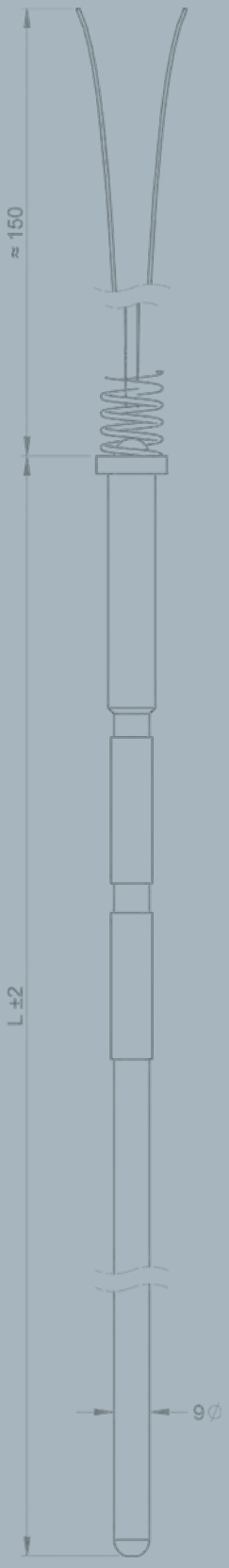
For any other configuration, please contact us.





SENSORS FOR EXPLOSIVE ATMOSPHERES





REMINDERS CONCERNING THE ATEX DIRECTIVE 184

"PRESSURE EQUIPMENT" DIRECTIVE 188

OPERATING SAFETY (SIL) 188

CONFIGURE YOUR ATEX SENSORS 192

GAS ENVIRONMENT 190

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- ID50 : COMPLETE ASSEMBLED SENSOR 194
- ID50 : ACCESSORIES 196
- TA1G : IP54/IP65 TC SENSOR 208
- TAX41G : IP67 TC SENSOR 210
- SA1G: IP54/IP65 PT100 SENSOR 212
- SAX41G : IP67 PT100 SENSOR 214
- TCG3I: PVC CABLE OUTPUT TC 216
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B - ZONES 1, 2 - ATEX D
- ID50 : CONFIGURABLE SENSOR 222
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- SAX42G : IP67 PT100 SENSOR 238

DUST ENVIRONMENT 240

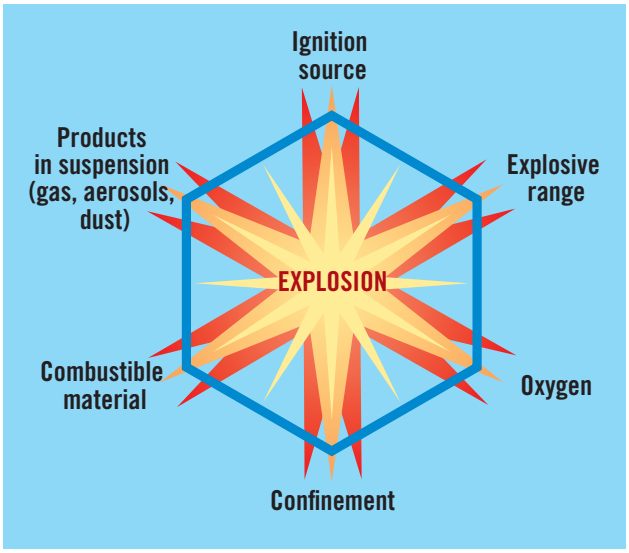
A - ZONES 20, 21, 22 - ATEX IA
- TA1D : IP65 TC SENSOR 242
- TAX41D : IP67 TC SENSOR 244
- SA1D : IP65 PT100 SENSOR 246
- SAX41D : IP67 PT100 SENSOR 248
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- TAX42D : IP67 TC SENSOR 262
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- SAX42D : P67 PT100 SENSOR 268

THE ATEX 2014/34/EU DIRECTIVE



An explosive atmosphere (**ATEX**) is a mixture, in atmospheric conditions, of inflammable substances in gas, vapour or dust form with air, in which, after inflammation, combustion propagates to the whole of the unburned mixture.



Directive 2014/34/EU, which is a revision of directive 94/9/CE, was published in the official bulletin of the European Union on 29th March 2014. It has been mandatory since 20th April 2016. The texts for transposition into French law have been published:

- Decree no. 2015-799 of 1st July 2015 concerning hazardous products and equipment
- Decree of 1st July 2015 concerning organizations authorized to perform conformity assessments and in-service monitoring operations on hazardous products and equipment

Directive 2014/34/EU applies equally to electrical and mechanical equipment. It explicitly covers the instruments and protective systems used in an ATEX atmosphere, as well as the safety, control and adjustment systems, even if they are not in contact with an ATEX atmosphere, as long as they are necessary for or contribute to operation on instruments and protective systems.

Temperature measurements in explosive zones are covered by this directive.

1 - GLOSSARY

Explosive atmosphere: Defined as a mixture of inflammable substances in gas, vapour, mist or dust form…

- With air;
- In atmospheric conditions;
- In which, after inflammation, combustion propagates to the whole of the unburned mixture.

Explosible atmosphere: Atmosphere liable to become explosive.

Ignition source: Inherent to the equipment concerned, a specific feature whose activation constitutes a risk of ignition. A distinction must be made between these two concepts during risk analysis. The possible ignition sources are listed in EN 1127-1. On a site transforming combustible materials, and in the presence of oxygen in the ambient air, the ignition source is the only element which can easily be eliminated to prevent an explosion. 13 ignition sources are identified in EN 1127-1.

Normal operation: Situation which exists when the equipment, protective systems and components fulfil their planned function in the context of their design parameters. Small leaks may be part of normal operation. Failures requiring repairs or shutdown are not considered to be part of normal operation.

Dysfunction: Situation which exists when the equipment, protective systems and components do not fulfil their planned function and may generate an ignition source. A foreseeable dysfunction is one which we know through experience may occur during the product's life span. A rare dysfunction only occurs exceptionally.

2 - DETERMINATION OF THE ZONES

The site manager is responsible for classification of the zones in which an **ATEX** atmosphere may form. This classification depends on the probability of **ATEX** atmosphere formation and determines the category of equipment installed there. The equipment manufacturer is not responsible for imposing the right equipment category, but it has a duty to inform its customers of the applicable regulations. The zones are defined according to the type and the probability of it encountering such an atmosphere. There are 3 levels of classification for **ATEX zones**, depending on the clearance for the source of combustible material and the type of ventilation in place. A distinction is made between zones containing gas or vapour and zones where dust is present.

GASES / VAPOURS / MISTS	
Zone 0	Explosive atmosphere present continuously or for long periods in normal operation. **1000 hours/year = constant, long-term or frequent hazard**
Zone 1	Explosive atmosphere present occasionally in normal operation **Between 10 and 100 hours/year or more = occasional hazard**
Zone 2	Explosive atmosphere present accidentally, in the event of dysfunction or for short periods **Less than 10 hours/year = rare or short-term hazard**
DUSTS	
Zone 20	Explosive atmosphere present continuously or for long periods in normal operation. **1000 hours/year = constant, long-term or frequent hazard**
Zone 21	Explosive atmosphere present occasionally in normal operation **Between 10 and 100 hours/year or more = occasional hazard**
Zone 22	Explosive atmosphere present accidentally, in the event of dysfunction or for short periods **Less than 10 hours/year = rare or short-term hazard**

3 - GROUPS OF GASES AND DUSTS

En the ATEX framework, a reference gas corresponds to each group of gases. These groups are based on their ignition characteristics.

GROUP	REFERENCE GAS	GAS DANGER LEVEL
IIA	Propane	++
IIB	Ethylene	+++
IIC (the most dangerous)	Hydrogen/Acetylene	++++

Dusts are also classified in 3 groups of explosible gases.

GROUP	TYPE OF DUST	DUST DANGER LEVEL
IIIA	Combustible fibres	+
IIIB	Non-conductive dust	++
IIC (the most dangerous)	Conductive dust	+++

4 - DEFINITION OF THE EQUIPMENT CATEGORIES

GROUPS I AND II

The equipment and protective systems are divided into two groups:

- **Group I**: equipment intended for use in the underground and surface parts of mines which may be endangered by firedamp and/or inflammable dust.
- **Group II:** equipment intended for use in surface industries which may be endangered by explosible atmospheres.

We do not propose any products classified in Group I. We will therefore only deal with equipment in Group II.

CATEGORIES IN GROUP II

- **Category 1:** Equipment in this category is characterized by at least two protective systems against explosion risks, operating in such a way that, if one of the protective systems fails, at least one independent secondary system ensures sufficient protection. This equipment is designed to operate in zones 0 or 20.
- **Category 2:** The anti-explosion protective systems for equipment in this category must operate in a way that ensures a sufficient level of protection against explosion risks even in the event of foreseeable dysfunctions. This equipment is designed to operate in zones 1 or 21.
- **Category 3:** The design of the equipment in this category must ensure a sufficient level of anti-explosion protection in normal operation. This equipment is designed to operate in zones 2 or 22.

The equipment categories in Group II should be used as follows:

G : Gas

D : Dust

ZONE	EQUIPMENT CATEGORY
0	1G, (1)G
1	2G, (2)G (or 1G, (1)G)
2	3G, (3)G (or 1G and 2G, (1)G and (2)G)
20	1D, (1)D
21	2D, (2)D (or 1D, (1)D)
22	3D, (3)D (or 1D and 2D, (1)D and (2)D)

- Use in the hazardous zone: Category 1G
- Installation in safe zone. Transmits or receives a signal from to the hazardous zone: Category (1)G

If you wish to use equipment in zone 0, its category must be 1G. Only this category is authorized in this zone.

For zone 2, equipment in Category 3G is authorized, along with equipment in Categories 1G and 2G: what can do more can also do less.

Equipment in the xGD categories can be used in explosible Gas and Dust atmospheres.

5 - TEMPERATURE CLASSES

Below, we present the different **ATEX temperature classes**, applicable to **ATEX** atmospheres, with limitation rules which differ according to the temperatures. These temperature ranges (T1 to T6) can then be used to classify the equipment intended for installation or use in **ATEX** zones.

The self-ignition temperature indicated for a combustible product (gas, vapour, dust) is the temperature at which the mixture with air **spontaneously ignites.** There is no need to provide a specific ignition source (flame, spark, electric arc, etc.) because the temperature is sufficient to set fire to the mixture.
Manufacturers commit to a temperature for their equipment by means of **the temperature classes**. If the equipment is in temperature class T2, the manufacturer guarantees that the surface temperature of its equipment will never exceed 300°C in the conditions indicated.

The maximum admissible surface temperature must always be lower than the self-ignition point.

TEMPERATURE CLASSES

Maximum admissible surface temperature	Equipment marking
450°C	T1
300°C	T2
200°C	T3
135°C	T4
100°C	T5
85°C	T6

TABLE SUMMARIZING THE CORRESPONDENCE BETWEEN GAS GROUPS AND TEMPERATURE CLASSES:

CLASSIFICATION OF GASES AND VAPOURS IN GAS GROUPS AND TEMPERATURE CLASSES					
	T1	T2	T3	T4	T6
I	Methane				
II A	Acetone, ethane, ethyl acetate, ammoniac, benzol, acetic acid, carbon monoxide, methanol, propane, toluene	Ethyl alcohol, i-amyl acetate, n-butane, n-butyl alcohol	Gasoline, diesel oil, kerosene, domestic fuel oil, n-hexane	Acetic acid, ether	
II B	City gas	Ethylene			
II C	Hydrogen	Acetylene			Carbon disulphide

TEMPERATURE LIMITATION RULES

For dusts: the temperature is part of the Ex Dust marking.

- **Dust clouds:** If a dust cloud occurs, the maximum surface temperature of the equipment must not exceed 2/3 of the ignition temperature under any circumstances: Max. temperature (C°) = 2/3 of the ignition temperature of a dust cloud (Tci)
- **Dust layers:** The temperature must be limited if there is a layer of dust present less than 5 mm thick: Max. temperature = 5 mm – 75 k (75 k is the safety coefficient equal to 75°C)

EXAMPLES OF EXPLOSIBLE DUSTS

Acetylsalicylic acid, ascorbic acid, aluminium, starch (wheat), asphalt, wheat, cocoa, cellulose, flour / bread wheat, powdered milk, malt, paracetamol, polystyrene, soap, soya (flour), sugar, etc.

NOTES

- On DUST-certified ATEX products, the maximum surface temperature is indicated in plain language in the Dust marking on the label. This should not be confused with the temperature class (T1 to T6) which only concerns gases and vapours!
- Do not confuse the maximum surface temperature of dust-certified equipment (e.g. T85 °C) or the temperature class of gas-certified equipment (e.g. T4) with the admissible ambient temperature for the equipment. These are distinct characteristics.

		DUST CLOUD		5 MM DUST LAYER		
	IFA / INRS IDENTIFICATION NO.	SELF-IGNITION TEMPERATURE T1	EQUIPMENT SURFACE TEMPERATURE (2/3 OF T1)	SELF-IGNITION TEMPERATURE T2	EQUIPMENT SURFACE TEMPERATURE (T2-75°C)	MAX. SURFACE TEMPERATURE TO USE WHEN CHOOSING THE EQUIPMENT
Wheat in bulk	3466	490 °C	326 °C	290 °C	215 °C	215 °C
Cocoa powder	3469	590 °C	393 °C	250 °C	175 °C	175 °C
Wheat starch	3525	380 °C	253 °C	530 °C	455 °C	253 °C
Powdered milk	2046	460 °C	306 °C	330 °C	255 °C	255 °C
Soya flour	1264	430 °C	286 °C	420 °C	345 °C	286 °C
Sulphur	2535	240 °C	160 °C	250 °C	175 °C	160 °C
Charcoal	254	520 °C	346 °C	320 °C	245 °C	245 °C
Sugar, pectin	232	410 °C	273 °C	380 °C	305 °C	273 °C

Source: GESTIS-CARATEX databank

6 - PROTECTION MODES

There are several protection modes recognized by the IEC (International Electrotechnical Commission) and CENELEC (Comité Européen de Normalisation Electrotechnique / European Committee for Electrotechnical Standardization). Each protection mode is symbolized by lower-case letters which figure on the equipment's ATEX label. Several protection modes may be used on the same equipment. If so, the symbols concerned are indicated one after the other (e.g. Ex db eb op is q IIC T4 Gb).

The most widely-used protection modes for Pyrocontrole's temperature sensors are "ia" (intrinsic safety) and "d" (explosion-proof enclosure).

MAIN PROTECTION MODES FOR ELECTRICAL EQUIPMENT

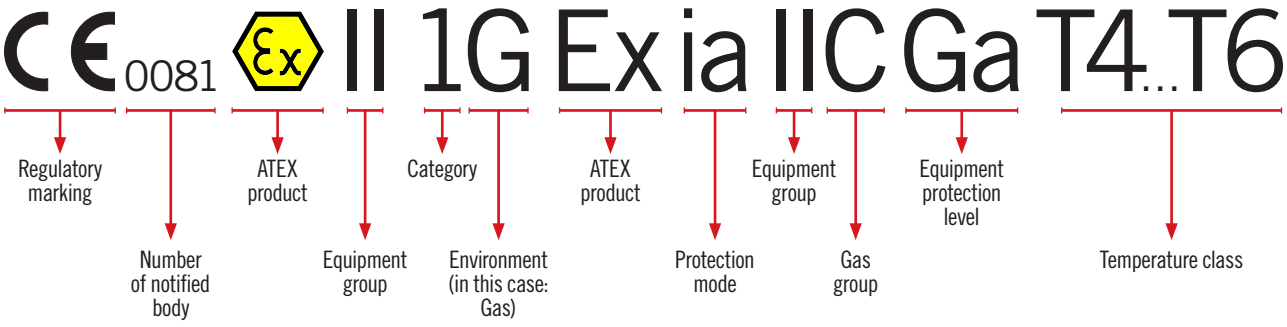
TYPE	SYMBOL	PROTECTION MODE	GROUP	EQUIPMENT CATEGORY	EQUIPMENT PROTECTION LEVEL (EPL)	CENELEC / IEC STANDARDS	PRINCIPLE OF PROTECTION
d	da	explosion-proof enclosure	II	1 G	Ga	60079-1	Parts which may ignite an explosive atmosphere are enclosed in an enclosure which must withstand an internal explosion and prevent propagation of the explosion outside it.
	db			2 G	Gb		
	dc			3 G	Gc		
e	eb	increased safety	II	2 G	Gb	60079-7	Steps are taken from the design phase onwards to avoid any internal overheating and any electric arcs or sparks inside or on the external parts of electrical equipment.
	ec			2 D	Db		
i	ia	intrinsic safety	II	1 G	Ga	60079-11	Limitation of electrical energy and internal heating, thus preventing any ignition.
	ib			2 G	Gb		
	ic			3 G	Gc		
nA	nA	non-sparking	II	3 G	Gc	60079-15	Elimination of electric arcs, sparks and internal heating.
nC	nC	sealed unit	II	3 G	Gc	60079-15	Must contain any internal explosion or must prevent the explosive mixture from penetrating inside.
nR	nR	limited respiration	II	3 G	Ga	60079-15	Enclosure designed to limit penetration of the explosive mixture.
m	ma	encapsulated	II	1 G	Gb	60079-18	Exclusion of the explosive atmosphere by encapsulation of the parts in resin.
	mb			2 G	Gb		
	mc			3 G	Gc		
op is	op is	optical radiation with intrinsic safety	II	1 G	Ga	60079-28	Limitation of the light energy produced (e.g. by a LED), to avoid ignition of the surrounding explosive atmosphere.
	op is			2 G	Gb		
	op is			3 G	Gc		
t	ta	protection by enclosure	III	1 D	Da	60079-31	The construction of the equipment prevents any penetration inside by dust.
	tb			2 D	Db		
	tc			3 D	Dc		

7 - PROTECTION RATINGS

	IP INGRESS PROTECTION RATINGS (IEC 60529)	
	SOLID PARTICLE PROTECTION	LIQUID INGRESS PROTECTION
0	Not protection.	
1	Protected against solid bodies larger than 50 mm. Example: involuntary contact with hand.	Protection against dripping water (vertically-falling drops). Example: condensation.
2	Protected against solid bodies larger than 12.5 mm. Example: finger.	Protected against dripping water when the enclosure is tilted by up to (15°).
3	Protected against solid bodies larger than 2.5 mm. Example: tools, wires.	Protected against dripping water when the enclosure is tilted by up to 60 °.
4	Protected against solid bodies larger than 1 mm. Example: small tools, small wires.	Protected against water splashing from any direction.
5	Protected against dust. No harmful deposit.	Protected against water projected by a nozzle from any direction.
6	Protected against penetration by dust (dust-tight).	Protected against water projected in powerful jets similar to heavy sea spray.
7		Protected against the effects of immersion at depths between 0.15 and 1 m.
8		Protected against the effects of prolonged immersion under pressure.

8 - COMPLETE ATEX MARKING





DIRECTIVE NO. 2014/68/EU PRESSURE EQUIPMENT

The European Pressure Equipment Directive (PED) specifies the requirements concerning pressure equipment for the distribution of pressure equipment inside the European economic area. The version currently in force is directive 2014/68/EU of the European Parliament and Council of 15th May 2014 regarding harmonization of the legislation in the member states concerning the commercialization of pressure equipment.

After examining the datasheets from the Pressure Equipment Liaison Committee (CLAP) concerning Directive 2014/68/EU, PYROCONTROLE can inform you that:

- An isolated sensor does not meet the definition of a pressure accessory (Guideline number A-25 – CLAP number X029)
- If a sensor is considered to be a component incorporated in an item of equipment, the requirements must be checked but the marking is not applicable (Guideline number A-22 – CLAP number X027)
- The compliance assessment procedures and the essential safety requirements in PED 97/23/CE are applicable to the whole safety chain (Guideline number A-25 – CLAP number X029)

Consequently, CE marking cannot be placed on an isolated sensor (in the context of the Pressure Equipment Directive).

SIL (SAFETY INTEGRITY LEVEL) EN 61508 STANDARD

This standard covers the functional safety of electrical/electronic/programmable electronic systems related to safety. It concerns applications for which a failure of these systems has a significant effect on the safety of people, the environment and the installations.

THE EN 61508 STANDARD:

Some industrial processes may represent a hazard for people, the environment and the installations themselves.

The safety functions are intended to reduce these hazards. SIL involves reducing the risks to a tolerable level. The EN 61508 standard was published to describe both the type of risk assessment necessary and the development of safety functions for the sensors, the logical processing part and the actuators. These measures include “risk suppression” (systematic faults) and “risk control” (random faults). This basic standard, which is independent of the applications, describes the requirements regarding the safety functions of the components and systems, allowing the development of branch-specific standards (e.g. the EN 61511 standard: see below).

THE EN 61511 STANDARD:

This international standard can be used to define the requirements concerning the specifications, design, installation, operation and maintenance of an instrumented safety system, so that it can be implemented with total confidence, thus establishing and/or maintaining the safety of the process at an acceptable level. This standard was designed to constitute an implementation of IEC 61508 in process industries.

PYROCONTROLE proposes “SIL Capable” process sensors by using temperature transmitters compliant with the EN 61508 standard. The performance level may be: SIL 2 Capable or SIL 3 Capable, depending on the type of mounting.

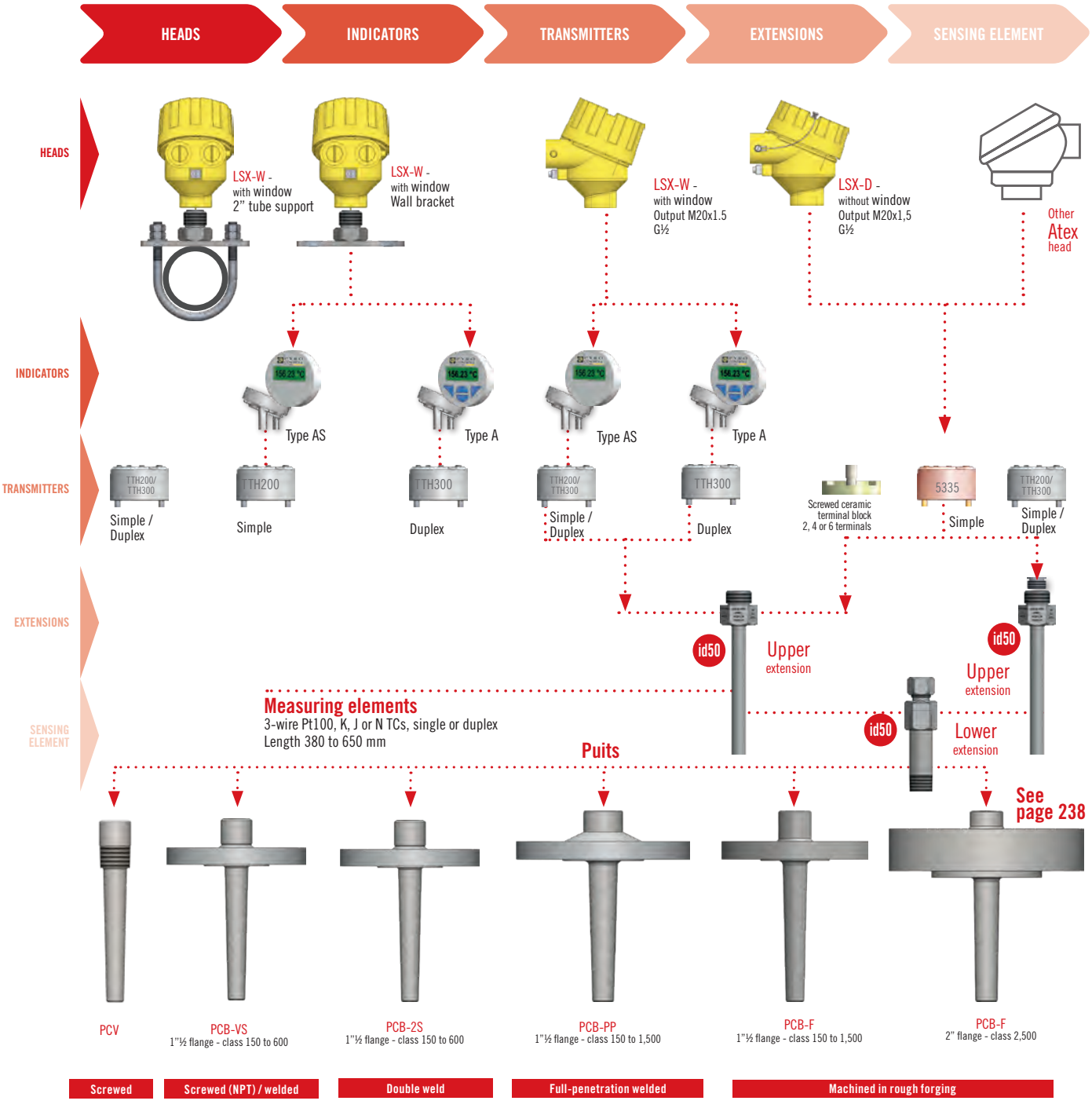
GAS ENVIRONMENT

ZONES 0, 1, 2 ATEX ia

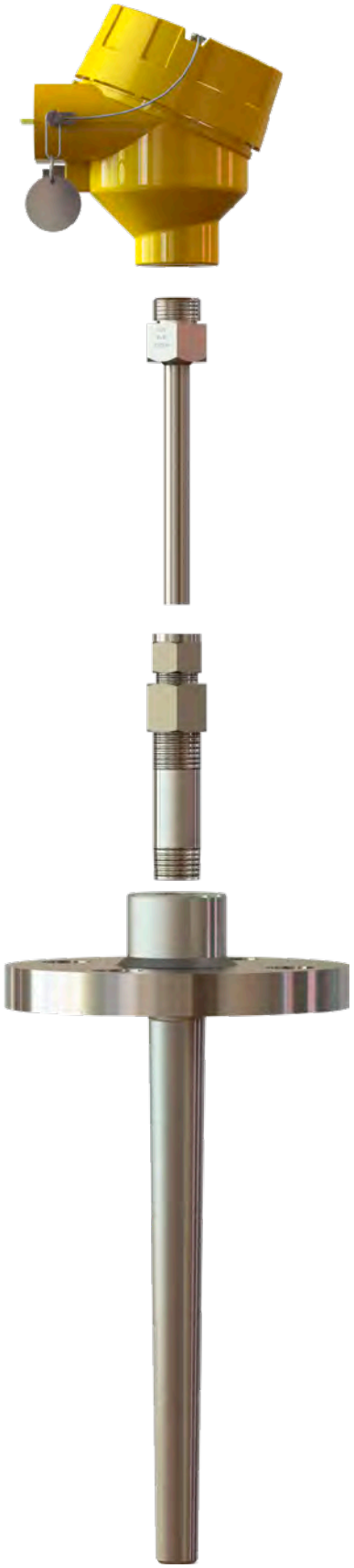
Complete, assembled sensor or totally configurable sensor: with CA PYROCONTROLE, you can choose.

Thanks to a wide choice of references, the PYROmodules id50 system allows you to define a tailored Atex ia/d sensor adapted to your in-line temperature measurement application.

ID50 MODULES I TAILORED CONSTRUCTION



Also, don't forget to protect your temperature sensors against excessive pressures, the velocity of the material and corrosion with our thermowells (see page 270)



For maintenance of your sensors, the id50 system enables you to replace the faulty part(s) only, whatever the sensor brand, at a competitive price.

GUARANTEED SAFETY

The id50 modules system offers numerous protective measures guaranteeing a high level of safety.

- Atex certification is maintained, even in the event of partial replacement of an existing sensor
- All the thermowells are the subject of calculation notes in accordance with the ASME PTC- 19.3 TW 2016 standard
- All the equipment is SIL-certified (for any assembly with a TTH200/ TTH300 transmitter)

ID50 MODULES SIMPLIFIED MAINTENANCE WORK

With the id50, modules, change only the faulty part(s) of your sensor and reduce your maintenance costs.

- This innovative modular system allows you to replace only the damaged parts
- Atex certification maintained
- id50 system adaptable to all types and makes of Atex sensors for temperature measurement





ID50

COMPLETE ASSEMBLED SENSOR

IP 54 | IEC 584-1 OR IEC60751 | Ex ia and Ex d | up to 1150°C

DESCRIPTION

id50 sensor delivered complete and assembled. This sensor comprises the components detailed in the pages which follow. The section presenting the thermowells begins on page 238.

SPECIFICATIONS

See following pages.

Cable gland to be ordered if needed.

See page 192 for an overview of the Pyromodules id50 solution.

CA PYROCONTROLE enables you to check the appropriate element using a test rod, code: L860514-001.

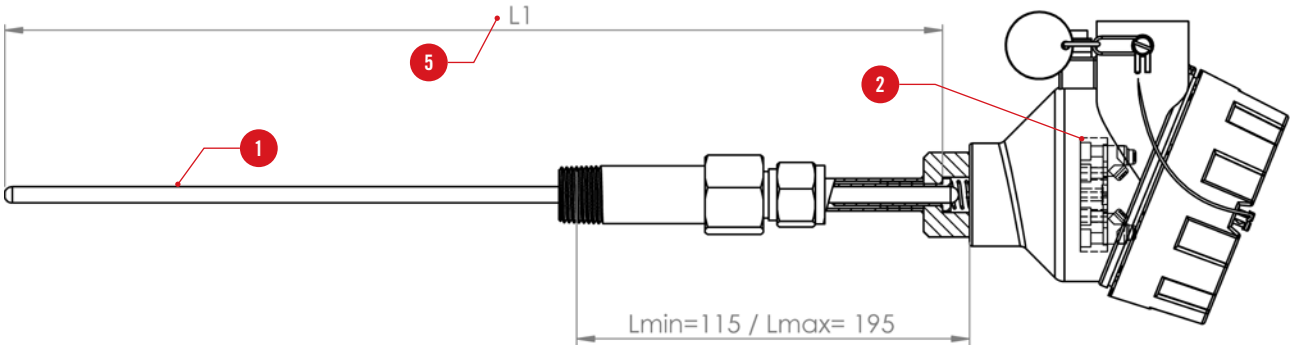
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	ELEMENT	TERMINAL STRIP TRANSMITTER	DISPLAY	ATEX	LENGTH L1 (mm)	TRANSMITTER SCALE	CABLE GLAND
ID50	1TCK	B	AS	IA	950-1,000	0/250	PE1
Reference in table and diagram	1	2	3	4	5		
Possible choice	1Pt100 2Pt100 1TCK 2TCK 1TCJ 2TCJ 1TCN 2TCN	Ceramic terminal strip: B TTH200 T200 TTH300: T300 LC5335: 5335	Without: XS AS: AS A: AA	d : AD ia : IA	200 - 250 -300 350 - 400 -450 500 - 550 -600 650 - 700 -750 800 - 850 - 900 950 - 1000		Atex "d" for non-armoured cable: PE1 Atex "d" for armoured cable: PE2 Atex "ia": PE3 Cap: CAP

DIAGRAM (MM)



DISPLAY 3

Indicator type	Transmitter type	
	TTH200	TTH300
Type AS: without keypad	•	•
Type A: with keypad		•

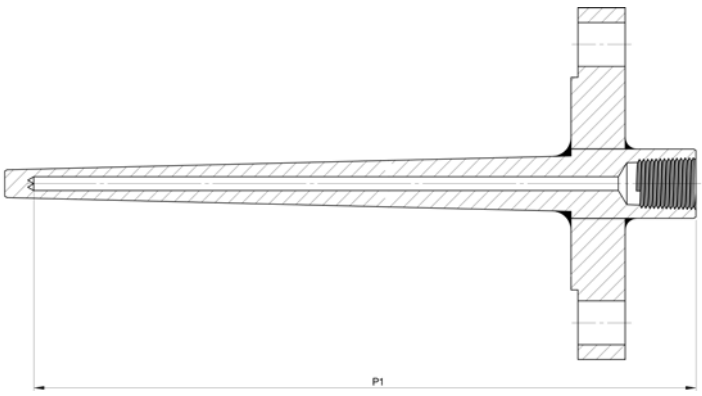
ATEX PROTECTION MODES 4

ATEX zone	ia protection mode	d protection mode
0	•	
1	•	•
2	•	•

LENGTH L1 5

The length L1 should be determined according to the depth of the thermowell (P1), as shown in the table below

Sensing element length	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
P1 min. (mm)	20	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820
P1 max. (mm)	85	135	185	235	285	335	385	435	485	535	585	635	685	735	785	835	885



LSX-D / LSX-W

HEADS FOR ID50





IP 54 | **WITH OR WITHOUT WINDOW** | **INTRINSIC SAFETY**

DESCRIPTION

ATEX heads for the id50 system. The PYROmodules id50 solution gives you the choice between an LSX-W head with a window and an LSX-D head without a window

SPECIFICATIONS

Model	LSX-D	LSX-W
ATEX	Ex II 1 GD / Ex ia IIC T6	
Material	Epoxy-coated aluminium alloy	
Colour	Yellow	
Cable input (cable gland, not supplied)	1 input M20x1.5 with plastic cover	1 input M20x1.5 with plastic cover 1 input M20x1.5 with cap
Window for mounting a display		•
External earth terminal	•	•
Cover chain	•	
Accessory supplied	Sleeved base for locking the internal element, reference L810437-004	

DESIGN YOUR SENSOR ID50

HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

TO ORDER

Photo	Head	ATEX	Reference
	LSX-D: without window	ia	L810439-001
	LSX-W: with window	ia	L810523-001
	LSX-W with strap for 2" tube	ia	L810499-001
	LSX-W with wall bracket	ia	L810520-001

MOUNTING



AS - A

INDICATORS FOR ID50



WITH OR WITHOUT KEYPAD

INTRINSIC SAFETY

SELF-POWERED



DESCRIPTION

ATEX ia indicators for the id50 system.
LCD indicators for mounting on TTH transmitters
Type AS: without keypad
Type A: with keypad

SPECIFICATIONS

Model	Type AS	Type A
Reference	L810503-000	L810502-000
Properties	Graphical LCD indicator controlled by transmitter without configuration function	Graphical LCD indicator controlled by transmitter with configuration function (keypad)
Compatibility	TTH200 / TTH300	TTH300
Display	Polarity signs, 4 digits, 2 digits after decimal point	Height of characters depending on the mode, polarity signs, 4 digits, 2 digits after the decimal point, graphical bar indicator.
Display possibilities	Sensor process value Bar chart Output %	Sensor 1 process value Sensor 2 process value Ambient temp./ electronics temp. Output value Output % Bar chart Output % Troubleshooting display information for transmitter and sensor status
Ambient operating temperature	-20 to +70°C	

DESIGN YOUR SENSOR ID50

HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

DISPLAY

Type A LCD indicator



Type AS LCD indicator



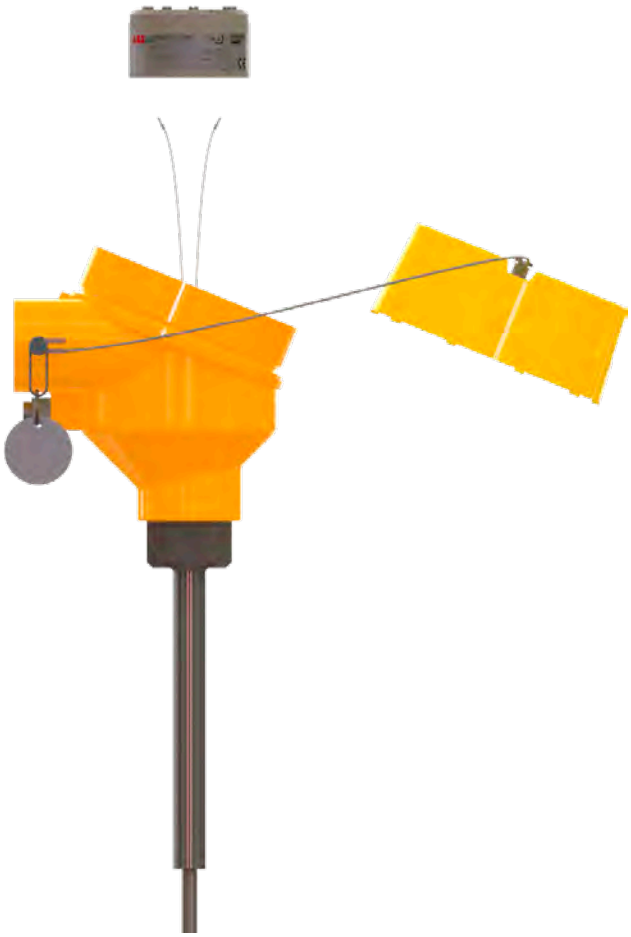
1. Quit / Cancel
2. Scroll back
3. Scroll forward
4. Confirm

TO ORDER

Indicator type	Transmitter type		Atex	Reference
	TTH200	TTH300		
Type AS: without keypad	•	•	ia	L810502-100
Type A: with keypad		•	ia	L810503-100

MOUNTING

The type A indicator can only be mounted on a TTH300 transmitter.
The type AS indicator can be mounted on a TTH200 or TTH300 transmitter.
It can be configured using the keypad on the indicator.
The indicator is fixed on a tilted base.
The indicator+transmitter assembly can only be mounted in LSX-W heads.



5335 TTH200/300

TRANSMITTERS FOR ID50



INSULATED 4-20 mA OUTPUT | TTH300 DUPLEX VERSION | TTH200 TTH300 IP20 / IP00 | 5335 IP68 / IP00 | UNIVERSAL INPUT | HART

DESCRIPTION

Programmable transmitters for conversion into a 4-20 mA analogue signal

TRANSMITTER SPECIFICATIONS

Model		TTH200	TTH300	5335
Reference		LTTH200-100	LTTH300-100	LC5335B-100
ATEX		Ex II 1 G Eex ia IIC T6 Ex II 2(1)G Eex [ia] ib IIC T6 Ex II 2 G (1D) Ex [iaD] ib IIC T6	Ex II 1 G Ex ia IIC T6 Ga Ex II 2(1)G Ex [ia] ib IIC T6 Gb (Ga) Ex II 2 G (1D) Ex [iaD] ib IIC T6 Gb (Da)	Ex II 1 G Ex ia IIC T6 or T4 Ga
Compatible protection mode	Ex ia	•	•	•
Ambient operating temperature		-50 to +44°C for T6 / -40 to +60°C for T4		-40 to +60°C for T6 -40 to +85°C for T4
HART protocol		HART 5	HART 5 or HART 7 (choice by switch) Delivered with HART 5 as standard.	HART 5
Input		3 or 4-wire Pt100 / J, K, N or T TC		
Cold junction compensation (if used as TC input)		•	•	•
Number of sensors		1	2	1
Output		4-20mA		
Sensor breakage		Programmable 3.5…23mA		
Power supply		11…30Vdc		8.0…30Vdc
Galvanic insulation		3.5 kVdc (2,5 kVac), 60s		1.5 kVac / 50Vac
Protection rating (as per EN60529) (head/ terminals)		IP20 / IP00		IP68 / IP00
Dimensions		Diam 44.4mm x h 24.7mm		Diam 44.0mm x h 20.2mm



TERMINAL STRIP SPECIFICATIONS

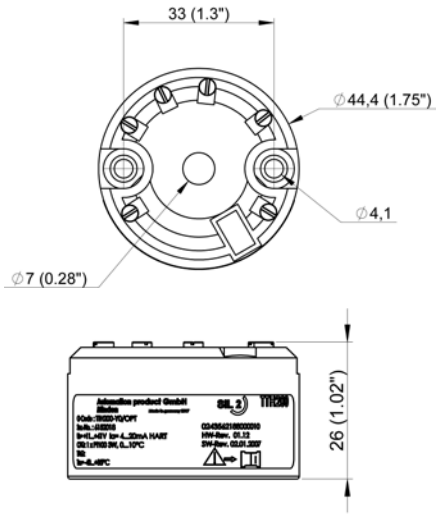
References	L015078-000	L015079-000	L015080-000
Number of terminals	2	4	6
Connection	1 x TC	2 x TC or 1 x 3-wire Pt100	2 x 3-wire Pt100

DESIGN YOUR SENSOR ID50

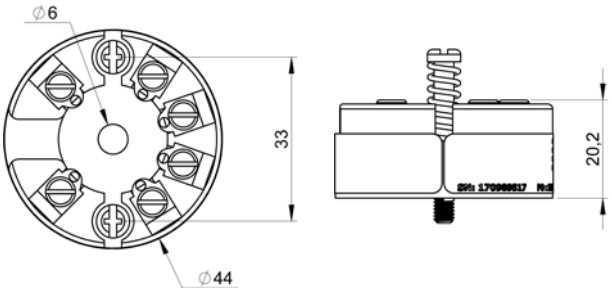
HEAD | INDICATOR | **TRANSMITTER** | EXTENSIONS | SENSING ELEMENT

CONNECTIONS

TTH200/300 transmitter

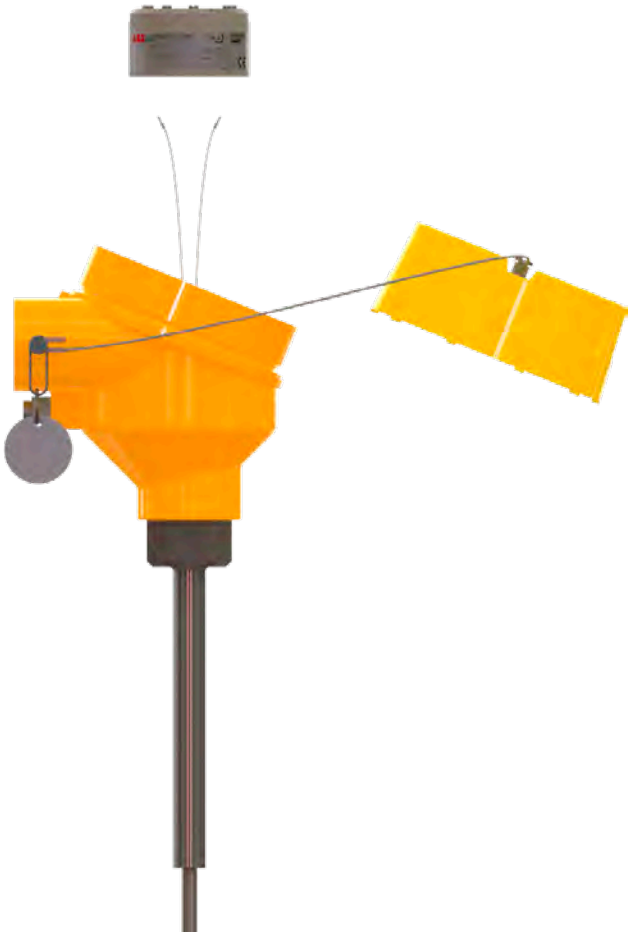


5335 transmitter



MOUNTING

Insert the wires of the ID50 measuring element inside the transmitter and screw it inside the connecting head.
For the intrinsic-safety loop calculation, the electrical parameters of the transmitters are indicated in the ia/A safety instructions.
Set up the cable of the ID50 measuring element as shown in the wiring diagrams.



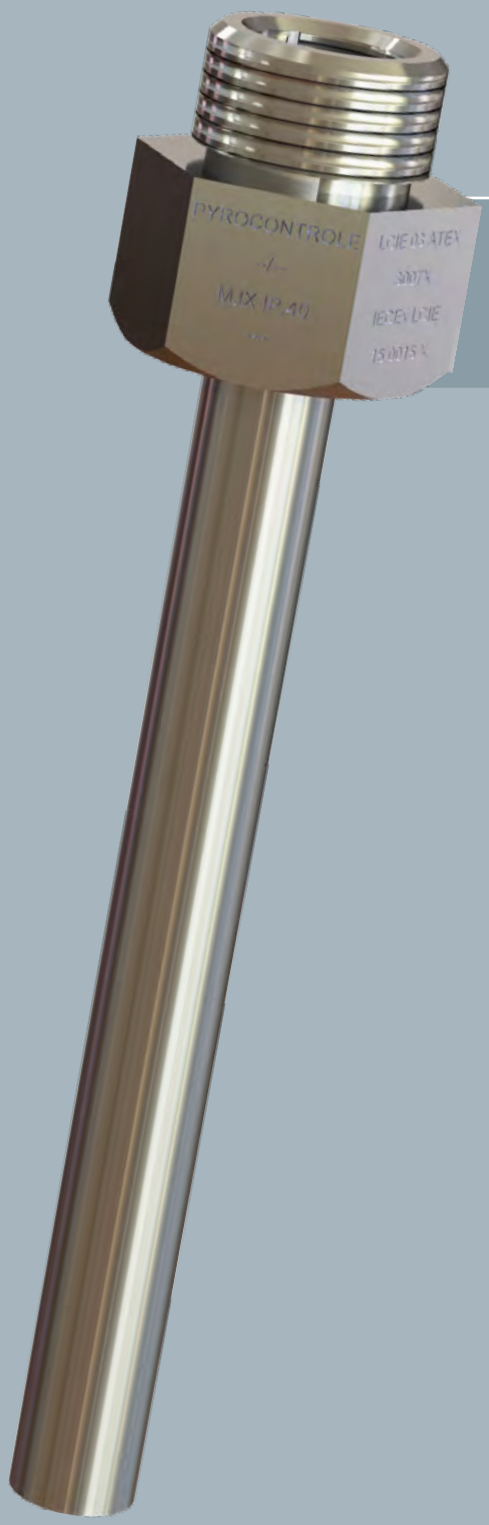
TO ORDER

Transmitter		ATEX	Reference
	TTH200	ia	LTTH200-100
	TTH300	ia	LTTH300-100
	5335B	ia	LC5335B-100

Ceramic terminal strip			ATEX	Reference
	2 terminals	Compatibility	ia	L015078-000
	4 terminals		ia	L015079-000
	6 terminals		ia	L015080-000

ID50 SENSOR

EXTENSIONS FOR ID50



ADJUSTABLE FROM 120 TO 200 MM

STAINLESS STEEL 316L

DESCRIPTION

The extension provides the link between the head and the thermowell. It comprises two parts, upper and lower, and can be adjusted without cutting according to the length of the measuring element and the depth of the thermowell.

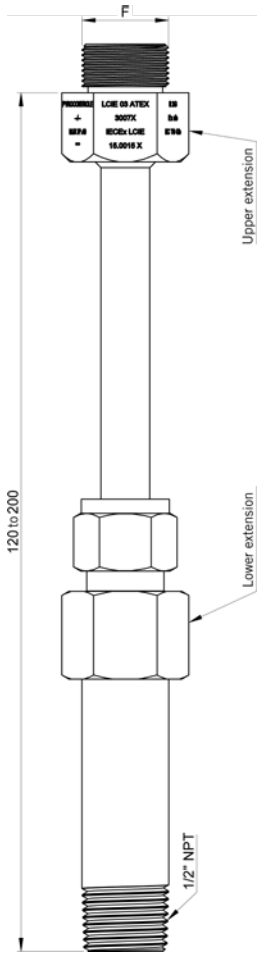
SPECIFICATIONS

Part	Upper	Lower
ATEX	Ex II 2G - Ex db IIC T6 Gb	N/A
Material	316L	
Mounting	On head	On thermowell
Threading	As per table opposite	½ NPT
Accessories	Screw for locking the measuring element for any head other than the LSX model. Thread lock.	

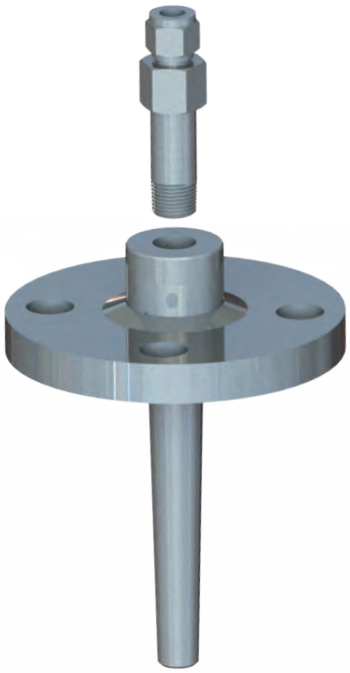
DESIGN YOUR SENSOR ID50

HEAD | INDICATOR | TRANSMITTER | **EXTENSIONS** | SENSING ELEMENT

DIAGRAM (MM)



MOUNTING



Set the upper extension in place on the thermowell.

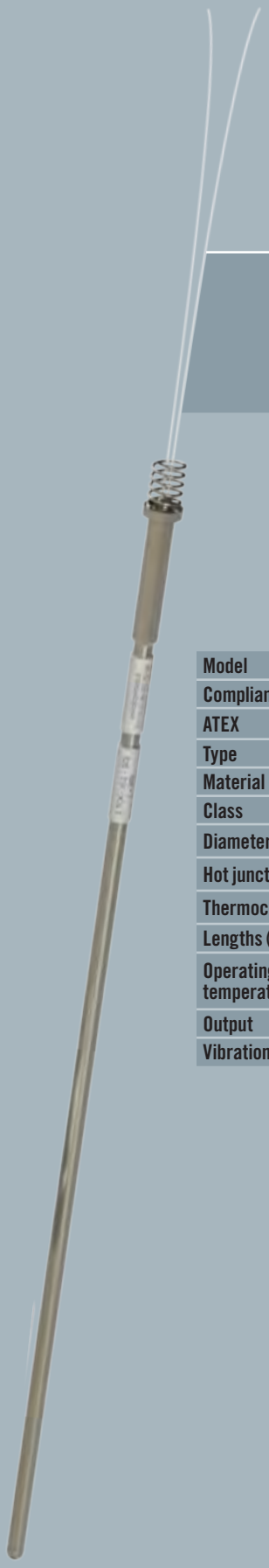


Screw the lower extension on the thermowell with a size-27 open-end wrench by making use of the hexagonal shape of the leak-tight fitting.`

Tighten until the lower extension is locked.

TO ORDER

Assembly		F	Reference
Upper extension	For LSX head (locking screw not included)	G½	L810437-001
	for other heads (screw included)	G½	L810437-G12
		M24	L810437-M24
		M20	L810437-M20
		½ NPT	L810437-N12
Lower extension			L810437-000



IDG50

THERMOCOUPLE FOR ID50

INTRINSIC SAFETY | CLASS 1 | SINGLE OR DUPLEX | IEC 584-1 | up to 1100°C

DESCRIPTION

Thermocouple measuring elements for the id50 system.

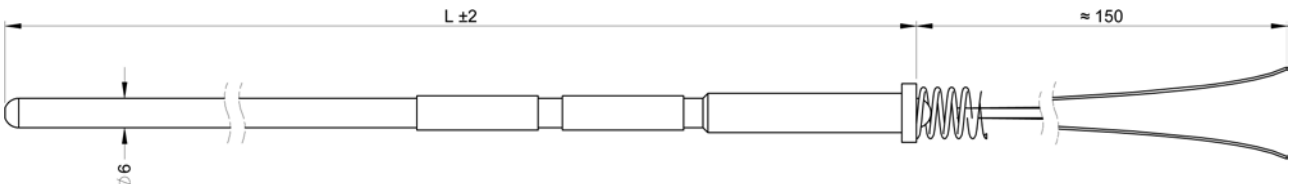
SPECIFICATIONS

Model		IDG50		
Compliance with standards		IEC 61515 / IEC 584-1 / EN 60079-0		
ATEX		Ex II 2 G / Ex db IIC T6 Gb / Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da		
Type		K	J	N
Material		Inconel 600	316L	Inconel 600
Class		1	1	1
Diameter (d) (mm)		6		
Hot junction		Insulated		
Thermocouple		Single / Duplex		
Lengths (mm)		200 to 1000		
Operating temperature (°C)	Min	-40	-40	-40
	Max	1100	700	1100
Output		Wires 150 mm long with end-pieces		
Vibration withstand		60g		

DESIGN YOUR SENSOR ID50

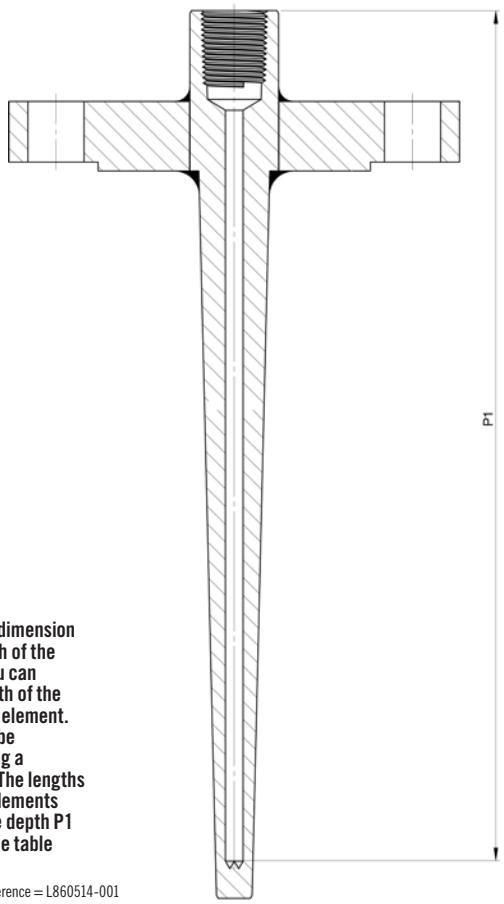
HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

DIAGRAM (MM)



DETERMINATION OF THE LENGTH OF THE IDG50 ELEMENT

Flanged thermowell



By determining dimension P1 (drilling depth of the thermowell), you can choose the length of the ID50 measuring element. This length can be determined using a measuring rod. The lengths of the sensing elements according to the depth P1 are defined in the table below.

*measuring rod = Reference = L860514-001

TO ORDER

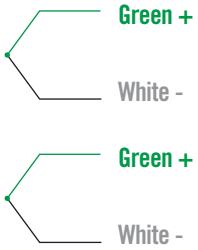
K THERMOCOUPLE	Single reference	Duplex reference
Length 200 mm	L810430-200	L810431-200
Length 250 mm	L810430-250	L810431-250
Length 300 mm	L810430-300	L810431-300
Length 350 mm	L810430-350	L810431-350
Length 400 mm	L810430-400	L810431-400
Length 450 mm	L810430-450	L810431-450
Length 500 mm	L810430-500	L810431-500
Length 550 mm	L810430-550	L810431-550
Length 600 mm	L810430-600	L810431-600
Length 650 mm	L810430-650	L810431-650
Length 700 mm	L810430-700	L810431-700
Length 750 mm	L810430-750	L810431-750
Length 800 mm	L810430-800	L810431-800
Length 850 mm	L810430-850	L810431-850
Length 900 mm	L810430-900	L810431-900
Length 950 mm	L810430-950	L810431-950
Length 1000 mm	L810430-001	L810431-001
N thermocouple	L810447-...	L810449-...
J thermocouple	L810445-...	L810448-...

CONNECTIONS - SINGLE AND DUPLEX

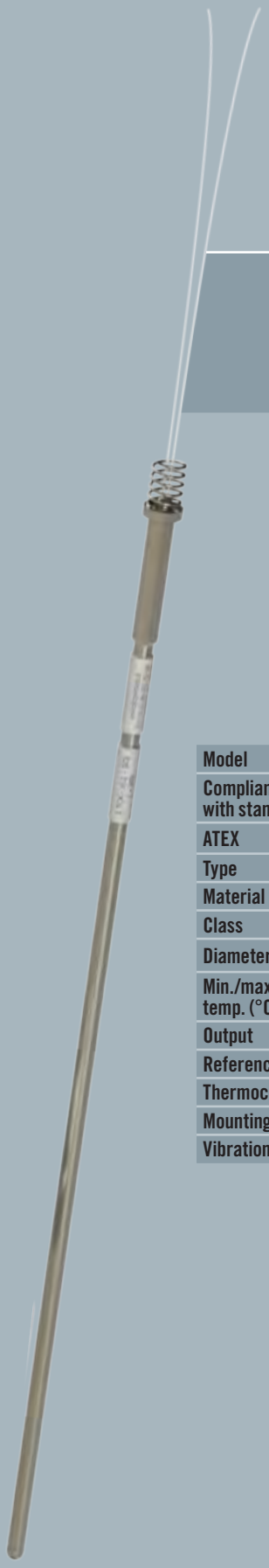
K TC



Duplex K TC



Sensing element length	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
P1 min. (mm)	20	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820
P1 max. (mm)	85	135	185	235	285	335	385	435	485	535	585	635	685	735	785	835	885



IDG50

Pt100 FOR ID50

INTRINSIC SAFETY | CLASS A | SINGLE OR DUPLEX | IEC 60751 | up to 450°C

DESCRIPTION

Pt100 measuring elements for the id50 system

SPECIFICATIONS

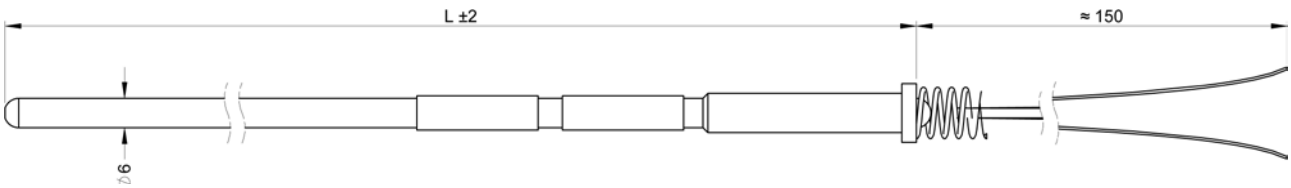
Model	IDG50			
Compliance with standards	IEC 60751 / EN 60079-0			
ATEX	Ex II 2 G / Ex db IIC T6 Gb / Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da			
Type	Pt100			
Material	316 L			
Class	A			
Diameter (d) (mm)	6			
Min./max. operating temp. (°C)	-40°C… 450°C			
Output	Wires 150 mm long with end-pieces			
Reference	L810432	L810433	L810434	L810435
Thermocouple	Single	Duplex	Single	Duplex
Mounting	1x3 wires	2x3 wires	1x3 wires	2x3 wires
Vibration withstand	10g		50g	

See page 184 for an overview of the PYROmodules id50 solution

DESIGN YOUR SENSOR ID50

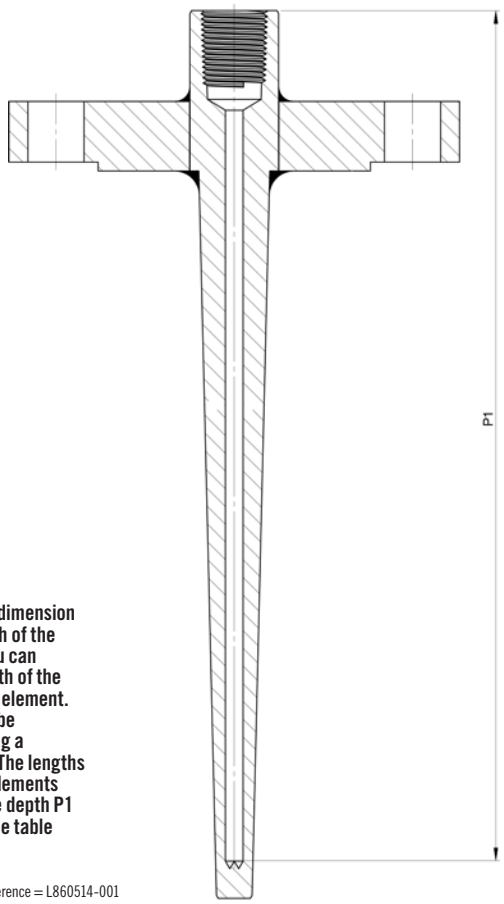
HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

DIAGRAM (MM)



DETERMINATION OF THE LENGTH OF THE IDG50 SENSING ELEMENT

Flanged thermowell



By determining dimension P1 (drilling depth of the thermowell), you can choose the length of the ID50 measuring element. This length can be determined using a measuring rod. The lengths of the sensing elements according to the depth P1 are defined in the table below.

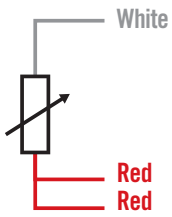
*measuring rod = Reference = L860514-001

TO ORDER

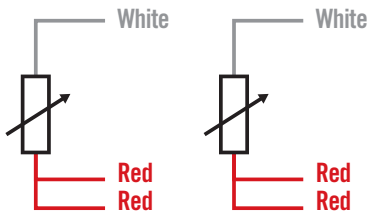
3-wire Pt100, Withstand 10g	Single reference	Duplex reference
Length 200 mm	L810432-200	L810433-200
Length 250 mm	L810432-250	L810433-250
Length 300 mm	L810432-300	L810433-300
Length 350 mm	L810432-350	L810433-350
Length 400 mm	L810432-400	L810433-400
Length 450 mm	L810432-450	L810433-450
Length 500 mm	L810432-500	L810433-500
Length 550 mm	L810432-550	L810433-550
Length 600 mm	L810432-600	L810433-600
Length 650 mm	L810432-650	L810433-650
Length 700 mm	L810432-700	L810433-700
Length 750 mm	L810432-750	L810433-750
Length 800 mm	L810432-800	L810433-800
Length 850 mm	L810432-850	L810433-850
Length 900 mm	L810432-900	L810433-900
Length 950 mm	L810432-950	L810433-950
Length 1000 mm	L810432-001	L810433-001
3-wire Pt100, Withstand 50g	L810434-...	L810435-...

CONNECTIONS

Connection 1 Pt100 Ω
1x3 wires

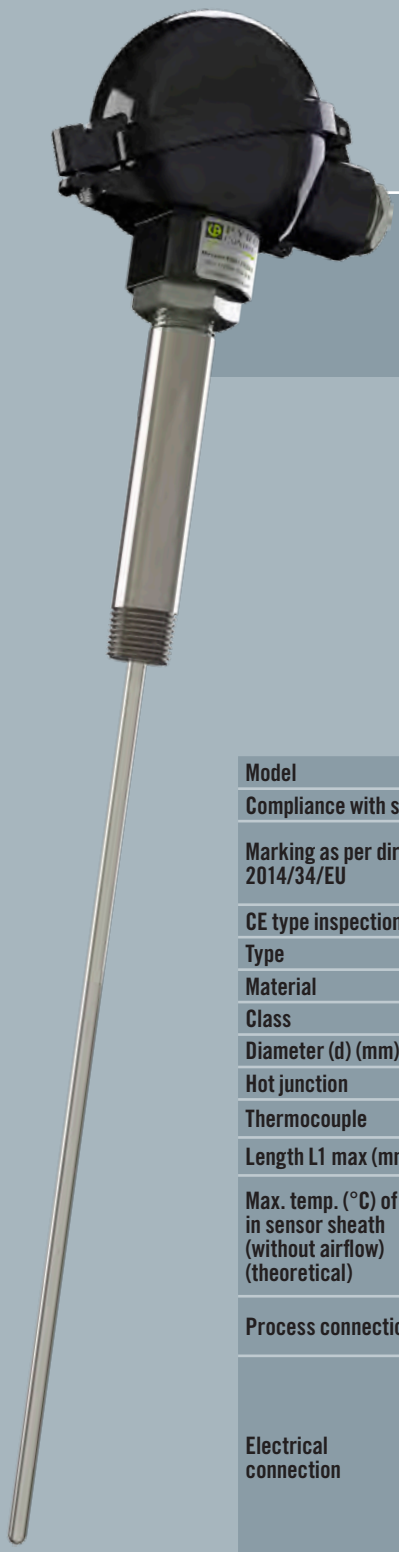


Connection 2 Pt100 Ω
2x3 wires



Sensing element length	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
P1 min. (mm)	20	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820
P1 max. (mm)	85	135	185	235	285	335	385	435	485	535	585	635	685	735	785	835	885

TA1G
THERMOCOUPLE



IP 54/65 | CLASS 1 | INTRINSIC SAFETY | IEC 584-1 | up to 1150°C

DESCRIPTION

Process sensor for use in explosive zones with a gas environment, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		TA1G				
Compliance with standards		IEC 584-1 / NF EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		With DAN i head: Ex II 1G / Ex ia IIC T4…T6 Ga With DAN Vi head: Ex II 1 GD / Ex ia IIC T4…T6 Ga ia IIIC T135°C…T85°C Da				
CE type inspection certificate		LCIE 14ATEX3020 X				
Type		K	J	T	N	
Material		Inconel600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		6 - 8				
Hot junction		Insulated				
Thermocouple		Single / Duplex			Single	
Length L1 max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: ½""NPT. Stainless steel.				
Electrical connection	Head type	DAN i			DAN-Vi	
	Material	Light alloy				
	Output	1 cable gland M20x1,5				
	Cable diam.	5,5 à 7,5 mm				
	Equipment	Ceramic terminal strip (standard) / Transmitter				
	IP	IP54			IP65	
Accessories (p.338)		Measuring element, thermowell, cable gland				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	EXTENSION	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
TA1G	DNI	1T	AC	8	1,000	M	G	0/250
Reference in table and diagram	1	2	3	4	5	6	7	
Possible choice	DAN i: DNI DAN-Vi: DVI	1T 1J 1K 1N 2K 2J	316L: AC INCONEL 600: CM PYROSIL: DB	6 8	Max. 1,500 mm	Extension type M: M Extension type RU: R	LC5331B-321: F LC5335B-100: G	

THERMOCOUPLE INFORMATION

2 Class 1 TC	Sheath diameter (mm) 6	Sheath diameter (mm) 8 (4)
T (CLASS 2)	316L	316L
J	316L	316L
K	INCONEL600	INCONEL600
N	INCONEL600	-
	PYROSIL	PYROSIL
2J	316L	316L
2K	INCONEL600	INCONEL600

3

CONNECTIONS

Duplex thermocouple

Red +

Black -

Green +

-

Single thermocouple

Red +

Black -

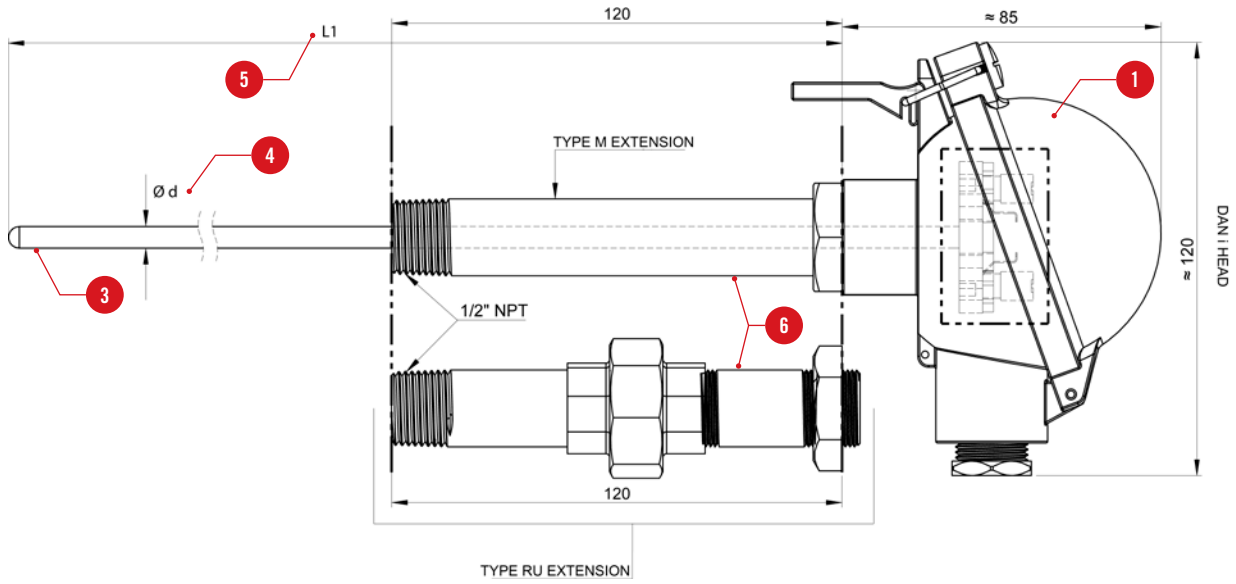
TRANSMITTER INFORMATION (1 TC ONLY)

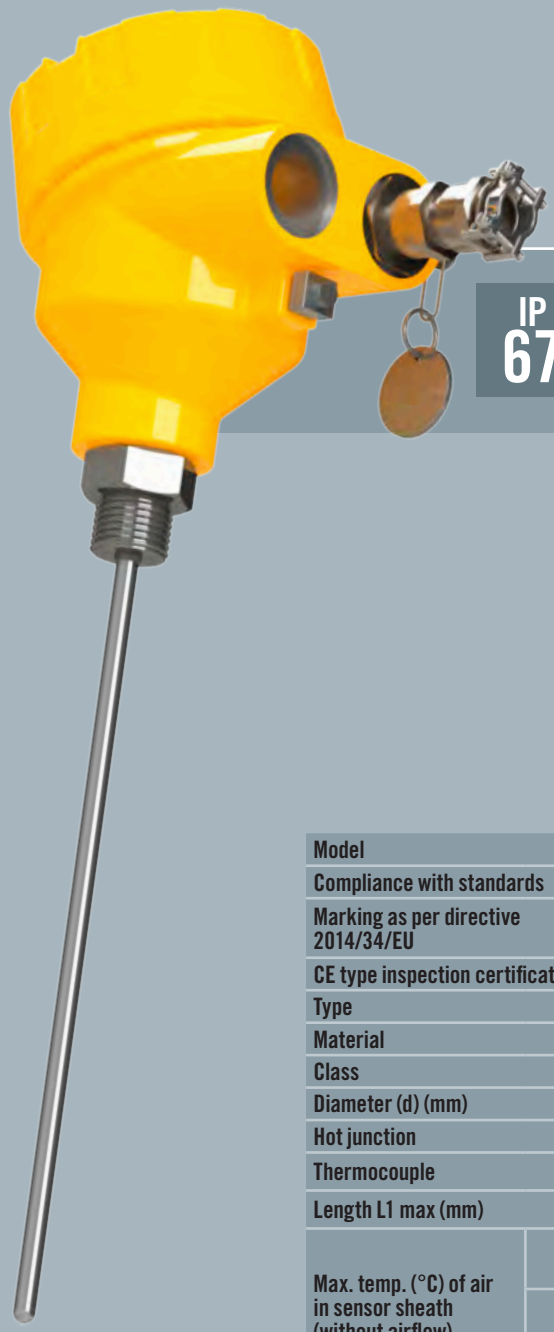
7

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100

For any other configuration, please contact us.

DIAGRAM (MM)





TAX41G
THERMOCOUPLE

IP 67 | CLASS 1 | INTRINSIC SAFETY | IEC 584-1 | up to 1150°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathed thermocouple with output via DAN or LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		TAX41G				
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		Ex II 1GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da				
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1				
Diameter (d) (mm)		4.5 - 6 - 8				
Hot junction		Insulated / Earthed				
Thermocouple		Single / Duplex			Simple	
Length L1 max (mm)		1 500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	ø 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Without, under head G½, connection G½				
Electrical connection	Head type	LSX			DAN-Vi	
	Material	Light alloy epoxy coating				
	Output	1 cable gland M20x1,5				
	Cable diam.	6 mm to 12 mm			4 mm to 12.5 mm	
	Equipment	Ceramic terminal strip (standard) / Transmitter				
	IP	IP67				
Accessories (p.338)		Leak-tight fittings, rotating fittings, thermowell				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	PROCESS CONNECTION	HOT JUNCTION
TAX41G	LSX	1T	AC	6	950	5	I
Reference in table and diagram	1	2	3	4	5	6	
Possible choice	LSX : LSX DAN-Vi : DVI	1T 1J 1K 1N 2K 2J	316L : AC INCONEL 600 : CM PYROSIL : DB	4.5 6 8	100 to 1,500	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	Insulated: I Earthed: M

EN OPTION

CABLE GLAND	TRANSMITTER	TRANSMITTER SCALE	DIAL*
CAP	G	0/250	XS
	7		
For LSX head only Cap: CAP Atex ia: P3 For DAN head Cable gland M20x1.5: DAN	LC5331B-221: F LC5335B-100: G TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA * compatible with the TTH200/TTH300 transmitters (see page 200)

THERMOCOUPLE INFORMATION

Class 1 TC (2)	Sheath diameter (mm) (4)		
	4.5	6	8
T (CLASS 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	-
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

(3)

TRANSMITTER INFORMATION (1 TC ONLY)

(7)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

CONNECTIONS

Duplex thermocouple

Red +

Black -

Green +

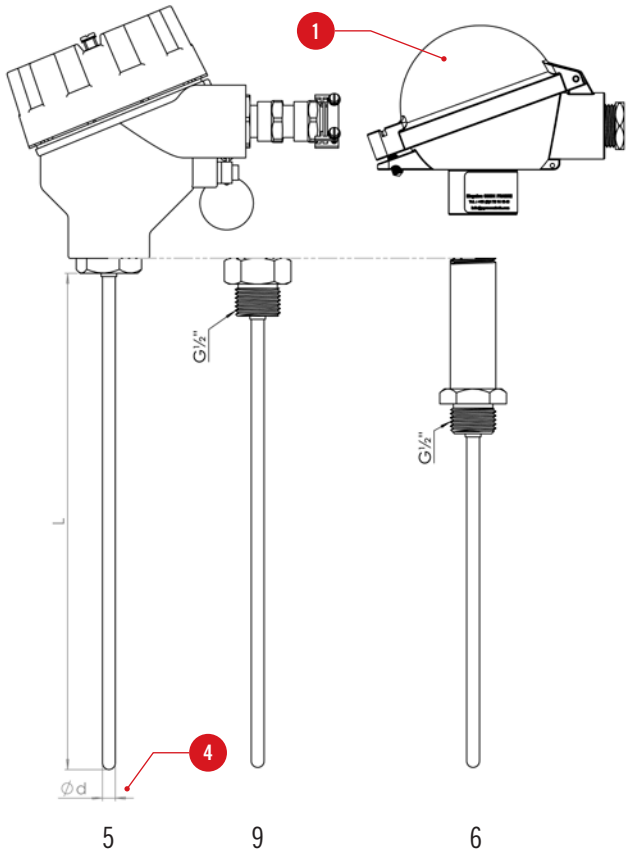
-

Single thermocouple

Red +

Black -

DIAGRAM (MM)



PROCESS CONNECTION

(6)

For any other configuration, please contact us.

SA1G

Pt100



IP 54/65 | CLASS A | IEC 60751 | INTRINSIC SAFETY | up to 450°C

DESCRIPTION

Pt100 process sensor for use in explosive zones with a gas environment, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		SA1G	
Compliance with standards		IEC 60751 / EN 60079-0	
Marking as per directive 2014/34/EU		With DAN i head: Ex II 1G / Ex ia IIC T4…T6 Ga With DAN Vi head: Ex II 1 GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X	
Type		Pt100	
Class		A	
Mounting/Construction		1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires	
Diameter (d) (mm)		6 / 8	
Min./max. operating temperature (°C)		-40…+450°C	
Type of measuring element		DS… / TS…	
Length L1 max (mm)		1 500	
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: ½" NPT. Stainless steel.	
Electrical connection	Head type	DAN i	DAN-Vi
	Material	Light alloy	
	Output	1 cable gland M20x1.5	
	Cable diam.	5.5 to 7.5 mm	
	Equipment	Ceramic terminal strip (standard) / Transmitter	
	IP	IP54	IP65
Accessories (p.338)		Measuring element, thermowell, cable gland	

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

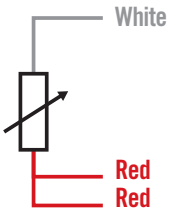
Parameters to be indicated when ordering. Example:

MODEL	HEAD	DIAM (mm)	MOUNTING	LENGTH L1 (mm)	EXTENSION	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
SA1G	DVI	6	C	900	M	G	0/250
Reference in table and diagram	1	2	3	4	5	6	
Possible choice	DAN i: DNI DAN-Vi: DVI	6 8	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	Max. 1,500 mm* *2x2-wire mounting limited to 250 mm	Extension type M: M Extension type RU: R	LC5333B-100: E LC5331B-321: F LC5335B-100: G	

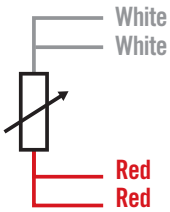
CONNECTIONS

3

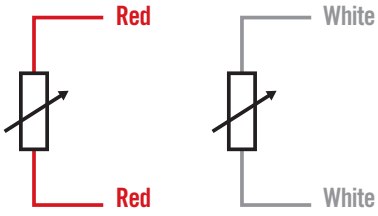
Connection 1 Pt100 Ω
1x3 wires



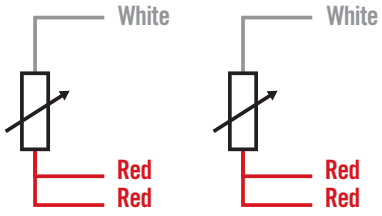
Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



Connection 2 Pt100 Ω
2x3 wires

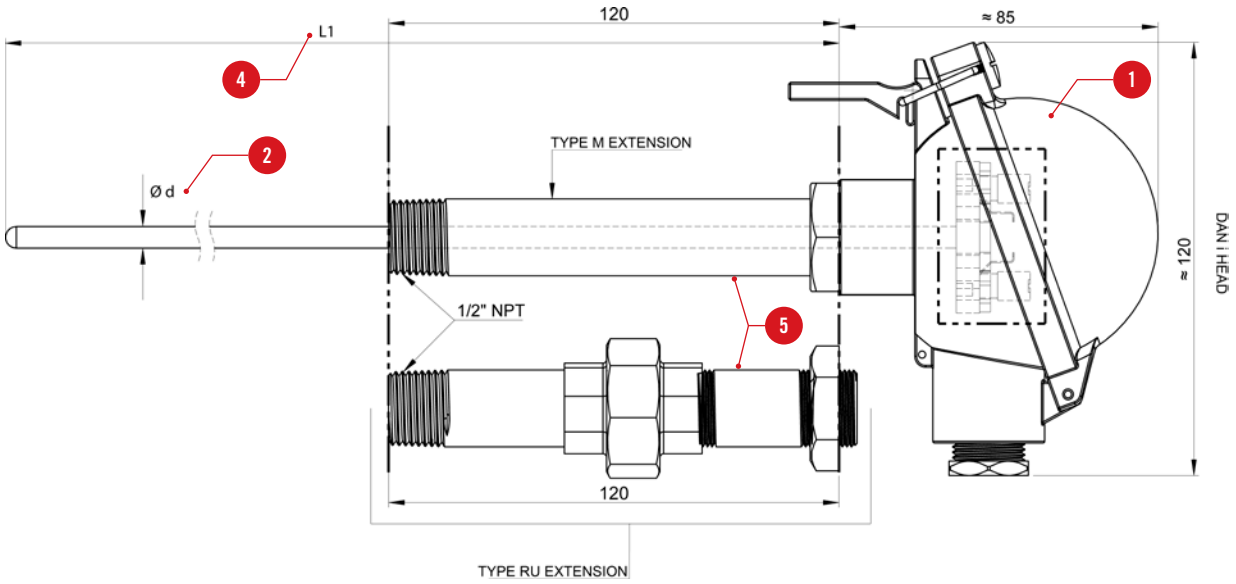


TRANSMITTER INFORMATION (1 PT100 ONLY)

6

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
Pt100	4-20mA	NONE	ia	LC5333B-100
TC + Pt100	4-20mA	1.5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1.5kV	ia	LC5335B-100

DIAGRAM (MM)





SAX41G

Pt100

IP 67 | CLASS A | IEC 60751 | INTRINSIC SAFETY | up to 450°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathed PT100 sensor with output via DAN or LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		SAX41G	
Compliance with standards		IEC 60751 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 1GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X	
Type		PT 100Ω	
Class		A	
Mounting/Construction		1x3 wires / 1x4 wires / 2x3 wires	
Diameter (d) (mm)		4.5 - 6 - 8	
Min./max. operating temperature (°C)		-40…+450°C	
Length L1 max (mm)		1,500	
Process connection		Without, under head G½, connection G½	
Electrical connection	Head type	LSX	DAN-Vi
	Material	Light alloy epoxy coating	
	Output	1 PE M20x1,5	
	Cable diam.	6 mm to 12 mm	4 mm to 12,5 mm
	Equipment	Ceramic terminal strip (standard) / Transmitter	
	IP	IP67	
Accessories (p. 338)		Leak-tight fittings, rotating fittings, thermowell	

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

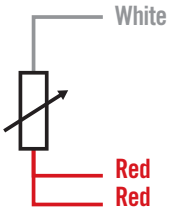
Parameters to be indicated when ordering. Example:

MODEL	HEAD	Ø SHEATH (mm)	LENGTH L1 (MM)	MONTAGE	RACCORD PROCESS	CABLE GLAND	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE	OPTION: DIAL*
SAX41G	LSX	6	950	C	5	CAP	T200	0/250	AA
Référence tableau et schéma	1	2	3	4	5	6	6		6
Choix possible	LSX : LSX DAN-Vi : DVI	4.5 6 8	100 to 1500	1x3 wires : B 1x4 wires : C 2x3 wires : D	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	For LSX head only Cap: CAP Atex ia: P3 For DAN head Cable gland M20x1.5: DAN	LC5333B-100 : E LC5331B-321: F LC5335B-100: G TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA * compatible with the TTH200/TTH300 transmitters (see page 200)

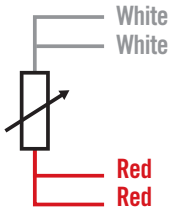
CONNECTIONS

3

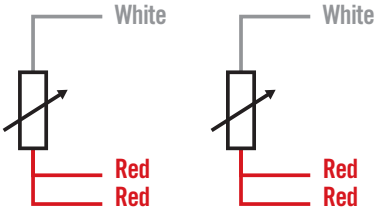
Connection 1 Pt100 Ω
1x3 wires



Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x3 wires

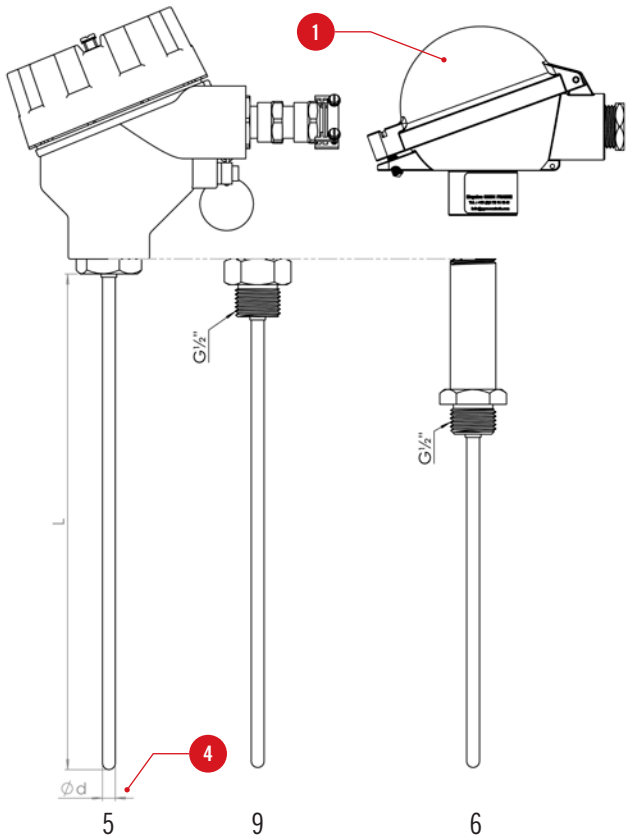


TRANSMITTER INFORMATION (1 TC ONLY)

6

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
Pt100	4-20mA	WITHOUT	ia	LC5333B-100
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

DIAGRAM (MM)



PROCESS CONNECTION

5



TCG3i
THERMOCOUPLE

PVC CABLE OUTPUT | INTRINSIC SAFETY | CLASS 1 | IEC 584-1 | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances.

Intrinsically-safe ATEX model for use in gas zones (0, 1 and 2) and dust zones (20, 21, 22).

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG3i	
Compliance with standards		IEC 584-3 / EN 61515 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X	
Type		K	J
Material		Inconel 600	316L
Class		1	
Diameter (d) (mm)		1 / 1,5 / 2 / 3 / 4.5 / 6 / 8	
Hot junction		Insulated	
Thermocouple		Single / Duplex	
Length L max (mm)	Diam. 1 to 2 mm	100 to 36,000 mm	
	Diam.> 2 mm	100 to 30,000 mm	
Max. temp. in air (°C) in sensor sheath (without flow) (theoretical)	Diam.1 -1.5mm	650°C	260°C
	Diam. 2 mm	700°C	440°C
	Diam. 3 mm	750°C	520°C
	Diam. 4.5mm	800°C	620°C
	Diam. 6 mm	1000°C	720°C
	Diam. 8 mm	1100°C	720°C
Output	Type of cable	extension	
	Cable sheath	PVC	
	Max. temperature	105°C	
	Conductors	2x0.22 mm², PVC insulation	
	Braid	Internal, copper, connected to sensor sheath	
	Length Lc Min/Max (mm)	200 to 10,000 mm	
Accessories (p.338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC TYPE		Ø SHEATH (MM)		LENGTH L (mm)		LENGTH LC (mm)		PROTECTIVE SPRING
TCG3i	-	1K	-	2.0	-	10200	-	2000	-	0
Reference in table and diagram		1		2		3		4		5
Possible choice		1J 1K 2J 2K		1.0 1.5 2.0 3.0 4.5 6.0 8.0		Diam 1-1.5-2: 00100 to 36,000 Diam 3 - 4.5 - 6 - 8: 00100 to 30,000		Lc: 200 to 10,000 mm (standard: 2,000 mm)		Without: 0 With: 1 (standard)

DIAGRAM (MM)

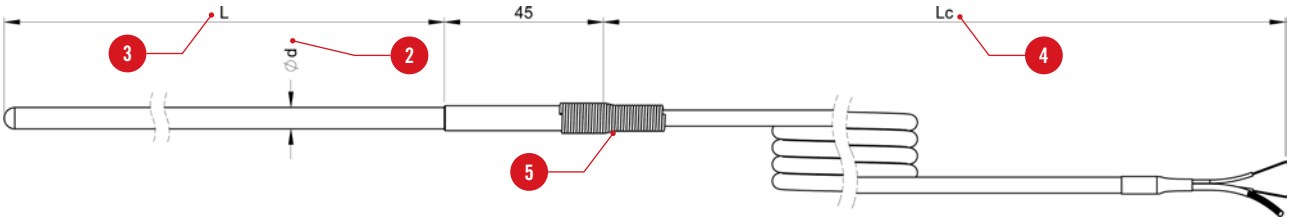
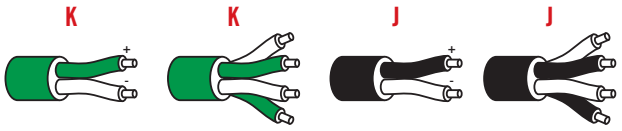


TABLE OF THERMOCOUPLE INFORMATION

Model	Cable	TC Class 1 (1)	Sheath diameter (mm)						
			1	1.5	2	3	4.5	6	8 (2)
TCG3i	PVC sheath	J	316L	316L	316L	316L	316L	316L	316L
		K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
		2J	-	316L	316L	316L	316L	316L	316L
		2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

CONNECTIONS



Single Duplex Single Duplex

For any other configuration, please contact us.

TCG32i
THERMOCOUPLE



FEP CABLE OUTPUT | CLASS 1 | INTRINSIC SAFETY | IEC 584-1 | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances.

Intrinsically-safe ATEX model for use in gas zones (0, 1 and 2) and dust zones (20, 21, 22).

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG32i	
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X	
Type		K	J
Material		Inconel 600	316L
Class		1	
Diameter (d) (mm)		1 / 1.5 / 2 / 3 / 4.5 / 6 / 8	
Hot junction		Insulated	
Thermocouple		Single / Duplex	
Length L max (mm)	Diam. 1 to 2 mm	100 to 36,000 mm	
	Diam.> 2 mm	100 to 30,000 mm	
Max. temp. in air (°C) in sensor sheath (without flow) (theoretical)	Diam.1 -1.5mm	650°C	260°C
	Diam. 2 mm	700°C	440°C
	Diam. 3 mm	750°C	520°C
	Diam. 4.5mm	800°C	620°C
	Diam. 6 mm	1000°C	720°C
	Diam. 8 mm	1100°C	720°C
Output	Type of cable	extension	
	Cable sheath	FEP	
	Max. temperature	250°C	
	Conductors	2 x 0.22 mm², FEP insulation	
	Braid	Internal, copper, connected to sensor sheath	
	Length Lc Min/Max (mm)	200 to 10,000 mm	
Accessories (p.338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC TYPE		Ø SHEATH (mm)		LENGTH L (mm)		LENGTH LC (mm)		PROTECTIVE SPRING
TCG32i	-	1J	-	8.0	-	22,000	-	9,000	-	1
Reference in table and diagram		1		2		3		4		5
Possible choice		1J 1K 2J 2K		1.0 1.5 2.0 3.0 4.5 6.0 8.0		Diam 1-1.5-2: 100 to 36,000 Diam 3 - 4.5 - 6 - 8: 100 to 30,000		Lc: 200 to 10,000 mm (standard: 2,000 mm)		Without: 0 With: 1 (standard)

DIAGRAM (MM)

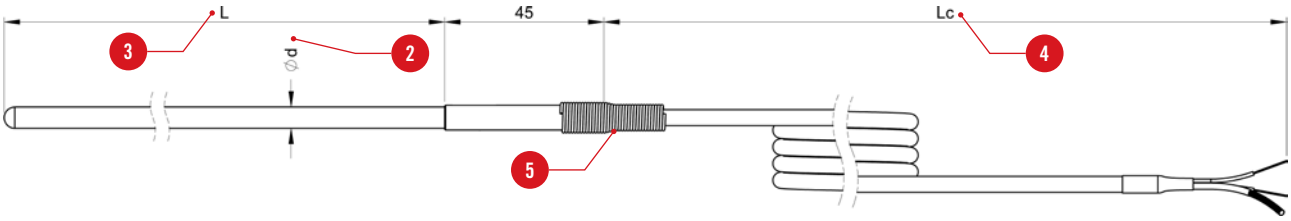
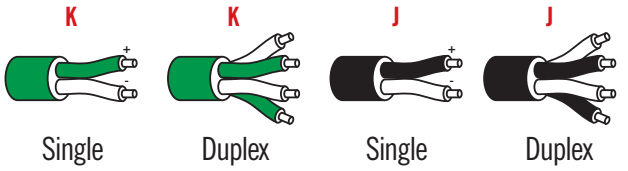


TABLE OF THERMOCOUPLE INFORMATION

Model	Cable	Class 1 TC (1)	Sheath diameter (mm)						
			1	1.5	2	3	4.5	6	8 (2)
TCG32i	FEP sheath	J	316L	316L	316L	316L	316L	316L	316L
		K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
		2J	-	316L	316L	316L	316L	316L	316L
		2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

CONNECTIONS



For any other configuration, please contact us.



S1i
Pt100

PVC CABLE OUTPUT OU FEP OU SILICONE | CLASS A | INTRINSIC SAFETY | IEC 60751 | up to 450°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 60751, with cable output, for temperature measurement up to 450°C in low-pressure and low flow-rate environments.

Intrinsically-safe ATEX model for use in gas zones (0, 1 and 2) and dust zones (20, 21, 22).

SPECIFICATIONS

Model		S1i		
Compliance with standards		IEC 60751 / EN 60079-0		
Marking as per directive 2014/34/EU		Ex II 1GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da		
CE type inspection certificate		LCIE 14ATEX3020 X		
Type		Pt100 Ω		
Material		316 L		
Class		A		
Mounting/Construction		Single: 1x3 wires ou 1x4 wires / Duplex: 2x2 wires ou 2x3 wires		
Diameter (d) (mm)		1.6 / 3 / 4.5 / 6 / 8		
Length L max (mm)		See table opposite		
Max. temp. in air (°C)		450°C		
Output	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3, 4 or 6 x 0.22 mm, PVC insulation	3, 4 or 6 x 0.22 mm, FEP insulation	3, 4 or 6 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/ Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p.338)		Measuring element, thermowell, cable gland		

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		NO. OF PT100		MOUNTING		Ø SHEATH (mm)		LENGTH L (mm)		CABLE		LENGTH LC (mm)		PROTECTIVE SPRING
S1i	-	1	-	C	-	3	-	1,000	-	PVC	-	900	-	1
Reference in table and diagram		1		2		3		4		5		6		7
Possible choice		1 2		1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E		1,6 3 4.5 6 8		As per table below		PVC PVC FEP: FEP Silicone: SIL		200 to 10,000 mm		Without: 0 With: 1 (standard)

DIAGRAM (MM)

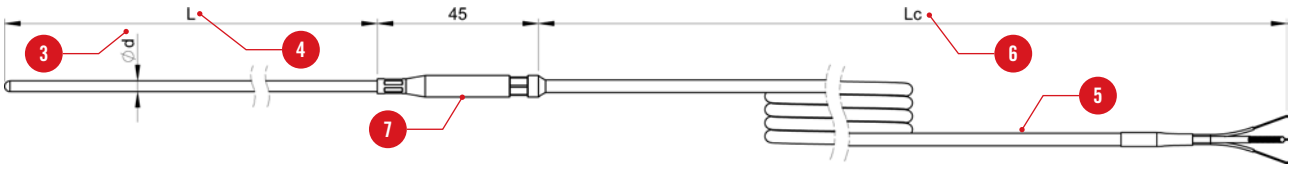


TABLE OF POSSIBLE ASSOCIATIONS

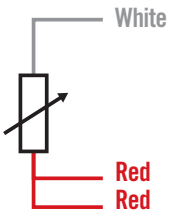
1 Number of Pt100	2 Mounting	Min. / max. length				3
		1.6	3	4.5	6	8
1	1x3 wires	50 / 250	50 / 1500	50 / 1500	50 / 1500	50 / 1500
	1x4 wires	50 / 250	50 / 1500	50 / 1500	50 / 1500	50 / 1500
2	2x2 wires	-	-	50 / 250	50 / 250	50 / 250
	2x3 wires	-	-	50 / 1500	50 / 1500	50 / 1500

4

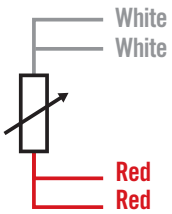
CONNECTIONS

2

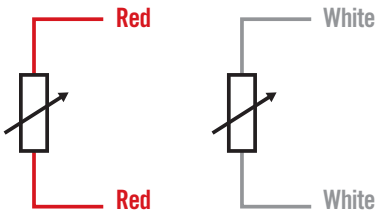
Connection 1 Pt100 Ω
1x3 wires



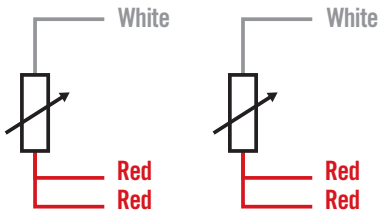
Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



Connection 2 Pt100 Ω
2x3 wires



For any other configuration, please contact us.

ENVIRONMENT GAS

ZONES 1,2 ATEX d

LSX-D / LSX-W

HEADS FOR ID50





IP 54 | **WITH OR WITHOUT WINDOW** | **ANTI-EXPLOSION**

DESCRIPTION

ATEX heads for the id50 system. The PYROmodules id50 solution allows you to choose between an LSX-W head with a window and a head without a window: the LSX-D

SPECIFICATIONS

Model	LSX-D	LSX-W
ATEX	Ex II 2 GD / Ex db IIC T6 Gb	
Material	Epoxy-coated aluminium alloy	
Colour	Yellow	
Cable input (cable gland, not supplied)	1 input M20x1.5 with plastic cover	1 input M20x1.5 with plastic cover 1 input M20x1.5 with cap
Process connection	G ½	
Window for mounting a display		•
External earth terminal	•	•
Cover chain	•	
Accessory supplied	Sleeved base for locking the internal element, reference L810437-004	

See page 192 for an overview of the PYROmodules id50 solution and page 194 to order a complete assembled sensor.

DESIGN YOUR SENSOR ID50

HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

TO ORDER

Picture	Head	ATEX	Reference
	LSX-D: without window	d	L810439-001
	LSX-W: with window	d	L810523-001
	LSX-W with strap for 2" tube	d	L810499-001
	LSX-W with wall bracket	d	L810520-001

MOUNTING





AS - A

INDICATORS FOR ID50

WITH OR WITHOUT KEYPAD

SELF-POWERED

DESCRIPTION

LCD indicators for mounting on TTH transmitters
Type AS: without keypad
Type A: with keypad

SPECIFICATIONS

Model	Type AS	Type A
Reference	L810503-000	L810502-000
Properties	Graphical LCD indicator controlled by transmitter without configuration function	Graphical LCD indicator controlled by transmitter with configuration function (keypad)
Compatibility	TTH200 / TTH300	TTH300
Display	Polarity signs, 4 digits, 2 digits after the decimal point	Height of characters depending on mode, polarity signs, 4 digits, 2 digits after the decimal point, bar graph indicator.
Display possibilities	Sensor process value Bar chart Output %	Sensor process value 1 Sensor process value 2 Ambient / electronics temp. Output value Output % Bar chart Output % Troubleshooting display information for transmitter and sensor status
Ambient operating temperature	-20 to +70°C	

See page 192 for an overview of the PYROmodules id50 solution and page 194 to order a complete assembled sensor.

DESIGN YOUR SENSOR ID50

HEAD | **INDICATOR** | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

DISPLAY

Type A LCD indicator



Type AS LCD indicator



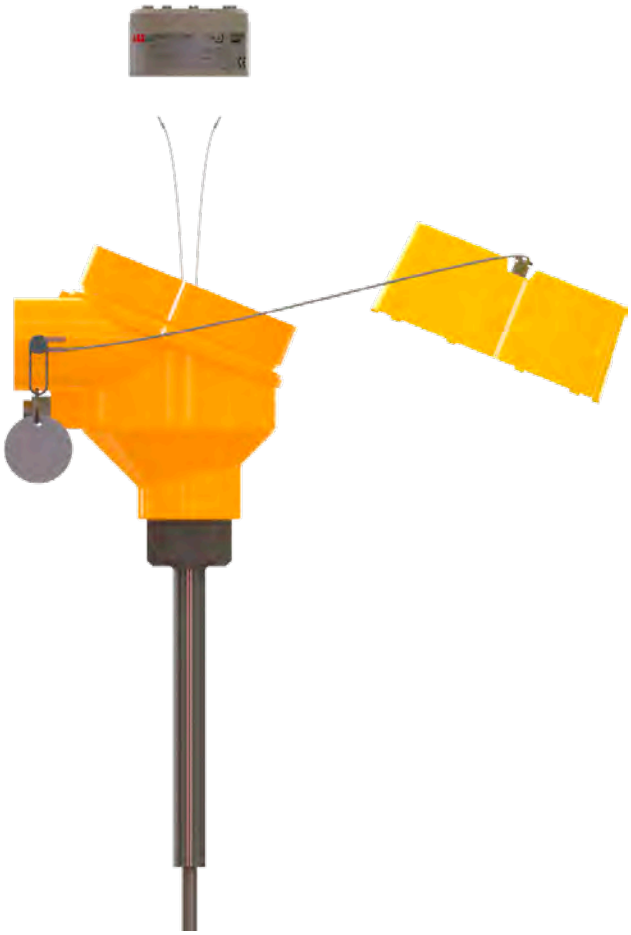
1. Quit / Cancel
2. Scroll back
3. Scroll forward
4. Confirm

TO ORDER

Indicator for TTHX00	Reference
Type AS: without keypad	L810502-100
Type A: with keypad	L810503-100

MOUNTING

The type A indicator can only be mounted on a TTH300 transmitter.
The type AS indicator can be mounted on a TTH200 or TTH300 transmitter.
It can be configured using the keypad on the indicator.
The indicator is fixed on a tilted base.
The indicator+transmitter assembly can only be mounted in LSX-W heads.



5335 TTH200/300

TRANSMITTERS FOR ID50



INSULATED 4-20 MA OUTPUT | TTH300 DUPLEX VERSION | TTH200 TTH300 IP20 / IP00 | 5335 IP68 / IP00 | UNIVERSAL INPUT | HART

DESCRIPTION

Programmable transmitters for conversion into a 4-20 mA analogue signal

TRANSMITTER SPECIFICATIONS

Model		TTH200	TTH300	5335
Reference		LTTH200-100	LTTH300-000	LC5335A-100
SIL2 as per IEC 61508		•		
Compatible protection mode	Ex d	•	•	•
Ambient operating temperature		-40 to +85°C / -20 to +70°C with display		-40 to +85°C
HART protocol		HART 5	HART 5 or HART 7 (choice by switch) Delivered with HART 5 as standard.	HART 5
Input		Pt100 3 or 4 wires / TC J, K, N, T		
Cold junction compensation (if used as TC input)		•	•	•
Number of sensors		1	2	1
Output		4-20mA		
Sensor breakage		Programmable 3.5…23mA		
Power supply		11...42 Vdc		8.0…35Vdc
Galvanic insulation		3.5 kVdc (2.5 kVac), 60s		1.5 kVac / 50Vac
Protection rating (as per EN60529) (head/ terminals)		IP20 / IP00		IP68 / IP00
Dimensions		Diam 44.4mm x h 24.7mm		Diam 44.0mm x h 20.2mm



TERMINAL STRIP SPECIFICATIONS

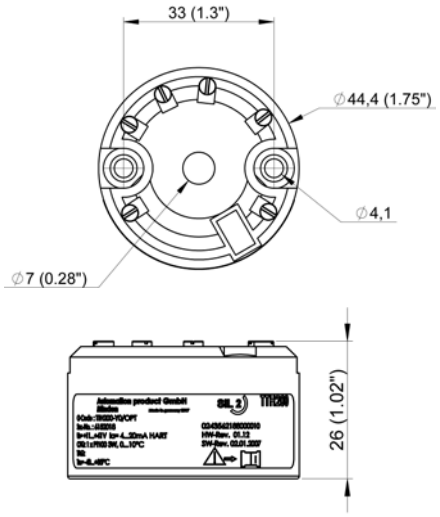
References	L015078-000	L015079-000	L015080-000
Number of terminals	2	4	6
Connection	1 x TC	2 x TC or 1 x 3-wire Pt100	2 x 3-wire Pt100

DESIGN YOUR SENSOR ID50

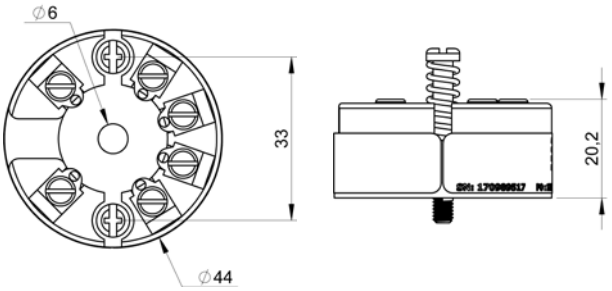
HEAD | INDICATOR | **TRANSMITTER** | EXTENSIONS | SENSING ELEMENT

CONNECTIONS

TTH200/300 transmitter

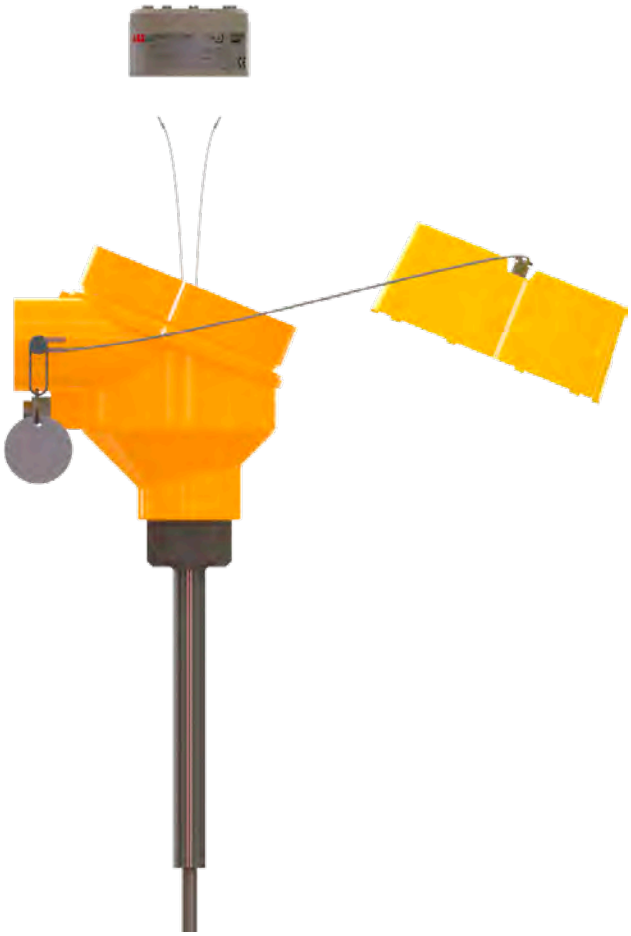


5335 transmitter



MOUNTING

Insert the wires of the ID50 measuring element inside the transmitter and screw it inside the connecting head.
For the intrinsic-safety loop calculation, the electrical parameters of the transmitters are indicated in the ia/A safety instructions.
Set up the cable of the ID50 measuring element as shown in the wiring diagrams.



TO ORDER

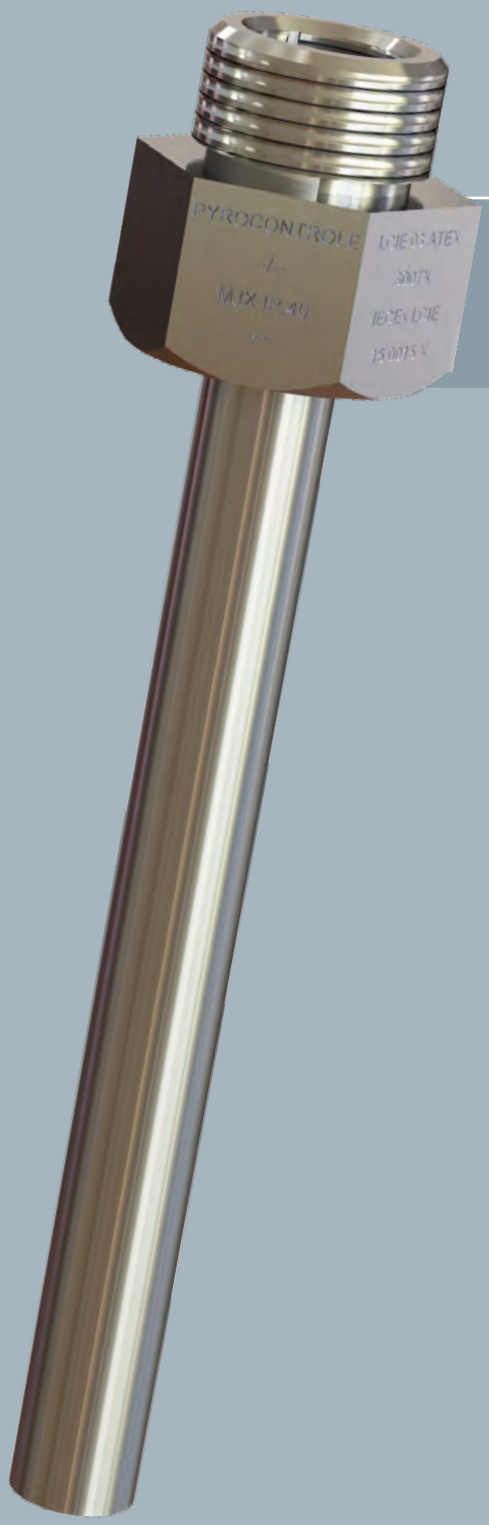
	Transmitter	Reference
	TTH200	LTTH200-000
	TTH300	LTTH300-000
	5335B	LC5335A-100

	Ceramic terminal strip	Reference
	2 terminals	L015078-000
	4 terminals	L015079-000
	6 terminals	L015080-000

See page 192 for an overview of the PYROmodules id50 solution and page 194 to order a complete assembled sensor.

ID50 SENSOR

EXTENSIONS FOR ID50



ADJUSTABLE FROM 120 TO 200 mA

316L STAINLESS STEEL

DESCRIPTION

The extension provides the link between the head and the thermowell. It comprises two parts, upper and lower, and can be adjusted without cutting , according to the length of the measuring element and the depth of the thermowell.

SPECIFICATIONS

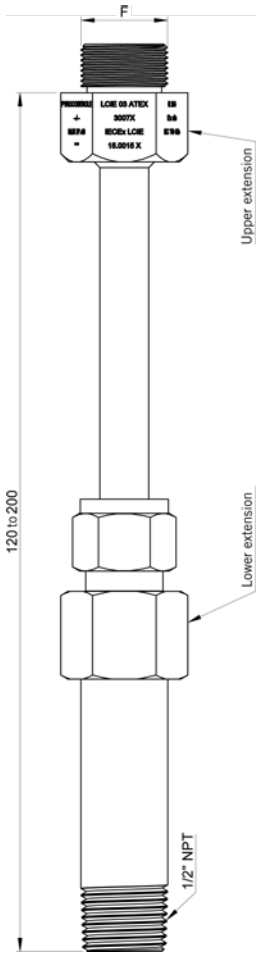
Part	Upper	Lower
ATEX	Ex II 2G - Ex db IIC T6 Gb	N/A
Material	316L	
Mounting	On head	On thermowell
Threading	As per table opposite	½ NPT
Accessories	Screw for locking the measuring element for any head other than the LSX model. Thread lock	

See page 192 for an overview of the PYROmodules id50 solution and page 194 to order a complete assembled sensor.

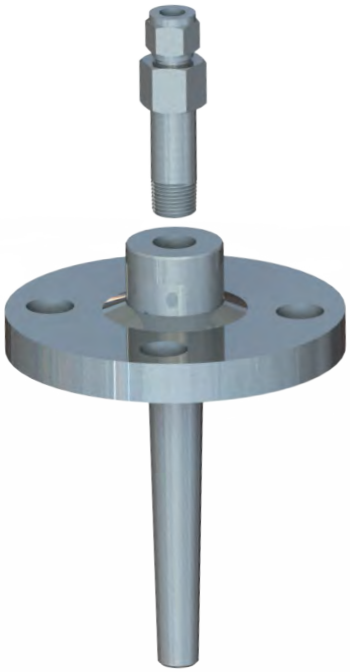
DESIGN YOUR SENSOR ID50

HEAD | INDICATOR | TRANSMITTER | **EXTENSIONS** | SENSING ELEMENT

DIAGRAM (MM)



MOUNTING



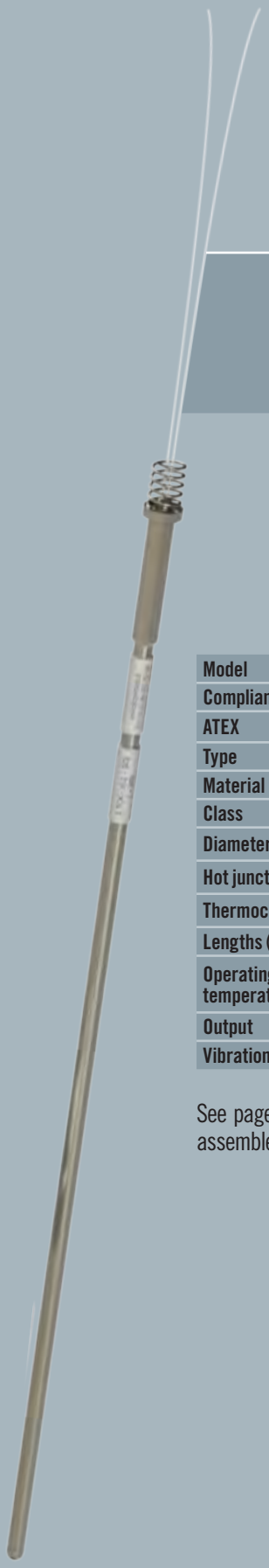
Set the lower extension in place on the thermowell.



Screw the lower extension on the thermowell with a size-27 open-end wrench by making use of the hexagonal shape of the leak-tight fitting.
Tighten until the lower extension is locked.

TO ORDER

Assembly		F	Reference
Upper extension	For LSX head (locking screw not included)	G½	L810437-001
	for other heads (screw included)	G½	L810437-G12
		M24	L810437-M24
		M20	L810437-M20
		½ NPT	L810437-N12
Lower extension			L810437-000



IDG50

THERMOCOUPLE FOR ID50

ANTI-EXPLOSION | CLASS 1 | SINGLE OR DUPLEX | IEC 584-1 | up to 1100°C

DESCRIPTION

Thermocouple measuring elements for the id50 system

SPECIFICATIONS

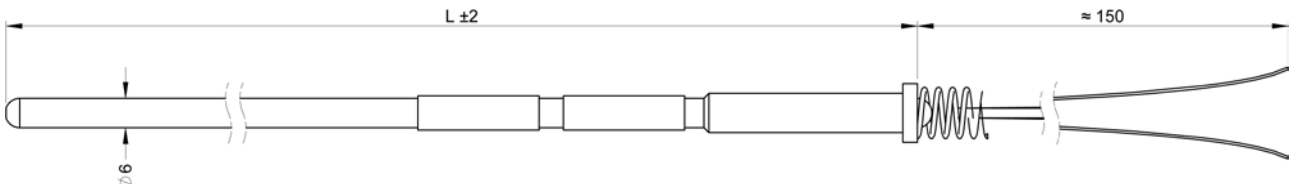
Model		IDG50		
Compliance with standards		IEC 61515 / IEC 584-1 / EN 60079-0		
ATEX		Ex II 2 G / Ex db IIC T6 Gb / Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da		
Type		K	J	N
Material		Inconel 600	316L	Inconel 600
Class		1	1	1
Diameter (d) (mm)		6		
Hot junction		Insulated		
Thermocouple		Single / Duplex		
Lengths (mm)		200 to 1000		
Operating temperature (°C)	Min	-40	-40	-40
	Max	1100	700	1100
Output		Wires 150 mm long with end-pieces		
Vibration withstand		60g		

See page 192 for an overview of the PYROmodules id50 solution and page 194 to order a complete assembled sensor.

DESIGN YOUR SENSOR ID50

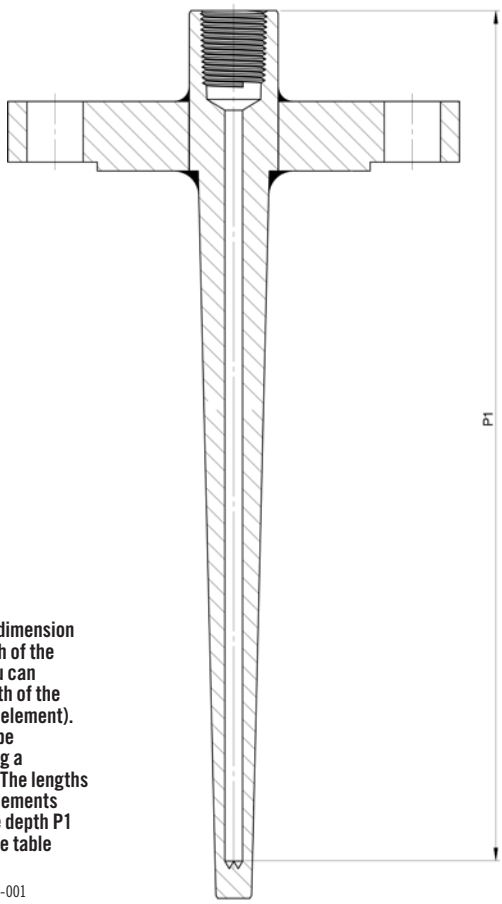
HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

DIAGRAM (MM)



DETERMINATION OF IDG50 ELEMENT LENGTH

Flanged thermowell



By determining dimension P1 (drilling depth of the thermowell), you can choose the length of the ID50 measuring element). This length can be determined using a measuring rod*.The lengths of the sensing elements according to the depth P1 are defined in the table below.

*Reference = L860514-001

TO ORDER

K THERMOCOUPLE	Single reference	Duplex reference
Length 200 mm	L810430-200	L810431-200
Length 250 mm	L810430-250	L810431-250
Length 300 mm	L810430-300	L810431-300
Length 350 mm	L810430-350	L810431-350
Length 400 mm	L810430-400	L810431-400
Length 450 mm	L810430-450	L810431-450
Length 500 mm	L810430-500	L810431-500
Length 550 mm	L810430-550	L810431-550
Length 600 mm	L810430-600	L810431-600
Length 650 mm	L810430-650	L810431-650
Length 700 mm	L810430-700	L810431-700
Length 750 mm	L810430-750	L810431-750
Length 800 mm	L810430-800	L810431-800
Length 850 mm	L810430-850	L810431-850
Length 900 mm	L810430-900	L810431-900
Length 950 mm	L810430-950	L810431-950
Length 1000 mm	L810430-001	L810431-001
N thermocouple	L810447-...	L810449-...
J thermocouple	L810445-...	L810448-...

CONNECTIONS - SINGLE AND DUPLEX

KTC



KTC duplex



Sensing element length	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Min. P1 (mm)	20	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820
Max. P1 (mm)	85	135	185	235	285	335	385	435	485	535	585	635	685	735	785	835	885



IDG50

Pt100 FOR ID50

ANTI-EXPLOSION | CLASS A | SINGLE OR DUPLEX | IEC 60751 | up to 450°C

DESCRIPTION

Pt100 measuring elements for the id50 system

SPECIFICATIONS

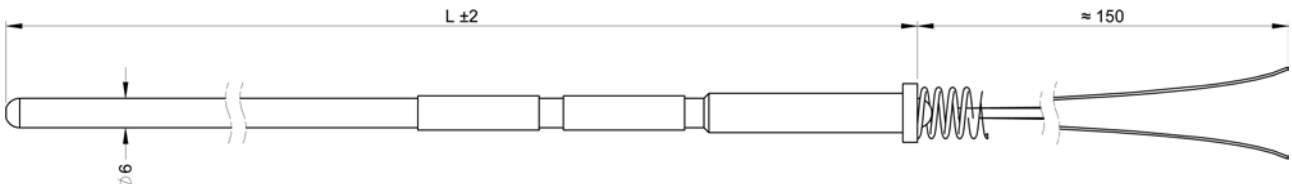
Model	IDG50			
Compliance with standards	IEC 60751 / EN 60079-0			
ATEX	Ex II 2 G / Ex db IIC T6 Gb / Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da			
Type	Pt100			
Material	316 L			
Class	A			
Diameter (d) (mm)	6			
Min./max. operating temp. (°C)	-40°C… 450°C			
Output	Wires 150 mm long with end-pieces			
Reference	L810432	L810433	L810434	L810435
Thermocouple	Single	Duplex	Single	Duplex
Mounting	1x3 wires	2x3 wires	1x3 wires	2x3 wires
Vibration withstand	10g		50g	

See page 192 for an overview of the PYROmodules id50 solution and page 194 to order a complete assembled sensor.

DESIGN YOUR SENSOR ID50

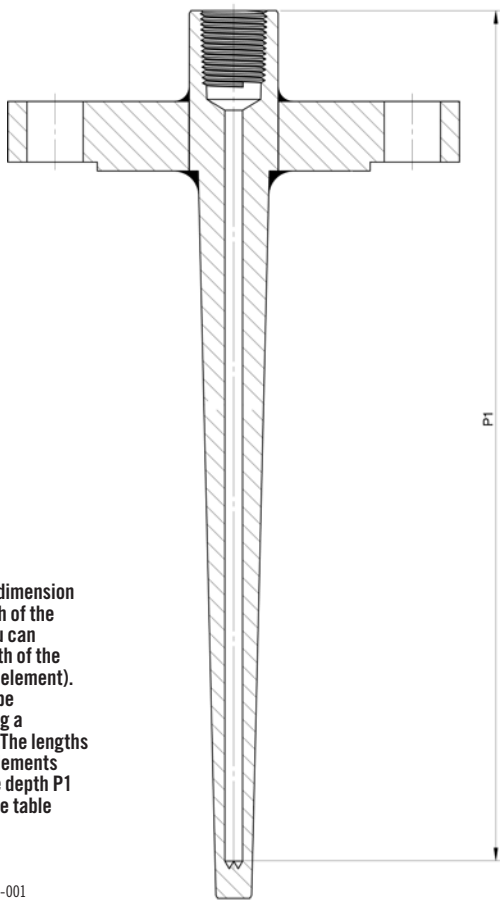
HEAD | INDICATOR | TRANSMITTER | EXTENSIONS | SENSING ELEMENT

DIAGRAM (MM)



DETERMINATION OF IDG50 ELEMENT LENGTH

Flanged thermowell



By determining dimension P1 (drilling depth of the thermowell), you can choose the length of the ID50 measuring element). This length can be determined using a measuring rod*.The lengths of the sensing elements according to the depth P1 are defined in the table below.

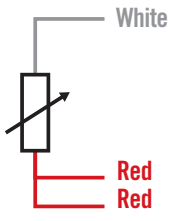
*Reference = L860514-001

TO ORDER

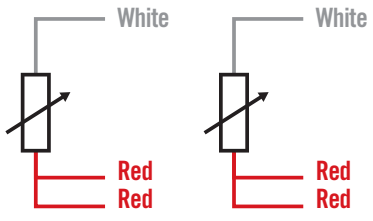
3-wire Pt100, Withstand 10g	Single reference	Duplex reference
Length 200 mm	L810432-200	L810433-200
Length 250 mm	L810432-250	L810433-250
Length 300 mm	L810432-300	L810433-300
Length 350 mm	L810432-350	L810433-350
Length 400 mm	L810432-400	L810433-400
Length 450 mm	L810432-450	L810433-450
Length 500 mm	L810432-500	L810433-500
Length 550 mm	L810432-550	L810433-550
Length 600 mm	L810432-600	L810433-600
Length 650 mm	L810432-650	L810433-650
Length 700 mm	L810432-700	L810433-700
Length 750 mm	L810432-750	L810433-750
Length 800 mm	L810432-800	L810433-800
Length 850 mm	L810432-850	L810433-850
Length 900 mm	L810432-900	L810433-900
Length 950 mm	L810432-950	L810433-950
Length 1000 mm	L810432-001	L810433-001

CONNECTIONS

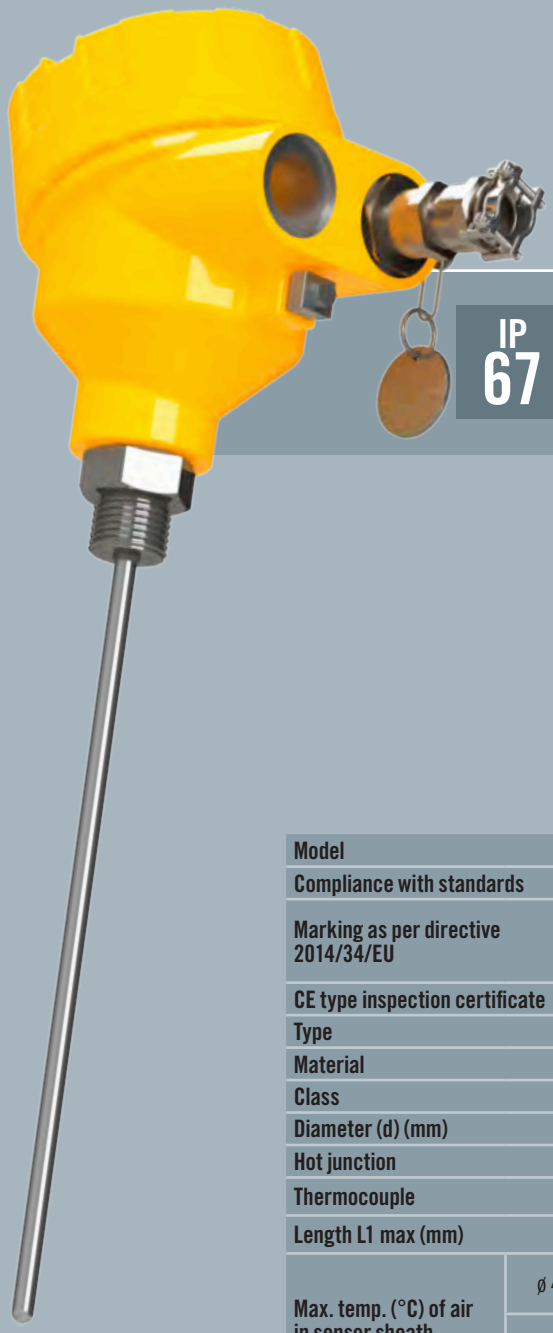
Connection 1 Pt100 Ω
1x3 wires



Connection 2 Pt100 Ω
2x3 wires



Sensing element length	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Min. P1 (mm)	20	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820
Max. P1 (mm)	85	135	185	235	285	335	385	435	485	535	585	635	685	735	785	835	885



TAX42G
THERMOCOUPLE

IP 67 | CLASS 1 | ANTI EXPLOSION | IEC 584-1 | up to 1150°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathed thermocouple with output via LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		TAX42G				
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		Ex II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP.6X Do not open when a voltage is present Do not open if there is dust in the atmosphere				
CE type inspection certificate		LCIE 14ATEX3007 X / IECEx LCIE 15.0015 X				
Type		K	J	T	N	
Material		Inconel600	316L	316L	Inconel 600	Pyrosil
Class		1				
Diameter (d) (mm)		4.5 - 6 - 8				
Hot junction		Insulated / Earthed				
Thermocouple		Single / Duplex			Single	
Length L1 max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	ø 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Without, under head G½, connection G½				
Electrical connection	Head type	LSX				
	Material	Light alloy epoxy coating				
	Output	1 cable gland M20x1,5 with fastening module		1 cable gland M20x1.5 for armoured cable with fastening module		
	Cable diam.	7 mm to 12 mm		Ø internal : 4.5mm to 8mm Ø external : 7 mm to 12 mm		
	Equipment	Ceramic terminal strip (standard) / Transmitter				
	IP	IP67				
Accessories (p. 338)		Leak-tight fittings, rotating fittings, thermowell				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	PROCESS CONNECTION	HOT JUNCTION
TAX42G	LSX	1T	AC	6	950	5	I
Reference in table and diagram	1	2	3	4	5	6	
Possible choice	LSX : LSX	1T 1J 1K 1N 2K 2J	316L : AC INCONEL 600 : CM PYROSIL : DB	4.5 6 8	100 to 1,500	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	Insulated: I Earthed: M

OPTION

CABLE GLAND	TRANSMITTER	TRANSMITTER SCALE	DIAL*
CAP	B	0/250	XS
	7		
Cap: CAP For non-armoured cable: PE1 For armoured cable: PE2	LC5334A-100: A LC5331A-321: B LC5335A-100: C TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA *compatible with the TTH200/TTH300 transmitters (see page 228)

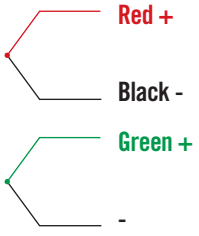
THERMOCOUPLE INFORMATION

Class 1 TC (2)	Sheath diameter (mm) (4)		
	4.5	6	8
T (CLASS 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	-
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

(3)

CONNECTIONS

Duplex thermocouple



Single thermocouple

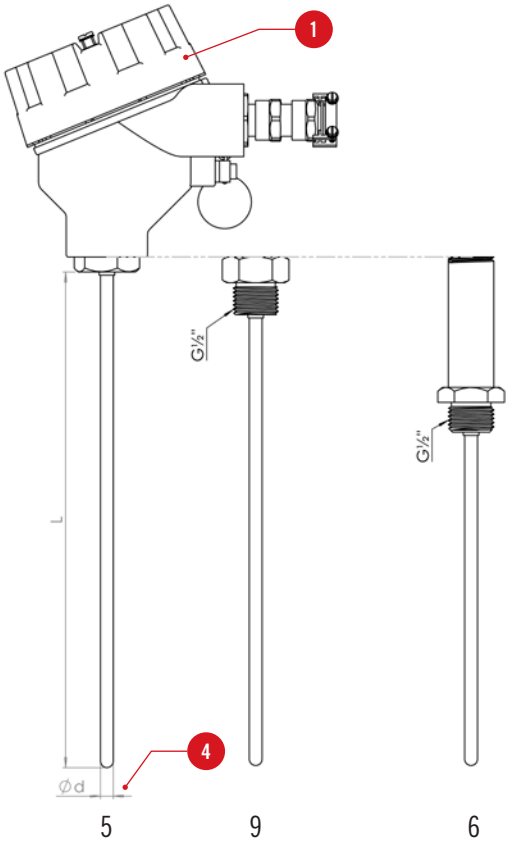


TRANSMITTER INFORMATION (1 TC ONLY) (7)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

For any other configuration, please contact us.

DIAGRAM (MM)



PROCESS CONNECTION (6)



SAX42G

Pt100

IP 67 | CLASS A | IEC 60751 | ANTI EXPLOSION | up to 450°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathedPT100 sensor with output via LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		SAX42G	
Compliance with standards		IEC 60751 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP.6X Do not open when a voltage is present Do not open if there is dust in the atmosphere	
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X	
Type		PT 100Ω	
Class		A	
Mounting		1x3 wires / 1x4 wires / 2x3 wires	
Diameter (d) (mm)		4.5 - 6 - 8	
Min./max. operating temperature (°C)		-40…+450°C	
Length L1 max (mm)		1,500	
Process connection		Without, under head G½, connection G½	
Electrical connection	Head type	LSX	
	Material	Light alloy epoxy coating	
	Output	1 cable gland M20x1,5 with fastening module	1 cable gland M20x1.5 for armoured cable with fastening module
	Cable diam.	7 mm to 12 mm	Ø internal : 4.5mm to 8mm Ø external : 7 mm to 12 mm
	Equipment	Ceramic terminal strip (standard) / Transmitter	
	IP	IP67	
Accessories (p. 338)		Leak-tight fittings, rotating fittings, thermowell	

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

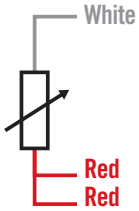
MODEL	HEAD	Ø SHEATH (mm)	LENGTH L1 (mm)	MOUNTING	PROCESS CONNECTION	CABLE GLAND
SAX42G	- LSX	- 8	- 400	- D	- 5	- CAP
Reference in table and diagram	1	2	3	4	5	5
Possible choice	LSX : LSX	4.5 6 8	100 to 1,500	1x3 wires : B 1x4 wires : C 2x3 wires : D	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	Cap: CAP For non-armoured cable: PE1 For armoured cable: PE2

OPTION

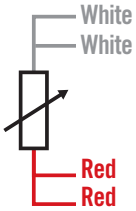
TRANSMITTER	TRANSMITTER SCALE	DIAL*
B	- 0/250	- AA
6		
LC5331A-321: B LC5335A-100: C LC5333A-100: D TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA *compatible with the TTH200/TTH300 transmitters (see page 228)

CONNECTIONS 3

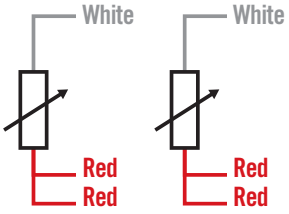
Connection 1 Pt100 Ω 1x3 wires



Connection 1 Pt100 Ω 1x4 wires



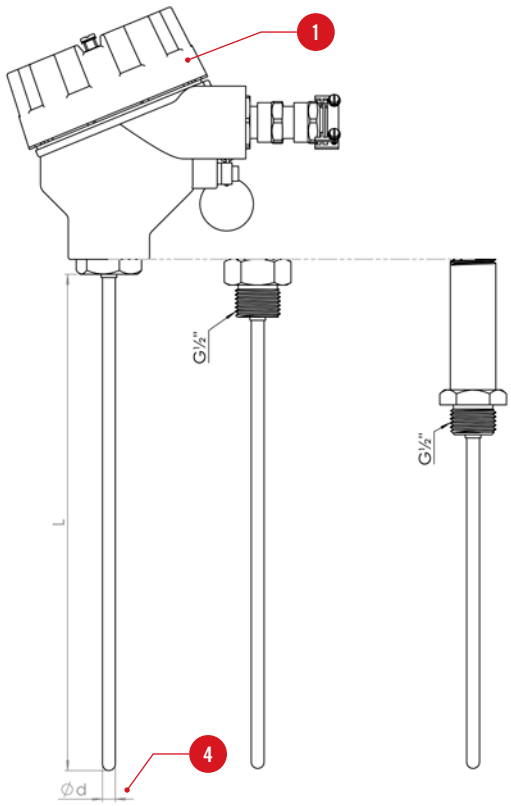
Connection 2 Pt100 Ω 2x3 wires



INFORMATIONS TRANSMETTEUR (1 PT100 UNIQUEMENT)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
Pt100	4-20mA	WITHOUT	ia	LC5333B-100
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

DIAGRAM (MM)

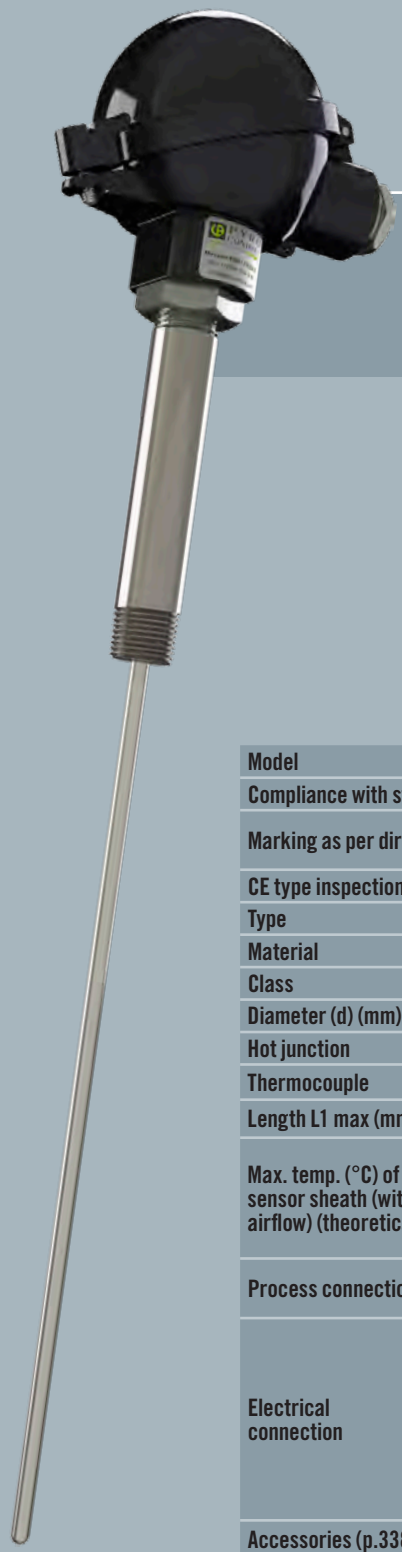


PROCESS CONNECTION 5

DUST ENVIRONMENT

ZONES 20, 21, 22 ATEX ia

TA1D
THERMOCOUPLE



IP 65 | CLASS 1 | IEC 584-1 | INTRINSIC SAFETY | up to 1150°C

DESCRIPTION

Process sensor for use in explosible zones with a dust environment, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		TA1D				
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		Ex II 1GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da				
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X				
Type		K	J	T	N	
Material		Inconel600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		6 - 8				
Hot junction		Insulated				
Thermocouple		Single / Duplex			Single	
Length L1 max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: ½" NPT. Stainless steel.				
Electrical connection	Head type	DAN-Vi				
	Material	Light alloy				
	Output	1 cable gland M20 x 1.5				
	Cable diam.	5.5 to 7.5 mm				
	Equipment	Ceramic terminal strip (standard) / Transmitter				
	IP	IP65				
Accessories (p.338)		Thermowell, cable gland				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC TYPE	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	EXTENSION	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
TA1D	DVI	1N	CM	6	800	R	F	0/200
Reference in table and diagram	1	2	3	4	5	6	7	
Possible choice	DAN-Vi: DVI	1T 1J 1K 1N 2K 2J	316L: AC INCONEL 600: CM PYROSIL: DB	6 8	Max. 1,500 mm	Extension type M: M Extension type RU: R	LC5331B-321: F LC5335B-100: G	

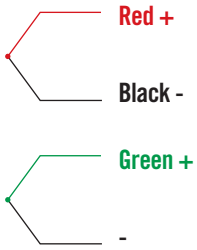
THERMOCOUPLE INFORMATION

2 Class 1 TC	Sheath diameter (mm) 6	8 (4)
T (CLASS 2)	316L	316L
J	316L	316L
K	INCONEL600	INCONEL600
N	INCONEL600	-
	PYROSIL	PYROSIL
2J	316L	316L
2K	INCONEL600	INCONEL600

(3)

CONNECTIONS

Duplex thermocouple



Single thermocouple



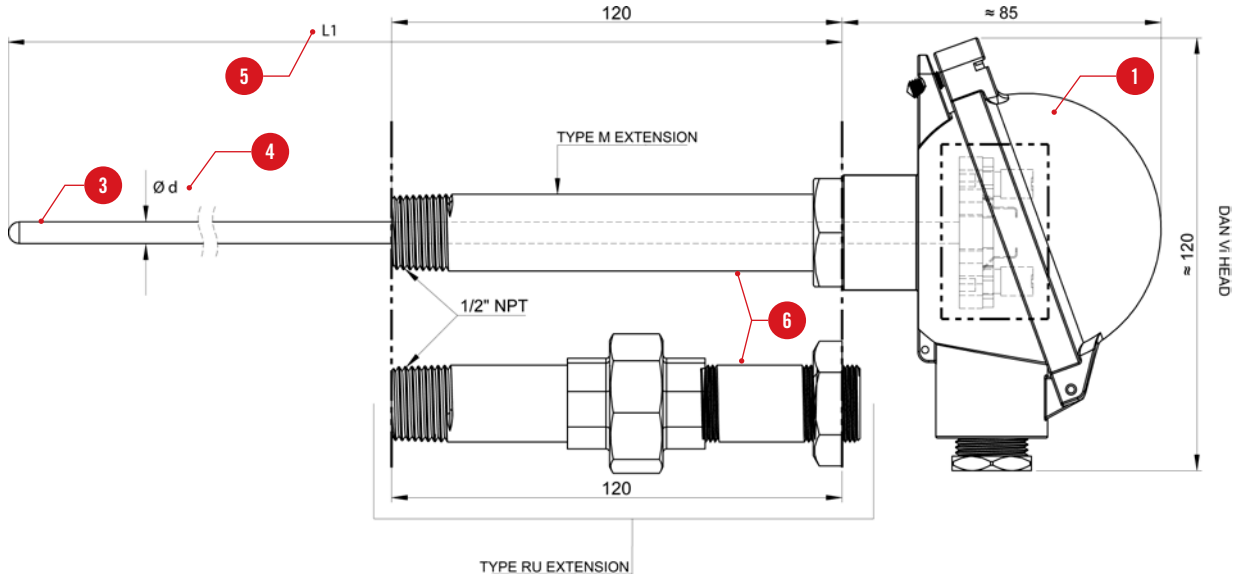
TRANSMITTER INFORMATION (1 TC ONLY)

(7)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
TC + Pt100	4-20mA	1.5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1.5kV	ia	LC5335B-100

For any other configuration, please contact us.

DIAGRAM (MM)





TAX41D
THERMOCOUPLE

IP 67 | CLASS 1 | INTRINSIC SAFETY | IEC 584-1 | up to 1150°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathed thermocouple with output via DAN or LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		TAX41D				
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		Ⓔx II 1GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da				
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X				
Type		K	J	T	N	
Material		Inconel600	316L	316L	Inconel 600	Pyrosil
Class		1				
Diameter (d) (mm)		4.5 - 6 - 8				
Hot junction		Insulated / Earthed				
Thermocouple		Single / Duplex			Single	
Length L1 max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	ø 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Without, under head G½, connection G½				
Electrical connection	Head type	LSX			DAN-Vi	
	Material	Light alloy epoxy costing				
	Output	1 cable gland M20x1,5				
	Cable diam.	6 mm to 12 mm			4 mm to 12,5 mm	
	Equipment	Ceramic terminal strip (standard) / Transmitter				
	IP	IP67				
Accessories (p.338)		Leak-tight fithings, rotating fittings, thermowell				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	PROCESS CONNECTION	HOT JUNCTION
TAX41D	LSX	1T	AC	6	950	5	I
Reference in table and diagram	1	2	3	4	5	6	
Possible choice	LSX : LSX DAN-Vi : DVI	1T 1J 1K 1N 2K 2J	316L : AC INCONEL 600 : CM PYROSIL : DB	4.5 6 8	100 to 1500	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	Insulated: I Earthed: M

OPTION

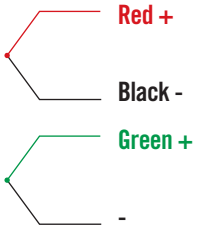
CABLE GLAND	TRANSMITTER	TRANSMITTER SCALE	DIAL*
PE3	G	0/250	XS
	7		
For LSX head only Cap: CAP Atex ia: P3 For DAN head Cable gland M20x1.5: DAN	LC5331B-221: F LC5335B-100: G TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA * compatible with the TTH200/TTH300 transmitters (see page 200)

THERMOCOUPLE INFORMATION

Class 1 TC (2)	Sheath diameter (mm)		
	4.5	6	8 (4)
T (CLASS 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	-
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600 (3)

CONNECTIONS

Duplex thermocouple



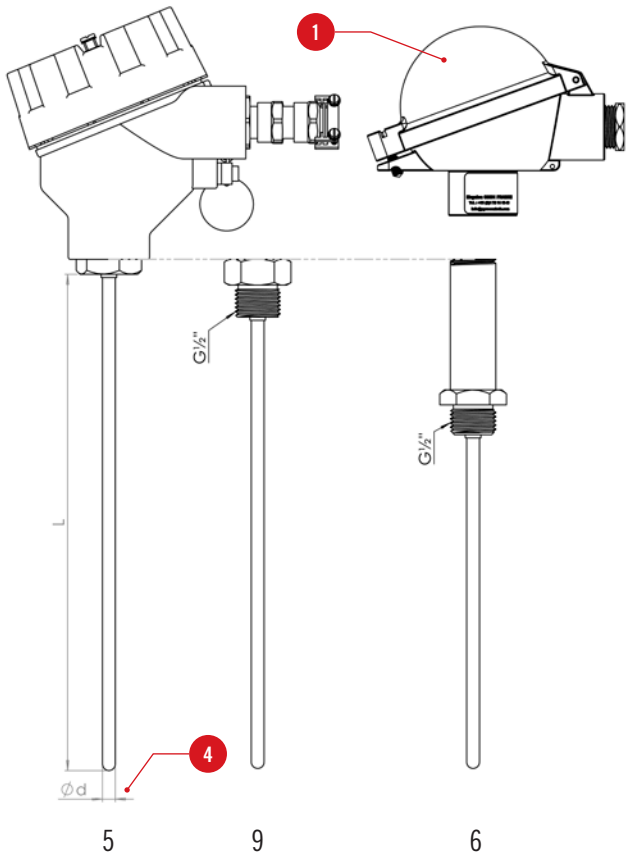
Single thermocouple



TRANSMITTER INFORMATION (1 TC ONLY) (7)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100

DIAGRAM (MM)

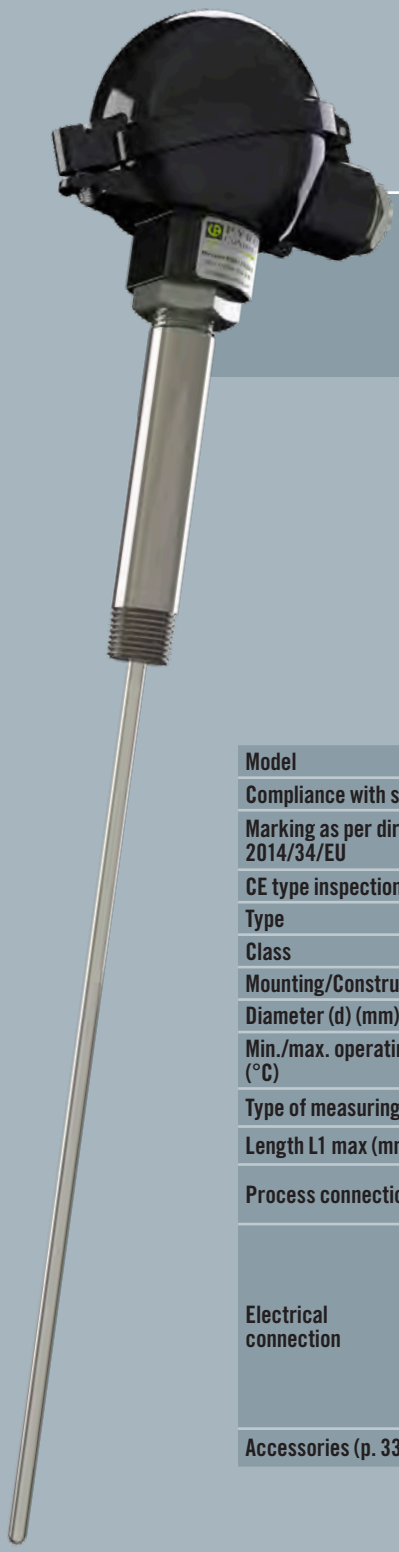


PROCESS CONNECTION (6)

Pour toute autre configuration, nous consulter.

SA1D

Pt100



IP 65 | CLASS A | IEC 60751 | INTRINSIC SAFETY | up to 450°C

DESCRIPTION

Process sensor for use in explosible zones with a dust environment, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		SA1D
Compliance with standards		IEC 60751 / EN 60079-0
Marking as per directive 2014/34/EU		Ex II 1 GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X
Type		Pt100
Class		A
Mounting/Construction		1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires
Diameter (d) (mm)		6 / 8
Min./max. operating temperature (°C)		-40…+450°C
Type of measuring element		DS… / TS…
Length L1 max (mm)		1,500
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: ½" NPT. Stainless steel.
Electrical connection	Head type	DAN-Vi
	Material	Light alloy
	Output	1 cable gland M20x1.5
	Cable diam.	5.5 to 7.5 mm
	Equipment	Ceramic terminal strip (standard) / Transmitter
	IP	IP65
Accessories (p. 338)		Measuring element, thermowell, cable gland

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

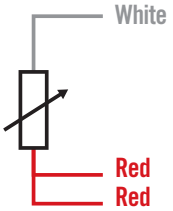
MODEL	HEAD	DIAM (mm)	MOUNTING	LENGTH L1 (mm)	EXTENSION	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
SA1D							
Reference in table and diagram	1	2	3	4	5	6	
Possible choice	DAN-Vi: DVI	6 8	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	Max. 1,500 mm* *2x2-wire mounting limited to 250mm	Extension type M: M Extension type RU: R	LC5333B-100: E LC5331B-321: F LC5335B-100: G	

TRANSMITTER INFORMATION (1 PT100 ONLY) 6

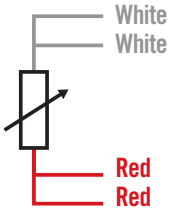
Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
Pt100	4-20mA	NONE	ia	LC5333B-100
TC + Pt100	4-20mA	1.5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1.5kV	ia	LC5335B-100

CONNECTIONS 3

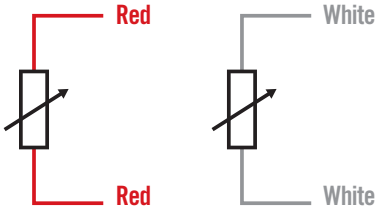
Connection 1 Pt100 Ω 1x3 wires



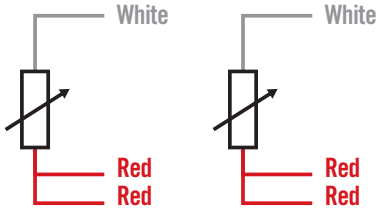
Connection 1 Pt100 Ω 1x4 wires



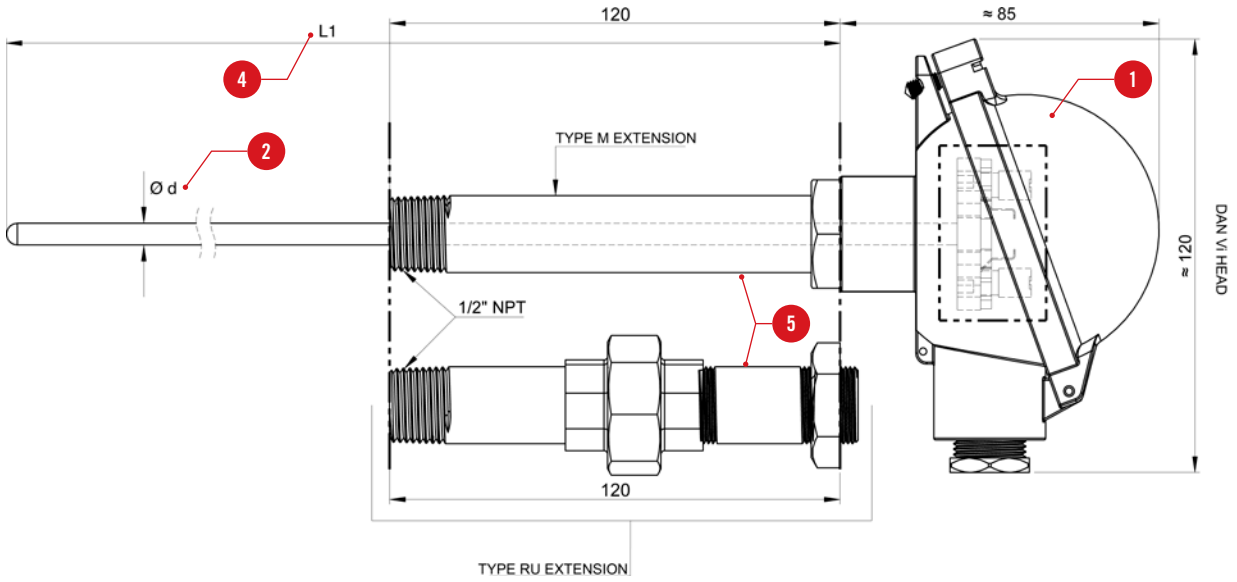
Connection 2 Pt100 Ω 2x2 wires

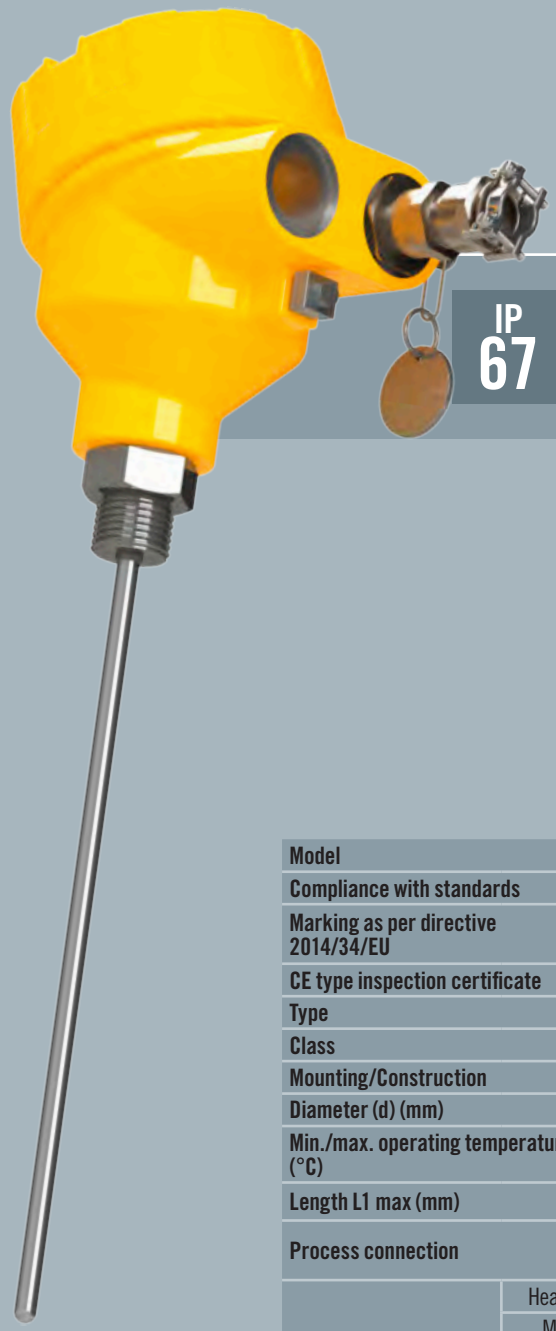


Connection 2 Pt100 Ω 2x3 wires



DIAGRAM





SAX41D

Pt100

IP 67 | CLASS A | IEC 60751 | INTRINSIC SAFETY | up to 450°C

DESCRIPTION

Capteur Process pour une utilisation en zone explosible avec un environnement poussière .Elément de mesure sonde PT100 gainée à sortie par tête DAN ou LSX. 3 variantes de raccordement sont prévues pour s'adapter à votre process. Montable sur puits thermométrique (voir page 270)

CARACTÉRISTIQUES

Model		SAX41D	
Compliance with standards		IEC 60751 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 1GD / Ex ia IIC T4…T6 Ga Ex ia IIIC T135°C…T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X / IECEx LCIE 14.0021 X	
Type		PT 100Ω	
Class		A	
Mounting/Construction		1x3 wires / 1x4 wires / 2x3 wires	
Diameter (d) (mm)		4.5 - 6 - 8	
Min./max. operating temperature (°C)		-40…+450°C	
Length L1 max (mm)		1,500	
Process connection		Without, under head G½, connection G½	
Electrical connection	Head type	LSX	DAN-Vi
	Material	Light alloy epoxy coating	
	Output	1 PE M20x1,5	
	Cable diam.	6 mm to 12 mm	4 mm to 12,5 mm
	Equipment	Ceramic terminal strip (standard) / Transmitter	
	IP	IP67	
Accessories (p. 338)		Leak-tight fittings, rotating fittings, thermowell	

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

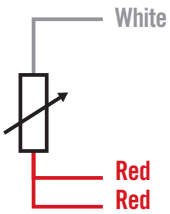
Parameters to be indicated when ordering. Example:

MODEL	HEAD	Ø SHEATH (mm)	LENGTH L1 (MM)	MONTAGE	RACCORD PROCESS	CABLE GLAND	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE	OPTION: DIAL*
SA1G	LSX	6	950	C	5	CAP	T200	0/250	AA
Reference in table and diagram	1	2	3	4	5	6	6		6
Possible choice	LSX : LSX DAN-Vi : DVI	4.5 6 8	100 to 1500	1x3 wires : B 1x4 wires : C 2x3 wires : D	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	For LSX head only Cap: CAP Atex ia: P3 For DAN head Cable gland M20x1.5: DAN	LC5333B-100: E LC5331B-321: F LC5335B-100: G TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA * compatible with the TTH200/TTH300 transmitters (see page 200)

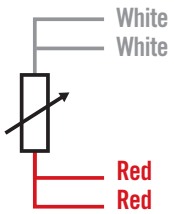
CONNECTIONS

3

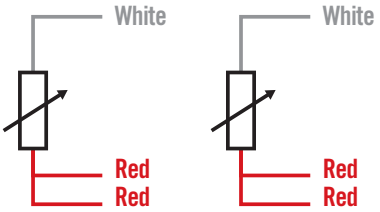
Connection 1 Pt100 Ω
1x3 wires



Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x3 wires

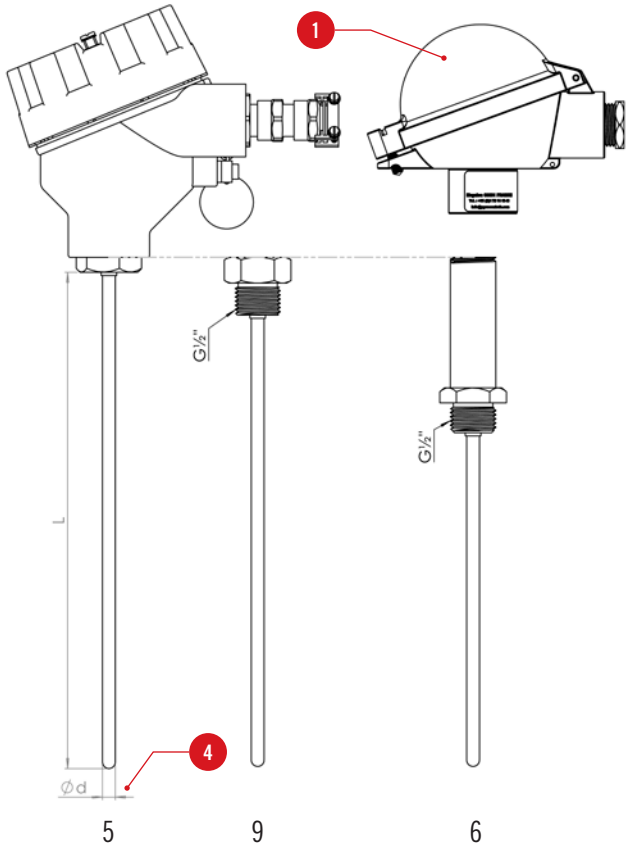


INFORMATIONS TRANSMETTEUR (1 PT100 UNIQUEMENT)

6

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
Pt100	4-20mA	WITHOUT	ia	LC5333B-100
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

DIAGRAM (MM)



PROCESS CONNECTION

5



TCG3i
THERMOCOUPLE

INTRINSIC SAFETY | CLASS 1 | IEC 584-1 | PVC CABLE OUTPUT | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances.

Intrinsically-safe ATEX model for use in gas zones (0, 1 and 2) and dust zones (20, 21 and 22).

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG3i	
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X	
Type		K	J
Material		Inconel 600	316L
Class		1	
Diameter (d) (mm)		1 / 1.5/ 2 / 3 / 4.5/ 6 / 8	
Hot junction		Insulated	
TC		Single / Duplex	
Length L max (mm)	Diam. 1 to 2 mm	100 to 36,000 mm	
	Diam.> 2 mm	100 to 30,000 mm	
Max. temp. in air (°C) in sensor sheath (without flow) (theoretical)	Diam.1 -1.5mm	650°C	260°C
	Diam. 2 mm	700°C	440°C
	Diam. 3 mm	750°C	520°C
	Diam. 4.5mm	800°C	620°C
	Diam. 6 mm	1000°C	720°C
	Diam. 8 mm	1100°C	720°C
Output	Type of cable	extension	
	Cable sheath	PVC	
	Max. temperature	105°C	
	Conductors	2 x 0.22 mm², PVC insulation	
	Braid	Internal, copper, connected to sensor sheath	
	Length Lc Min/ Max (mm)	200 to 10,000 mm	
Accessories (p. 338)		Leak-tight fittings, rotating fittings	

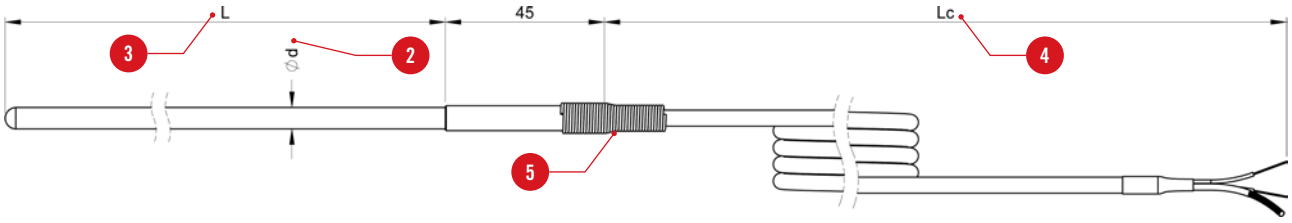
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC TYPE		Ø SHEATH (mm)		LENGTH L (mm)		LENGTH LC (mm)		PROTECTIVE SPRING
TCG3i	-	1K	-	1	-	01500	-	2,000	-	0
Reference in table and diagram		1		2		3		4		5
Possible choice		1J 1K 2J 2K		1 1.5 2 3 4.5 6 8		Diam 1-1.5-2: 00100 to 36,000 Diam 3 - 4.5 - 6 - 8: 00100 to 30,000		Lc: 200 to 10,000 mm (standard: 2,000 mm)		Without: 0 With: 1 (standard)

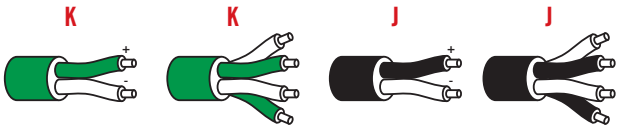
DIAGRAM (MM)



THERMOCOUPLE INFORMATION

Model	Cable	Class 1 TC (1)	Sheath diameter (m Class 1 TC m) (2)						
			1	1.5	2	3	4.5	6	8
TCG3i	PVC sheath	J	316L	316L	316L	316L	316L	316L	316L
		K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
		2J	-	316L	316L	316L	316L	316L	316L
		2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

CONNECTIONS



For any other configuration, please contact us.

TCG32i
THERMOCOUPLE



FEP CABLE OUTPUT | CLASS 1 | IEC 584-1 | INTRINSIC SAFETY | up to 1100°C

DESCRIPTION

Bendable flexible sheathed thermocouple for adaptation to the application, even in confined spaces. Small-diameter sensor with a short response time. Equipped with a cable for easy connection even over long distances.

Intrinsically-safe ATEX model for use in gas zones (0, 1 and 2) and dust zones (20, 21, 22).

Thermocouples up to 3 mm in diameter must be handled with caution to avoid any breakage.

SPECIFICATIONS

Model		TCG32i	
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0	
Marking as per directive 2014/34/EU		Ⓔx II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da	
CE type inspection certificate		LCIE 14ATEX3020 X	
Type		K	J
Material		Inconel 600	316L
Class		1	
Diameter (d) (mm)		1 / 1.5/ 2 / 3 / 4.5/ 6 / 8	
Hot junction		Insulated	
Thermocouple		Single / Duplex	
Length L max (mm)	Diam. 1 to 2 mm	100 to 36,000 mm	
	Diam.> 2 mm	100 to 30,000 mm	
Max. temp. in air (°C) in sensor sheath (without flow) (theoretical)	Diam.1 -1.5mm	650°C	260°C
	Diam. 2 mm	700°C	440°C
	Diam. 3 mm	750°C	520°C
	Diam. 4.5mm	800°C	620°C
	Diam. 6 mm	1000°C	720°C
	Diam. 8 mm	1100°C	720°C
Output	Type of cable	extension	
	Cable sheath	FEP	
	Max. temperature	250°C	
	Conductors	2 x 0.22 mm², FEP insulation	
	Braid	Internal, copper, connected to sensor sheath	
	Length Lc Min/ Max (mm)	200 to 10,000 mm	
Accessories (p. 338)		Leak-tight fittings, rotating fittings	

DESIGN YOUR SENSOR

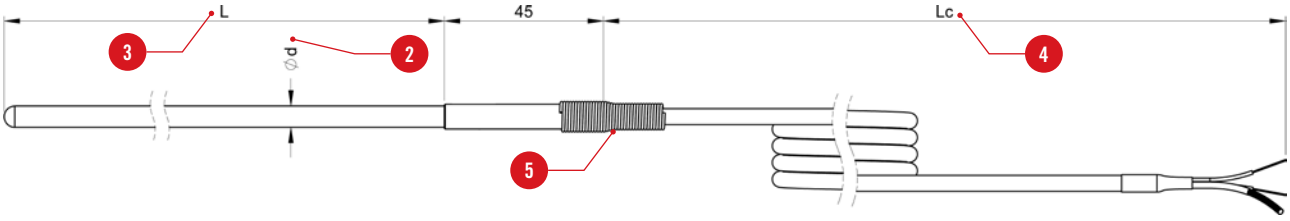
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		TC TYPE		Ø SHEATH (mm)		LENGTH L1 (mm)		LENGTH LC (mm)		PROTECTIVE SPRING
TCG32i	-	2J	-	2	-	01700	-	8,000	-	1

Reference in table and diagram	1	2	3	4	5
Possible choice	1J 1K 2J 2K	1 1.5 2 3 4.5 6 8	Diam 1-1.5-2: 00100 to 36,000 Diam 3 - 4.5 - 6 - 8: 00100 to 30,000	Lc: 200 to 10,000 mm (standard: 2,000 mm)	Without: 0 With: 1 (standard)

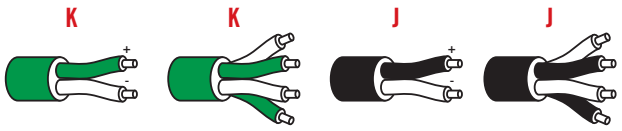
DIAGRAM (MM)



THERMOCOUPLE INFORMATION

Model	Cable	Class 1 TC (1)	Sheath diameter (mm) (2)						
			1	1.5	2	3	4.5	6	8
TCG32i	FEP sheath	J	316L	316L	316L	316L	316L	316L	316L
		K	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600
		2J	-	316L	316L	316L	316L	316L	316L
		2K	-	-	INCONEL600	INCONEL600	INCONEL600	INCONEL600	INCONEL600

CONNECTIONS



For any other configuration, please contact us.



S1i
Pt100

PVC OR FEP OR SILICONE CABLE OUTPUT

CLASS A

INTRINSIC SAFETY

IEC 60751

up to 450°C

DESCRIPTION

Sheathed Pt100 sensor, Class A as per IEC 751, with cable output, for temperature measurement up to 450°C in low-pressure and low flow-rate environments.

Intrinsically-safe ATEX model for use in gas zones (0, 1 and 2) and dust zones (20, 21 and, 22).

SPECIFICATIONS

Model		S1i		
Compliance with standards		IEC 60751 / EN 60079-0		
Marking as per directive 2014/34/EU		Ex II 1GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da		
CE type inspection certificate		LCIE 14ATEX3020 X		
Type		Pt100 Ω		
Material		316 L		
Class		A		
Mounting/Construction		Single: 1x3 wires or 1x4 wires / Duplex: 2x2 wires or 2x3 wires		
Diameter (d) (mm)		1.6 / 3 / 4.5 / 6 / 8		
Length L1 max (mm)		See table opposite		
Max. temp. in air (°C) (without flow) (theoretical)		450°C		
Output	Sheath	PVC	FEP	SILICONE
	Max. temperature	105°C	200°C	200°C
	Conductors	3, 4 or 6 x 0.22 mm, PVC insulation	3, 4 or 6 x 0.22 mm, FEP insulation	3, 4 or 6 x 0.22 mm, FEP insulation
	Shielding braid	•	•	
	Length Lc Min/ Max (mm)	200 to 10,000 mm		
	Termination	Insulated bare wires		
Accessories (p. 338)		Measuring element, thermowell, cable gland		

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		NO. OF PT100		MOUNTING		Ø SHEATH (mm)		LENGTH L (mm)		CABLE		LENGTH LC (mm)		PROTECTIVE SPRING
S1i	-	1	-	C	-	3	-	900	-	SIL	-	520	-	0
Reference in table and diagram		1		2		3		4		5		6		7
Possible choice		1 2		1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E		1.6 3 4.5 6 8		As per table below		PVC: PVC FEP: FEP Silicone: SIL		200 to 10,000 mm		Without: 0 With: 1 (standard)

DIAGRAM (MM)



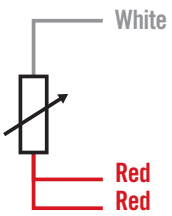
TABLE OF POSSIBLE ASSOCIATIONS

1 Number of Pt100	2 Mounting	Length L min. / max. (mm) 4				
		1.6	3	4.5	6	8
1	1x3 wires	50 / 250	50 / 1500	50 / 1500	50 / 1500	50 / 1500
	1x4 wires	50 / 250	50 / 1500	50 / 1500	50 / 1500	50 / 1500
2	2x2 wires	-	-	50 / 250	50 / 250	50 / 250
	2x3 wires	-	-	50 / 1500	50 / 1500	50 / 1500

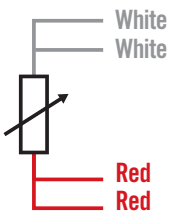
CONNECTIONS

2

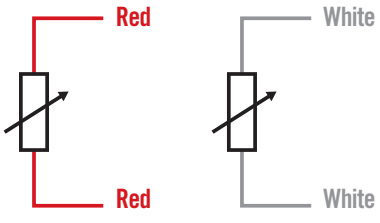
Connection 1 Pt100 Ω
1x3 wires



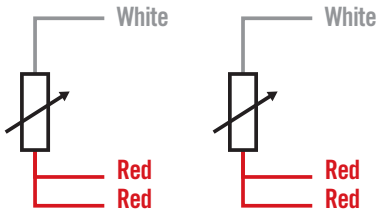
Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



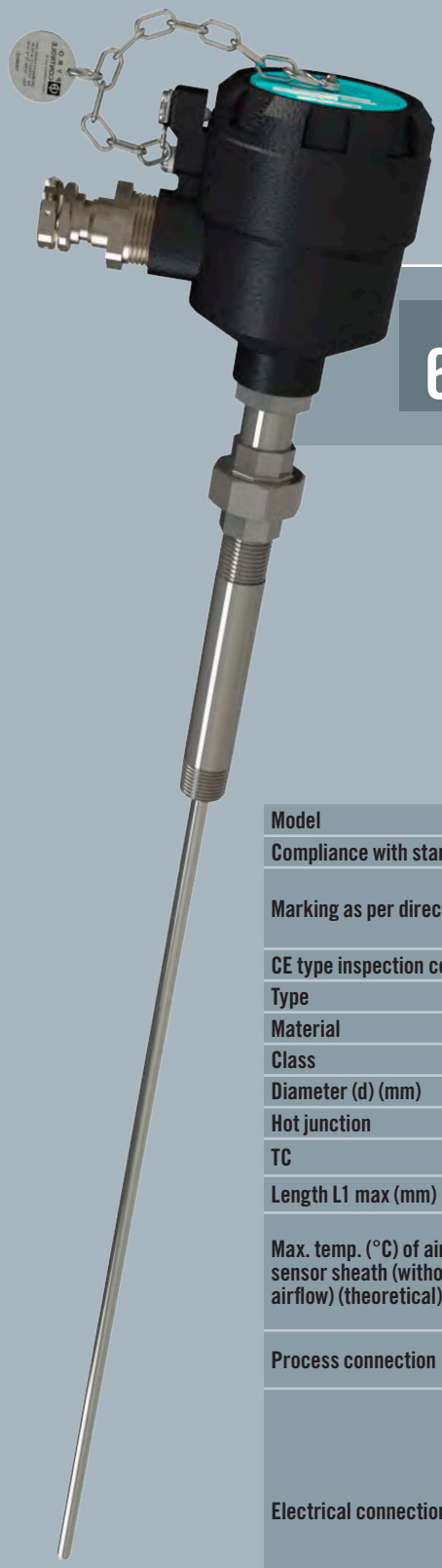
Connection 2 Pt100 Ω
2x3 wires



For any other configuration, please contact us.

DUST ENVIRONMENT

ZONES 21, 22 ATEX d



TA2D
THERMOCOUPLE

IP 65 | CLASS 1 | IEC 584-1 | ANTI-EXPLOSION | up to 1100°C

DESCRIPTION

Process sensor for use in explosible zones with a dust environment, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 270).

SPECIFICATIONS

Model		TA2D				
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		Ex II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP.6X Do not open when live Do not open in the presence of dust atmospheres				
CE type inspection certificate		LCIE 15ATEX3007 X / IECEx LCIE 15.0015 X				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1		2	1	
Diameter (d) (mm)		4.5 - 6				
Hot junction		Insulated / Earthed				
TC		Single / Duplex			Single	
Length L1 max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	Diam. 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	Diam. 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: ½" NPT. Stainless steel.				
Electrical connection	Head type	PSX				
	Material	Epoxy-coated light alloy				
	Output	1 anti-explosion cable gland 3/4" NPT with nickel-plated brass fastening				
	Cable diam.	For non-armoured cable : Ø 7.0 - 12.0 mm For armoured cable : Ø ext. 10.0 - 16.0 mm Ø int. 7.0 - 12.0 mm				
	Equipment	Ceramic terminal strip (standard) / Transmitter				
	IP	IP65				
Accessories (p. 338)		Measuring element, thermowell, cable gland				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

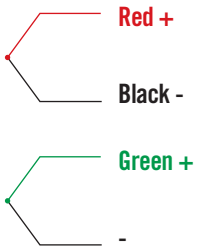
MODEL	HEAD	TC TYPE	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	HOT JUNCTION	EXTENSION	CABLE GLAND	EN OPTION TRANSMITTER	EN OPTION TRANSMITTER SCALE
TA2D	PSX	1T	AC	6	1,400	M	M	N	A	0/250
Reference in table and diagram	1	2	3	4	5	8	6		7	
Possible choice	PSX	1T 1J 1K 1N 2K 2J	316L : AC INCONEL 600 : CM PYROSIL : DB	4.5 6	Max. 1,500 mm	Insulated: I (standard) Earthed: M	Extension type M: M Extension type RU: R	For non-armoured cable : PE1 For armoured cable : PE2 Without : N	LC5334A-100 : A LC5331A-321 : B LC5335A-100 : C	

THERMOCOUPLE INFORMATION

2 Class 1 TC	Sheath diameter (mm) 4	
	6	8
T (CLASS 2)	316L	316L
J	316L	316L
K	INCONEL600	INCONEL600
N	INCONEL600	- 3
	PYROSIL	PYROSIL
2J	316L	316L
2K	INCONEL600	INCONEL600

ASSOCIATED CONNECTIONS ON TERMINAL STRIP

Duplex thermocouple



Single thermocouple

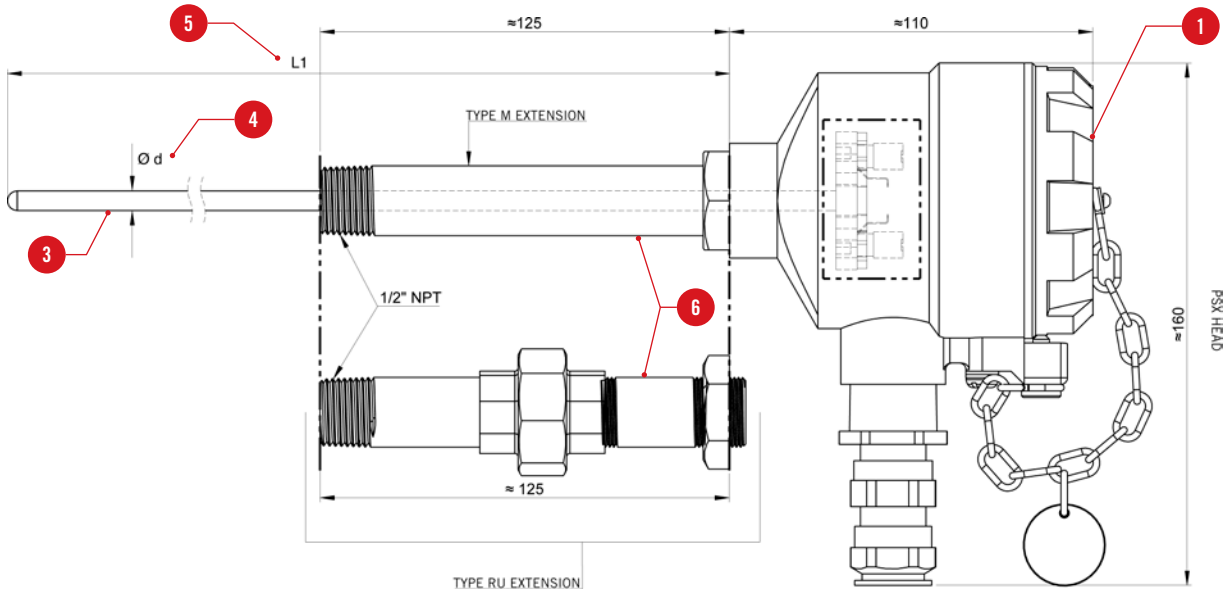


For any other configuration, please contact us

TRANSMITTER INFORMATION (1 TC ONLY) 7

Transmitter			
Input	Output	Galvanic insulation	Reference
TC	4-20mA	1.5kV	LC5334A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

DIAGRAM (MM)





DGM/TGM
THERMOCOUPLE

CLASS 1 | IEC 584-1 | SIMPLE OR DUPLEX | up to 1150°C

DESCRIPTION

Elément interchangeable à thermocouple pour une utilisation dans les capteurs type TPS. Equipé de ressorts de poussée pour un montage antivibratoire.

CARACTÉRISTIQUES

Model		DGM... / TGM...				
Compliance with standards		CEI 584-1 / NF EN 60584-1				
Type		K	J	T	N	
Material		Inconel600	316L	316L	Inconel 600	Pyrosil
Class		1		1	1	
Sheath diameter (mm)		4.5 - 6				
Hot junction		Insulated/Earthed				
Thermocouple		Single / Duplex		Single		
Length L1 Min/Max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	**Diam. 4.5 mm**	800°C	620°C	350°C	800°C	1100°C
	Diam. 6 mm	1100°C	720°C	350°C	1000°C	1100°C

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

	TYPE OF TERMINAL STRIP	ELEMENT TYPE		DIAMETER (mm)		TC TYPE		SHEATH TYPE		LENGTH L1 (MM)		HOT JUNCTION		OPTION: TRANSMITTER		OPTION: TRANSMITTER SCALE
	T	GM1	-	6	-	K	-	AC	-	800	-	I	-	N	-	-
Reference in table and diagram	1			2		3		4		5				6		
Possible choice	DIN ceramic terminal strip: D Socket for integrated transmitter: T	Single thermocouple: G1 Duplex thermocouple: G2		4.5 6		K J T N		316L: AC INCONEL 600: CM PYROSIL: DB		120 to 1,500 mm		Insulated: I (standard) Earthed: M		LC5334A-100: A LC5331A-321: B LC5335A-100: C SANS : N* *embase livrée fils libres (85 mm) sans boinier, ni transmeteur		

SCHÉMA (MM)

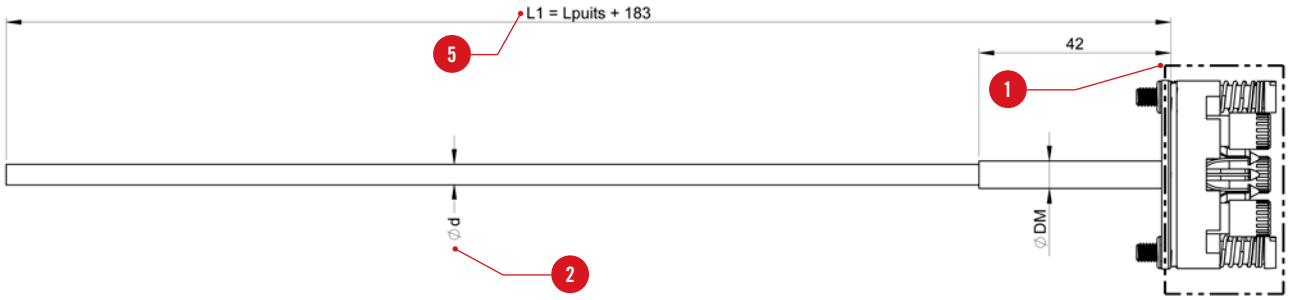


TABLEAU DES ASSOCIATIONS POSSIBLES

3 Type thermocouple Classe 1	Diamètre de la gaine (mm) 6	Diamètre de la gaine (mm) 8 (2)
T (classe2)	316L	316L
J	316L	316L
K	INCONEL600	INCONEL600
N	INCONEL600	-
	PYROSIL	PYROSIL
2J	316L	316L
2K	INCONEL600	INCONEL600

4

INFORMATIONS TRANSMETTEUR

6

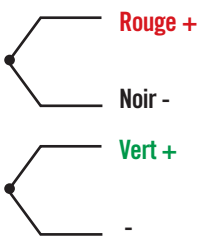
Transmetteur			
Entrée	Sortie	Isolation galvanique	Référence
TC	4-20mA	1,5kV	LC5334A-100
TC + Pt100	4-20mA	1,5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1,5kV	LC5335A-100

Non compatible avec version duplex

Pour toute autre configuration, nous consulter.

BRANCHEMENT

Thermocouple duplex



Thermocouple simple





TAX42D
THERMOCOUPLE

IP 67 | CLASS 1 | ANTI EXPLOSION | IEC 584-1 | jusqu'à 1150°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathed thermocouple with output via LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		TAX42D				
Compliance with standards		IEC 584-1 / EN 61515 / EN 60079-0				
Marking as per directive 2014/34/EU		Ex II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP.6X Do not open when a voltage is present Do not open if there is dust in the atmosphere				
CE type inspection certificate		LCIE 14ATEX3007 X / IECEx LCIE 15.0015 X				
Type		K	J	T	N	
Material		Inconel 600	316L	316L	Inconel 600	Pyrosil
Class		1				
Diameter (d) (mm)		4.5 - 6 - 8				
Hot junction		Insulated / Earthed				
Thermocouple		Single / Duplex			Single	
Length L1 max (mm)		1,500				
Max. temp. (°C) of air in sensor sheath (without airflow) (theoretical)	ø 4.5 mm	800°C	620°C	350°C	800°C	1100°C
	ø 6 mm	1000°C	720°C	350°C	1000°C	1100°C
	ø 8 mm	1100°C	720°C	350°C	1100°C	1150°C
Process connection		Without, under head G½, connection G½				
Electrical connection	Type de tête	LSX				
	Matière	Light alloy epoxy coating				
	Sortie	1 cable gland M20x1,5 with fastening module			1 cable gland M20x1.5 for armoured cable with fastening module	
	Diam. câble	67 mm to 12 mm			Ø infernal : 4.5mm to 8mm Ø external : 7 mm to 12 mm	
	Equipement	Ceramic terminal strip (standard) / Transmitter				
	IP	IP67				
Accessories (p. 338)		Leak-tight fithings, rotating fittings, thermowell				

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	HEAD	TC	SHEATH TYPE	Ø SHEATH (mm)	LENGTH L1 (mm)	PROCESS CONNECTION	HOT JUNCTION
TAX42D	LSX	1K	DB	4.5	870	6	I
Référence tableau et schéma	1	2	3	4	5	6	
Choix possible	LSX : LSX	1T 1J 1K 1N 2K 2J	316L: AC INCONEL 600: CM PYROSIL: DB	4.5 6 8	100 à 1500	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	Insulated: I Earthed: M

OPTION

CABLE GLAND	TRANSMITTER	TRANSMITTER SCALE	DIAL*
PE2	C	0/250	XS
	7		
Cap: CAP For non-armoured cable: PE1 For armoured cable: PE2	LC5334A-100: A LC5331A-321: B LC5335A-100: C TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA *compatible with the TTH200/TTH300 transmitters (see page 228)

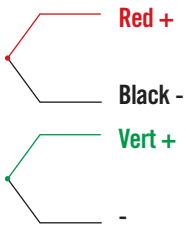
THERMOCOUPLE INFORMATION

Class 1 TC (2)	Sheath diameter (mm) (4)		
	4.5	6	8
T (CLASS 2)	316L	316L	316L
J	316L	316L	316L
K	INCONEL600	INCONEL600	INCONEL600
N	INCONEL600	INCONEL600	-
	PYROSIL	PYROSIL	PYROSIL
2J	316L	316L	316L
2K	INCONEL600	INCONEL600	INCONEL600

(3)

CONNECTIONS

Duplex thermocouple



Single thermocouple



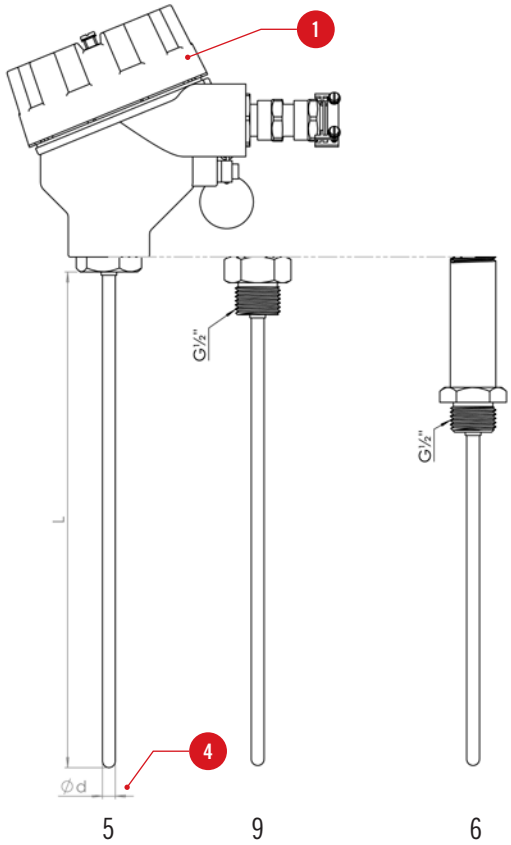
TRANSMITTER INFORMATION (1 TC ONLY)

(7)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

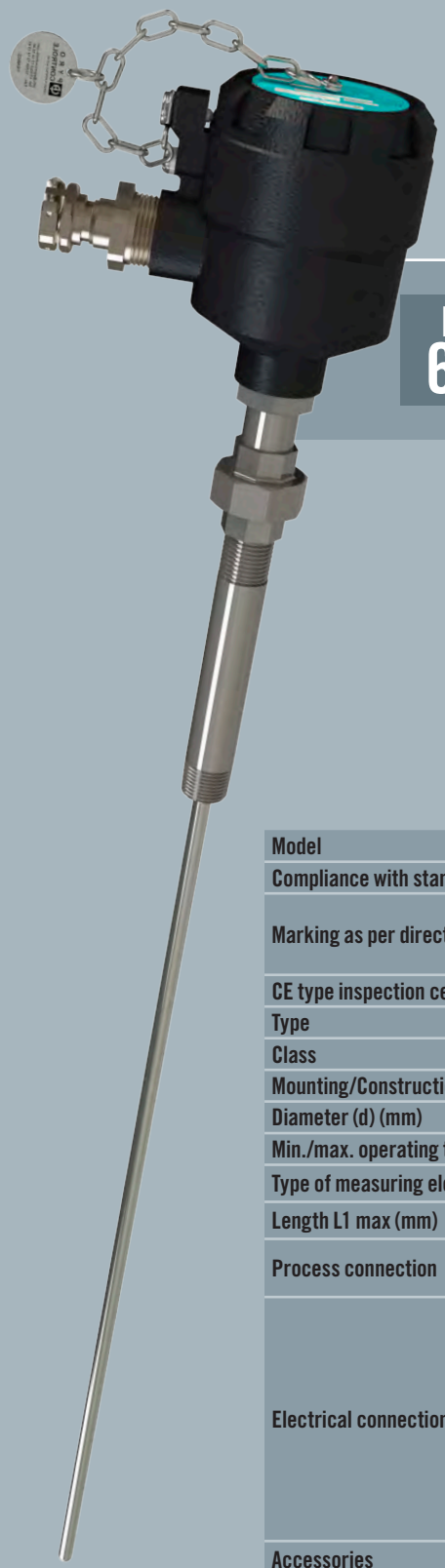
For any other configuration, please contact us.

DIAGRAM (MM)



PROCESS CONNECTION

(6)



SA2D

Pt100

IP 65 | CLASS A | IEC 60751 | ANTI-EXPLOSION | up to 450°C

DESCRIPTION

Process sensor for use in explosible zones with a dust environment, equipped with an interchangeable measuring element. For mounting in a thermowell (see page 238).

SPECIFICATIONS

Model		SA2D
Compliance with standards		IEC 60751 / EN 60079-0
Marking as per directive 2014/34/EU		Ex II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP.6X Do not open when live Do not open in the presence of dust atmospheres
CE type inspection certificate		LCIE 15ATEX3007 X / IECEx LCIE 15.0015 X
Type		Pt100
Class		A
Mounting/Construction		1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires
Diameter (d) (mm)		4.5 - 6
Min./max. operating temp. (°C)		-40...+450°C
Type of measuring element		DS... / TS...
Length L1 max (mm)		1,500
Process connection		Type M extension - Type RU extension (makes it easy to orient the head). Threading: ½"NPT.Stainless steel.
Electrical connection	Head type	PSX
	Material	Epoxy-coated light alloy
	Output	1 anti-explosion cable gland 3/4" NPT with nickel-plated brass fastening
	Cable diam.	For non-armoured cable : Ø 7.0 - 12.0 mm For armoured cable : Ø ext. 10.0 - 16.0 mm Ø int. 7.0 - 12.0 mm
	Equipment	Ceramic terminal strip (standard) / Transmitter
	IP	IP65
Accessories		Measuring element, thermowell, cable gland

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

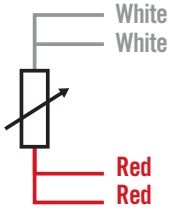
MODEL	HEAD	Ø (mm)	MOUNTING	LENGTH L1 (mm)	EXTENSION	CABLE GLAND	OPTION: TRANSMITTER	OPTION: TRANSMITTER SCALE
SA2D	PSX	6	D	1,250	M	N	B	0/200
Référence tableau et schéma	1	2	3	4	5		6	
Choix possible	PSX	4.5 6	1x3 wires: B 1x4 wires: C 2x2 wires: D 2x3 wires: E	Max. 1,500 mm* *2x2-wire mounting limited to 250mm	Extension type M : M Extension type RU : R	Pour câble non armé : PE1 Pour câble armé : PE2 SANS : N	LC5333A-100 : D LC5331A-321 : B LC5335A-100 : C	

TRANSMITTER INFORMATION (1 PT100 ONLY) 6

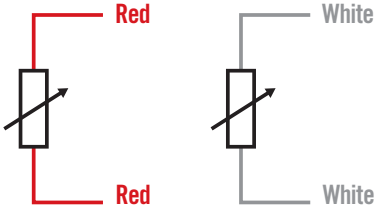
Transmitter			
Input	Output	Galvanic insulation	Reference
Pt100	4-20mA	NONE	LC5333A-100
TC + Pt100	4-20mA	1.5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1.5kV	LC5335A-100

CONNECTIONS 3

Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



Connection 2 Pt100 Ω
2x3 wires

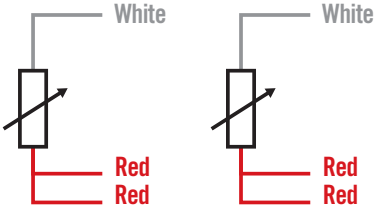
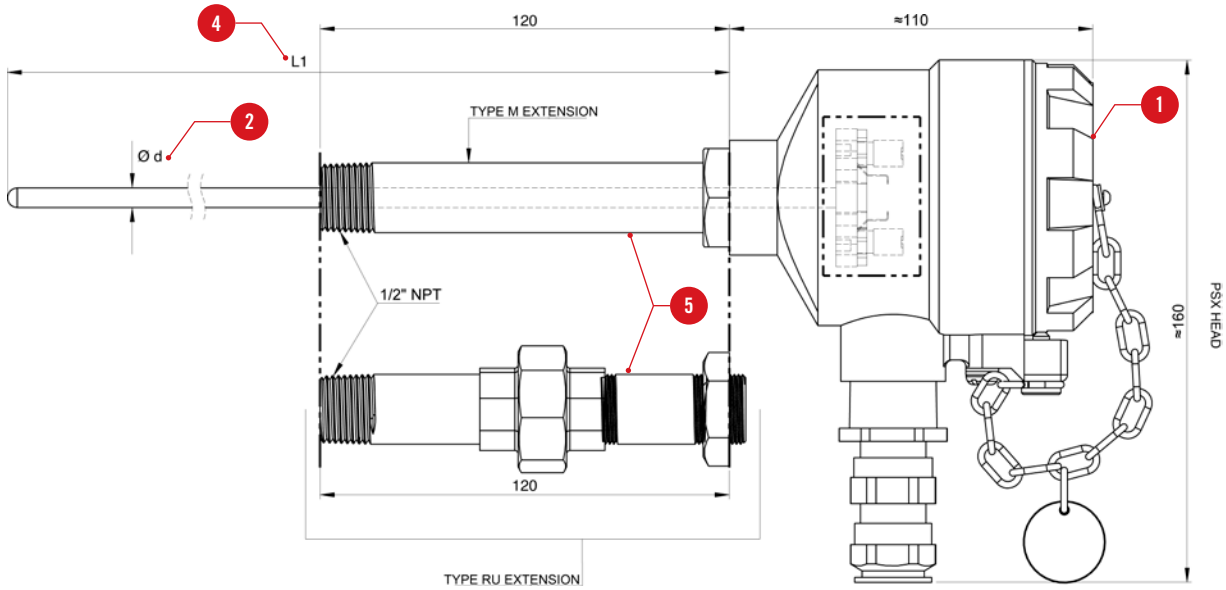


DIAGRAM (MM)





DSM/TSM

Pt100

CLASS A | IEC 60751 | SINGLE OR DUPLEX | up to 450°C

DESCRIPTION

Interchangeable Pt100 element for use in TPS/SPS sensors. Equipped with support springs for anti-vibration mounting.

SPECIFICATIONS

Model	DSM... / TSM...
Compliance with standards	IEC 60751
Type	Pt100
Class	A up to 450 °C I B from 450 to 600 °C
Mounting/Construction	1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires
Sheath diameter (mm)	4.5 - 6
Min./Max. operating temp. (°C)	-40...+600°C
Sheath material	316L
Length L1 Min/Max (mm)	1,500

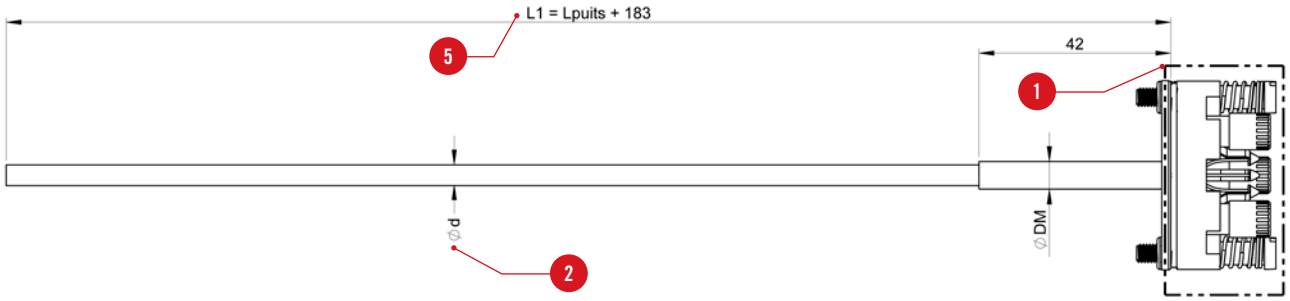
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering

	TYPE OF TERMINAL STRIP		ELEMENT TYPE		Ø (mm)	MOUNTING	LENGTH L1 (mm)	OPTION TRANSMITTER	OPTION TRANSMITTER SCALE
	D	-	SM1	-	6	4	900	A	0/150
Reference in table and diagram	1		2		3	4	5	6	
Possible choice	DIN ceramic terminal strip: D Socket for integrated transmitter: T		Single Pt100: S1 Duplex Pt100: S2		4.5 6	1x2 or 2x2 wires: 2 1x3 or 2x3 wires: 3 1x4 wires: 4	Max 1,500 mm	LC5333A-100: A LC5331A-321: B LC5335A-100: C WITHOUT : N* *embase livrée fils libres (85 mm) sans boinier, ni transmeteur	

DIAGRAM



TRANSMITTER INFORMATION

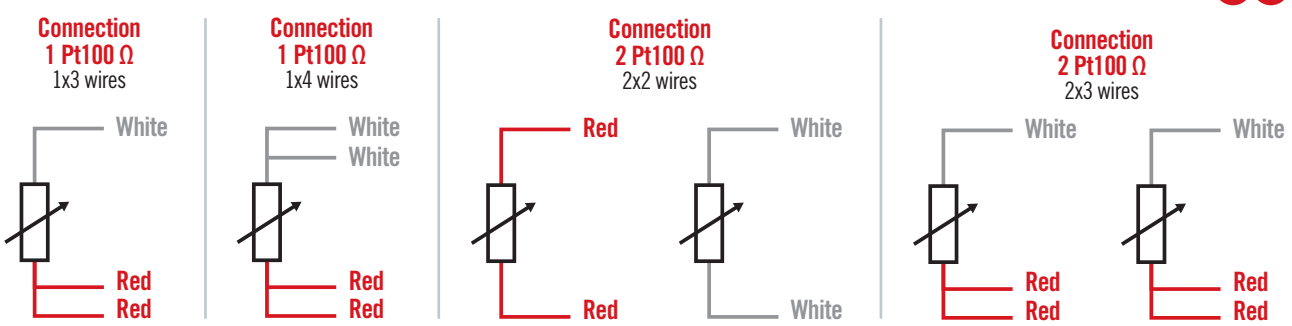
6

Transmitter			
Input	Output	Galvanic insulation	Reference
Pt100	4-20mA	SANS	LC5333A-100
TC + Pt100	4-20mA	1,5kV	LC5331A-321
TC + Pt100	4-20mA + HART	1,5kV	LC5335A-100

Not compatible with duplex version

CONNECTIONS

2 4



For any other configuration, please contact us.



SAX42D

Pt100

IP 67 | CLASS A | IEC 60751 | ANTI EXPLOSION | jusqu'à 450°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathedPT100 sensor with output via LSX head. 3 connection variants are available for adaptation to your process. Mountable on thermowell (see page 270)

SPECIFICATIONS

Model		SAX42D	
Compliance with standards		IEC 60751 / EN 60079-0	
Marking as per directive 2014/34/EU		Ex II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP.6X Do not open when a voltage is present Do not open if there is dust in the atmosphere	
CE type inspection certificate		LCIE 14ATEX3007 X / IECEx LCIE 15.0015 X	
Type		PT 100Ω	
Class		A	
Mounting		1x3 wires / 1x4 wires / 2x2 wires / 2x3 wires	
Diameter (d) (mm)		4.5 - 6 - 8	
Min./max. operating temperature (°C)		-40…+450°C	
Length L1 max (mm)		1,500	
Process connection		Without, under head G½, connection G½	
Electrical connection	Head type	LSX	
	Material	Light alloy epoxy coating	
	Output	1 cable gland M20x1,5 with fastening module	1 cable gland M20x1.5 for armoured cable with fastening module
	Cable diam.	7 mm to 12 mm	Ø internal : 4.5mm to 8mm Ø external : 7 mm to 12 mm
	Equipment	Ceramic terminal strip (standard) / Transmitter	
	IP	IP67	
Accessories (p. 338)		Leak-tight fittings, rotating fittings, thermowell	

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

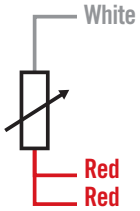
MODEL	HEAD	Ø SHEATH (mm)	LENGTH L1 (mm)	MOUNTING	PROCESS CONNECTION	CABLE GLAND
SAX42D	LSX	8	1140	B	9	PE1
Reference in table and diagram	1	2	3	4	5	5
Possible choice	LSX : LSX	4.5 6 8	100 to 1500	1x3 wires : B 1x4 wires : C 2x3 wires : D	Without: 5 Extension and connection G ½": 6 Connection hunder head G ½": 9	Cap: CAP For non-armoured cable: PE1 For armoured cable: PE2

OPTION

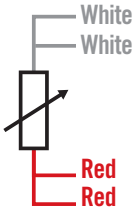
TRANSMITTER	TRANSMITTER SCALE	DIAL*
B	0/250	AA
6		
LC5331A-321: B LC5335A-100: C LC5333A-100: D TTH200: T200 TTH300: T300		Without: XS AS: AS A: AA *compatible with the TTH200/ TTH300 transmitters (see page 228)

CONNECTIONS 3

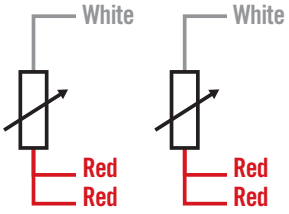
Branchement 1 Pt100 Ω
1x3 wires



Branchement 1 Pt100 Ω
1x4 wires



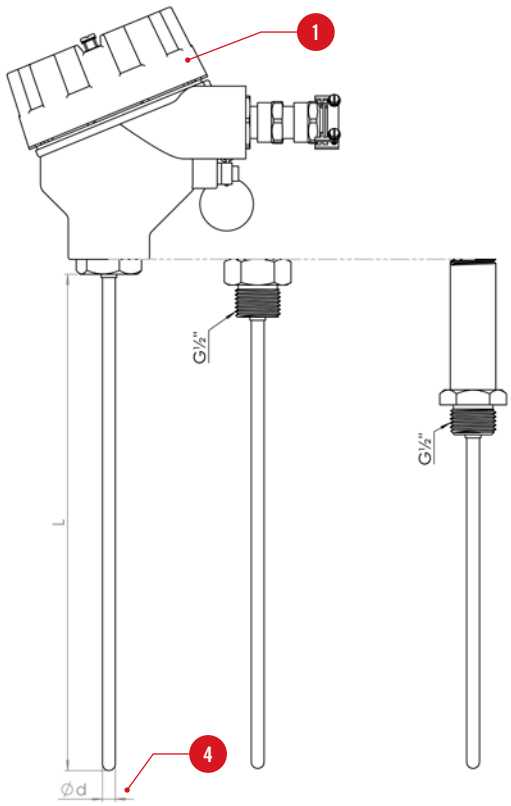
Branchement 2 Pt100 Ω
2x3 wires



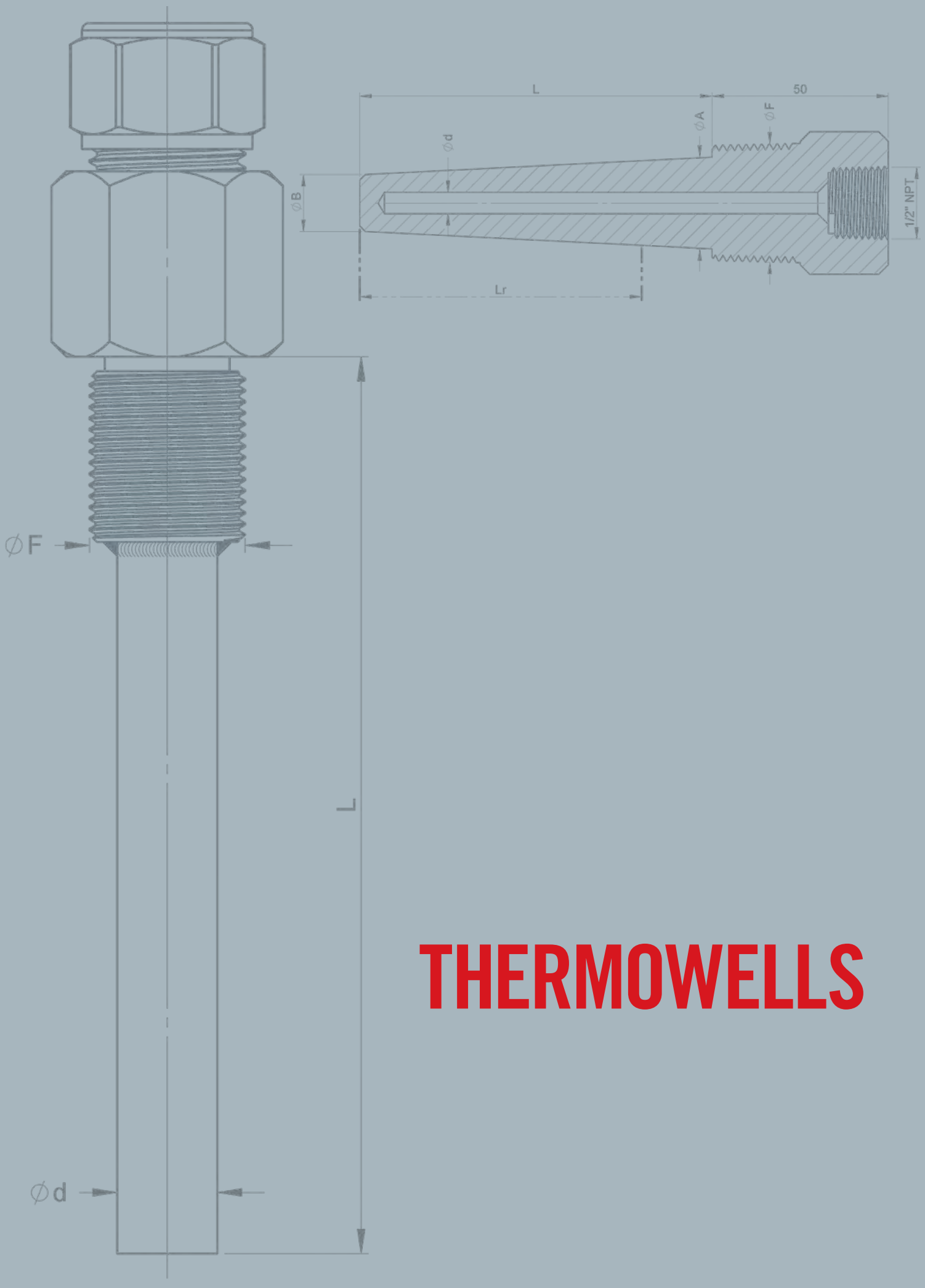
INFORMATIONS TRANSMETTEUR (1 PT100 UNIQUEMENT)

Transmitter				
Input	Output	Galvanic insulation	ATEX	Reference
Pt100	4-20mA	WITHOUT	ia	LC5333B-100
TC + Pt100	4-20mA	1,5kV	ia	LC5331B-321
TC + Pt100	4-20mA + HART	1,5kV	ia	LC5335B-100
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH200
TC + Pt100	4-20mA + HART	3,5kV	ia	TTH300

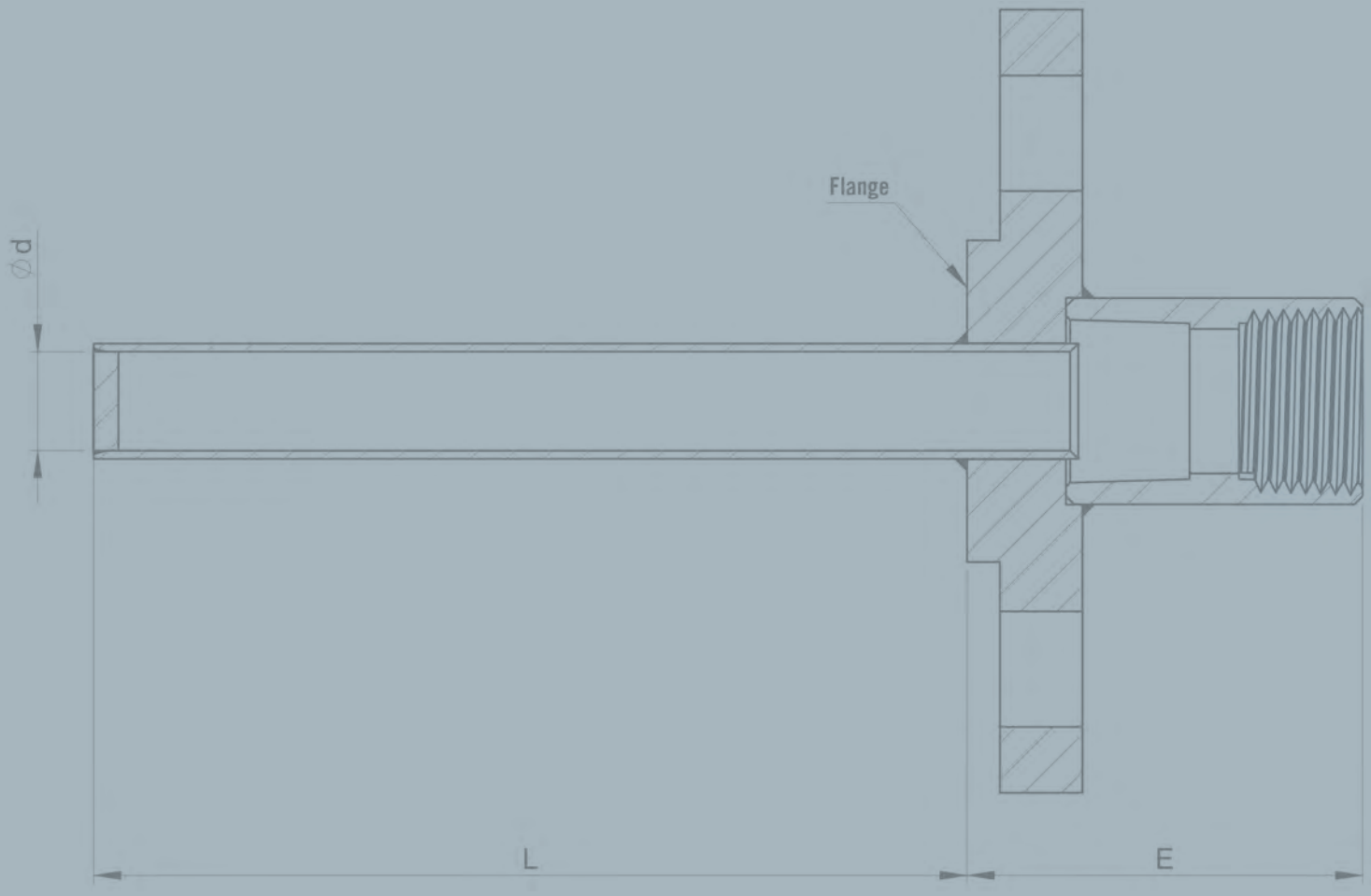
DIAGRAM (MM)



PROCESS CONNECTION 6



THERMOWELLS



PRODUCT	TYPE	DESIGN	PROCESS CONNECTION	CONSTRUCTION	MODEL	PAGE
Thermowell	Mechanically welded	Straight	Screwed		PMSV	272
			Flanged	Double welding	PMSB	274
	Bored	Straight	Screwed		PDV	276
			Flanged	Screwed/Welded	PDB-VS	278
				Double welding	PDB-2S	280
		Tapered	Screwed		PCV	282
			Flanged	Screwed/Welded	PCB-VS	284
				Double welding	PCB-2S	286
				Full penetration	PCB-PP	288
				Forged	PCB-F	290



PMSV
THERMOWELL

STRAIGHT

SCREW-ON

DESCRIPTION

Straight, screw-on, mechanically-welded thermowell for use in undemanding operating conditions.

SPECIFICATIONS

Model	PMSV
Max. pressure and temperature	100 bar / 350°C
Instrument connection	Leak-tight fitting
Sensor diameter	3 - 4.5- 6 mm
Process connection	1/8"- 1/4" - 3/8" - 1/2" G 1/8"- 1/4" - 3/8" - 1/2"
Tube diameter D (mm)	5x3.5 - 6x5 - 9x7
Material	316
Length L min/max (mm)	50 to 400 mm

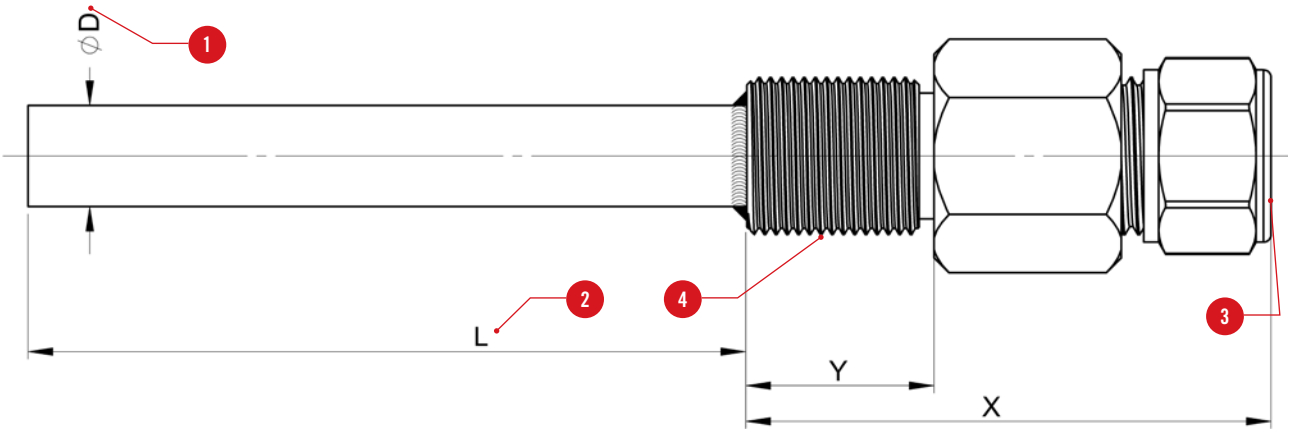
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		Ø TUBE (mm)		L (mm)		SENSOR DIAMETER (mm)		PROCESS CONNECTION
PMSV	-	A	-	50	-	40	-	N38
Reference in table and diagram		1		2		3		4
Possible choice		5 x 3.5: A 6 x 5: B 9 x 7: C		50 100 150 200 300 400		3: 30 4.5: 45 6: 60		1/8" NPT: N18 1/4"NPT: N14 3/8"NPT: N38 1/2"NPT: N12 G 1/8": G18 G1/4": G14 G3/8": G38 G1/2": G12

DIAGRAM (MM)



PROCESS CONNECTION DIMENSIONS (MM)

Process connection		X (MM)	Y (MM)
1/8"	NPT	35	10
	G	35	10
1/4"	NPT	45	15
	G	40	10
3/8"	NPT	45	15
	G	40	15
1/2"	NPT	50	20
	G	45	15

For any other configuration, please contact us.

⚠ Minimum order quantity : 10

PMSB
THERMOWELL



STRAIGHT FLANGED

DESCRIPTION

Straight, flanged, mechanically-welded thermowell for use in undemanding operating conditions.

SPECIFICATIONS

Model	PMSB
Instrument connection	1/2"NPT
Process connection	See table opposite
Tube D diameter (mm)	10, 12, 20
Material	316L - 321
Length L min/max (mm)	50 to 2,000 mm

DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		MATERIAL		TUBE DIAMETER (mm)		FLANGE		L (mm)		OPTION PLUG + CHAIN		TAG
PMSB	-	AC	-	12	-	218	-	150	-	NO	-	-
Reference in table and diagram				1		2		3				
Possible choice		316L : AC 321 : AR		10 12 20		See table below		50 - 2 000 mm		YES NO		Personalized customer reference

DIAGRAM (MM)

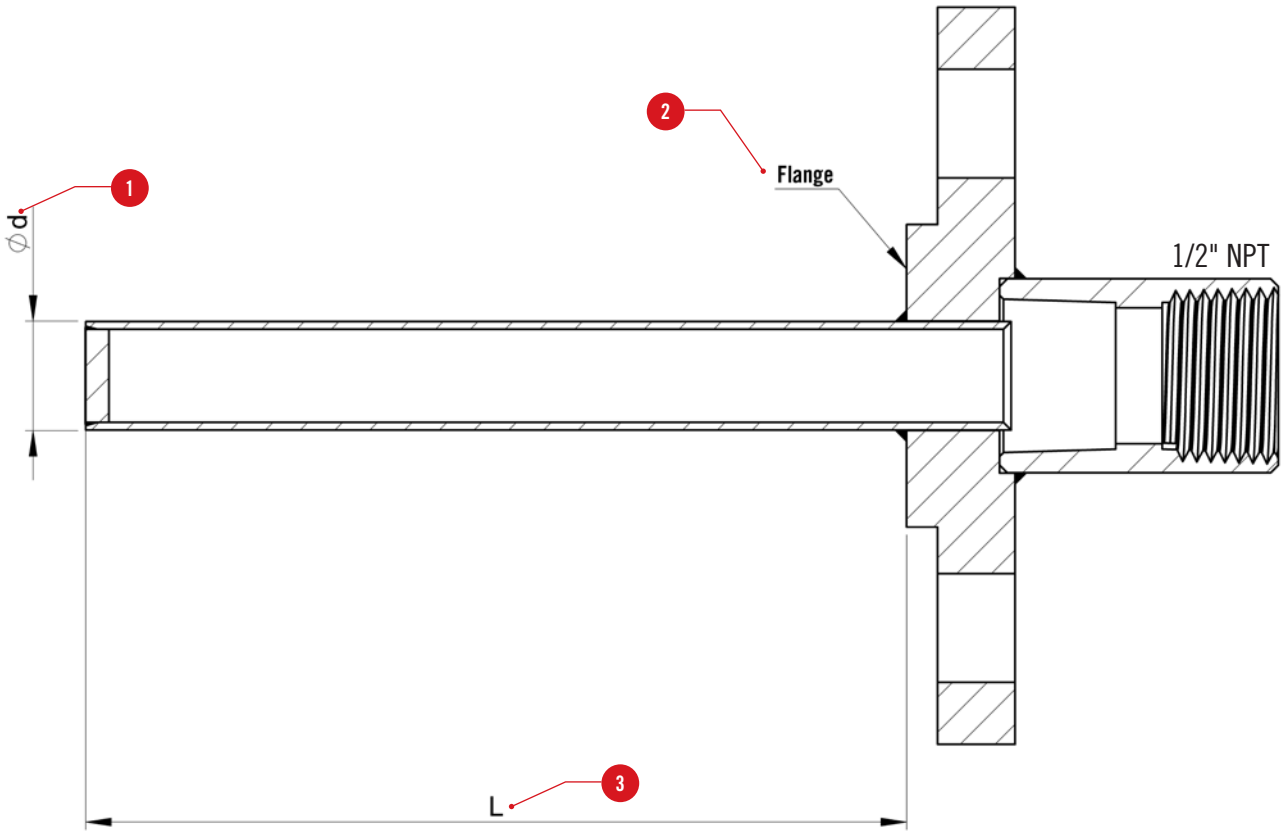


TABLE OF FLANGES

2

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1

For any other configuration, please contact us.



PDV
THERMOWELL

BORED FROM BAR STOCK | STRAIGHT | SCREW-ON

DESCRIPTION

Straight, screw-on thermowell bored from bar stock, for use in demanding operating conditions.

It offers an excellent mechanical pressure withstand.

SPECIFICATIONS

Model		PDV
Instrument connection		1/2"NPT
Process connection		3/4"NPT - 1"NPT - G3/4" - G1"
Diameter (mm)		20
Bore diameter (mm)		10 / 6.5
Material		304L - 316L - 321
Length L min/max (mm)		50 to 500 mm
Tip		Normal - Thinned - Reduced
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	PMI	1 point
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5 mm

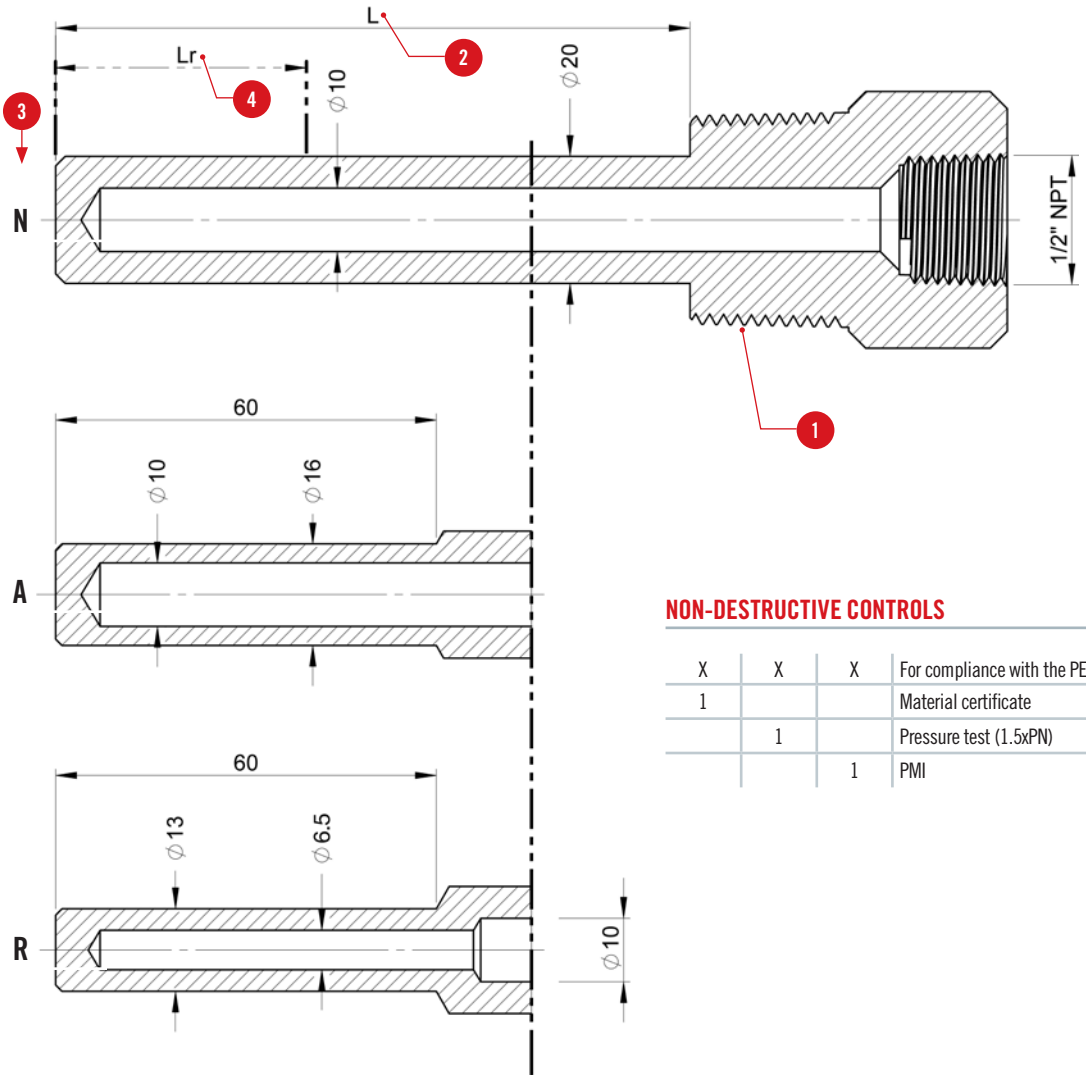
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	MATERIAL	LENGTH L (mm)	TIP	OPTION: REVÊTEMENT	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PDV	G10	AR	250	A	S200		NO	-
Reference in table and diagram	1		2	3	4	5		
Possible choice	3/4"NPT : N34 1"NPT : N10 G3/4" : G34 G1": G10	304L : AB 316L : AC 321 : AR	50 to 500 mm	Normal: N Thinned: A Reduced: R	Without: 0000 Stellite: SXXX L max.: 200 mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table below).	YES NO	Personalized customer reference

DIAGRAM (MM)



NON-DESTRUCTIVE CONTROLS

5

X	X	X	For compliance with the PED directive 2014/68/EU
1			Material certificate
	1		Pressure test (1.5xPN)
		1	PMI

For any other configuration, please contact us.



PDB-VS
THERMOWELL

BORED FROM BAR STOCK | STRAIGHT | FLANGED | ASME B16.5

DESCRIPTION

Straight thermowell bored from bar stock, with screwed and welded flange, for use in demanding operating conditions.
It offers an excellent mechanical pressure withstand.

SPECIFICATIONS

Model		PDB-VS
Compliance with standards		ASME B16.5
Instrument connection		1/2"NPT
Process connection	Flange	As per table opposite
Diameter (mm)		20
Bore diameter (mm)		10 / 6.5
Material		316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	Penetrant test	Performed according to EN ISO3452 and interpreted according to EN ISO23277 level 1 or ASME VIII div 1.
	PMI	2 points (flange + thermowell)
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

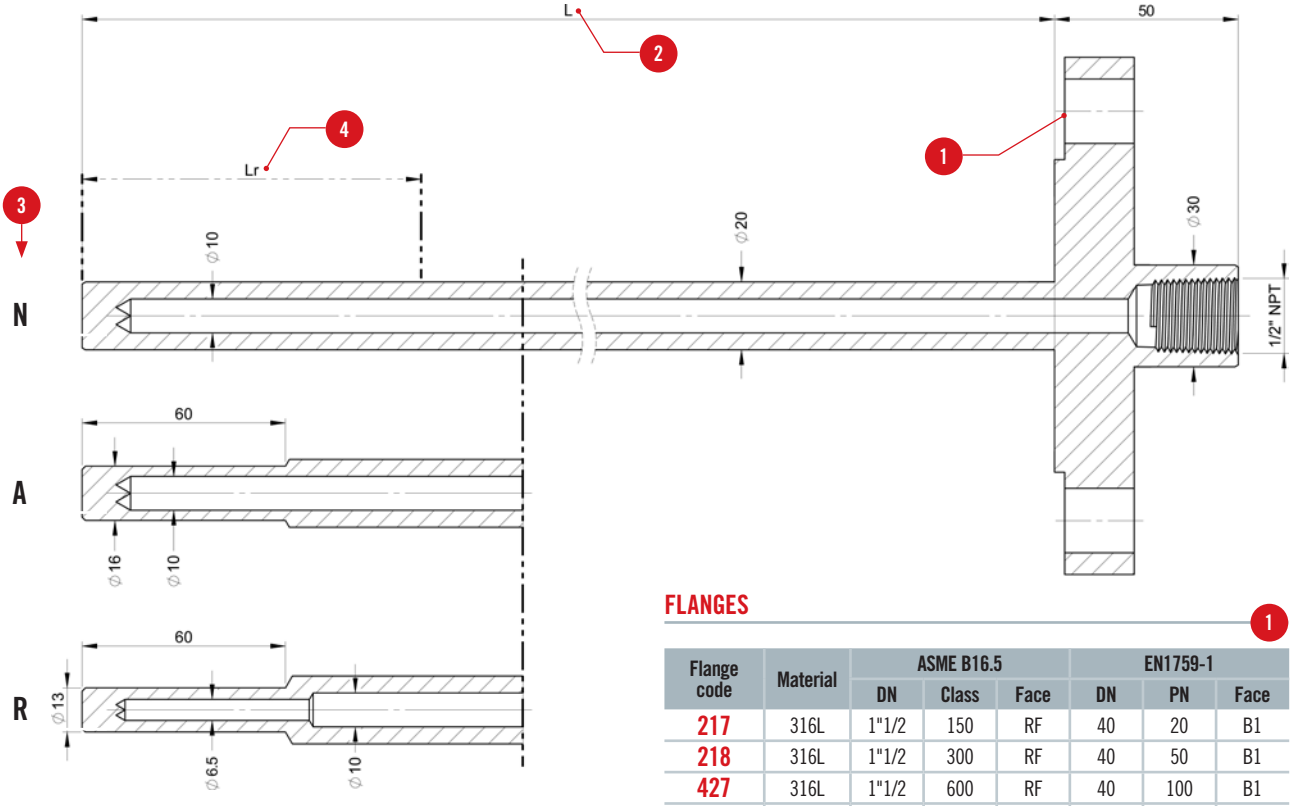
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	FLANGE	MATERIAL	LENGTH L (mm)	TIP	OPTION: COATING	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PDB-VS	217	AC	700	N	M100		NO	-
Référence tableau et schéma	1		2	3	4	5		
Choix possible	As per table below	316L : AC 321 : AR	50 to 500 mm	Normal: N Thinned: A Reduced: R	Without: 0000 Stellite: SXXX L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table opposite).	YES NO	Personalized customer reference

DIAGRAM (MM)



NON-DESTRUCTIVE TESTING

5

X	X	X	X	For compliance with the PED directive 2014/68/EU
1				Material certificate: flange + thermowell
	1			Weld penetrant test (COFREND 2)
		1		Pressure test (1.5xPN)
			1	PMI

FLANGES

1

Flange code	Material	EN1092-1		
		DN	PN	Face
400	316L	10/40	40	B1
413	316L	10/40	50	B1

For any other configuration, please contact us.

FLANGES

1

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
411	316L	1"1/2	600	RJ	40	100	B1
245	321	1"1/2	600	RJ	40	100	B1
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1
219	316L	2"	150	RF	50	20	B1
409	316L	2"	300	RF	50	50	B1
448	316L	2"	600	RF	50	100	B1
238	316L	2"	600	RJ	50	100	
477	316L	2"	1500	RJ	50	250	
562	321	2"	150	RF	50	20	B1
269	321	2"	300	RF	50	50	B1
519	321	2"	600	RF	50	100	B1
563	321	2"	600	RJ	50	100	
564	321	2"	1500	RJ	50	250	



PDB-2S
THERMOWELL

BORED FROM BAR STOCK | STRAIGHT | FLANGED | ASME B16.5

DESCRIPTION

Straight thermowell bored from bar stock, with flange welded on both sides (partial penetration), for use in demanding operating conditions.

It offers an excellent mechanical pressure withstand.

SPECIFICATIONS

Model		PDB-2S
Compliance with standards		ASME B16.5
Instrument connection		1/2"NPT
Process connection	Flange	As per table opposite
Diameter (mm)		20
Bore diameter (mm)		10 / 6.5
Material		316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	Penetrant test	Performed according to EN ISO3452 and interpreted according to EN ISO23277 level 1 or ASME VIII div 1.
	PMI	2 points (flange + thermowell)
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

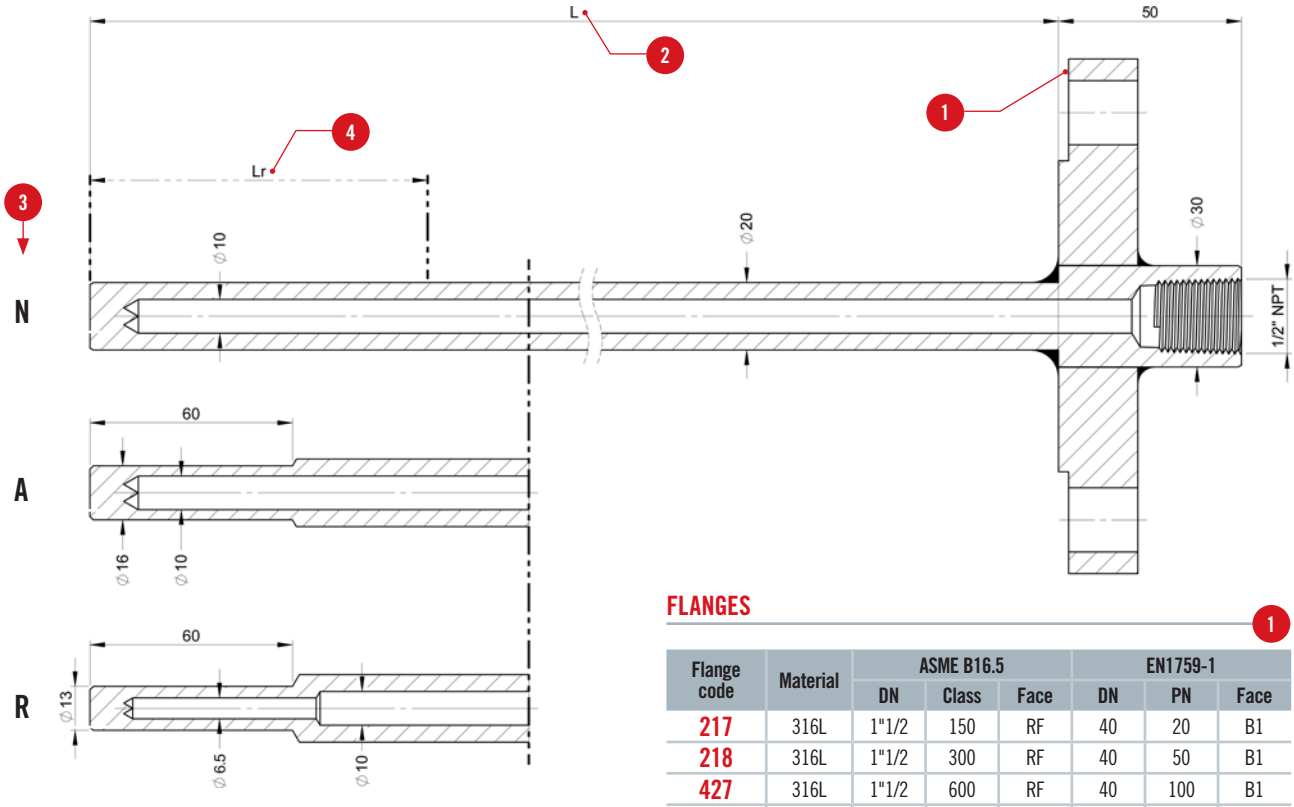
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	FLANGE	MATERIAL	LENGTH L (mm)	TIP	OPTION: COATING	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PDB-2S	427	AC	75	N	0000	-	NON	-
Reference in table and diagram	1		2	3	4	5		
Possible choice	As per table below	316L : AC 321 : AR	50 to 500 mm	Normal: N Thinned: A Reduced: R	Without: 0000 Stellite: SXXX L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table opposite).	YES NO	Personalized customer reference

DIAGRAM (MM)



NON-DESTRUCTIVE CONTROLS

6

X	X	X	X	For compliance with the PED directive 2014/68/EU
1				Material certificate: flange + thermowell
	1			Weld penetrant test (COFREND 2)
		1		Pressure test (1.5xPN)
			1	PMI

FLANGES

1

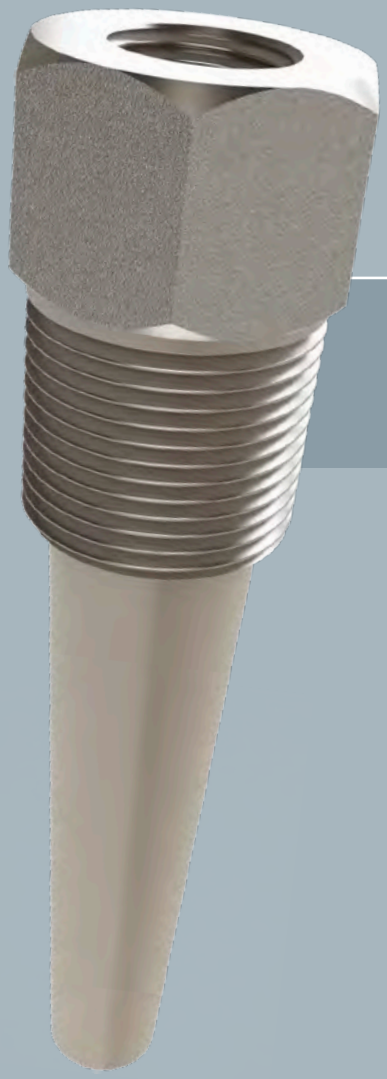
Flange code	Material	EN1092-1		
		DN	PN	Face
400	316L	10/40	40	B1
413	316L	10/40	50	B1

For any other configuration, please contact us.

FLANGES

1

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
411	316L	1"1/2	600	RJ	40	100	B1
245	321	1"1/2	600	RJ	40	100	B1
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1
219	316L	2"	150	RF	50	20	B1
409	316L	2"	300	RF	50	50	B1
448	316L	2"	600	RF	50	100	B1
238	316L	2"	600	RJ	50	100	
477	316L	2"	1500	RJ	50	250	
562	321	2"	150	RF	50	20	B1
269	321	2"	300	RF	50	50	B1
519	321	2"	600	RF	50	100	B1
563	321	2"	600	RJ	50	100	
564	321	2"	1500	RJ	50	250	



PCV
THERMOWELL

BORED FROM BAR STOCK | TAPERED | SCREW-ON

DESCRIPTION

Tapered, screw-on thermowell bored from bar stock, for use in demanding operating conditions.

It offers an excellent mechanical pressure withstand.

Compatible with PED 2014/68/EU.

SPECIFICATIONS

Model		PCV
Compliance with standards		ASME PTC19,3 TW-2016
Instrument connection		1/2"NPT
Process connection		3/4"NPT - 1"NPT - G3/4" - G1"
Thermowell shape		21x16 - 26x19
Bore diameter (mm)		6.5 - 8.5
Material		304L - 316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Calculation note	As per ASME PTC19.3 TW-2016
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	PMI	1 point
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

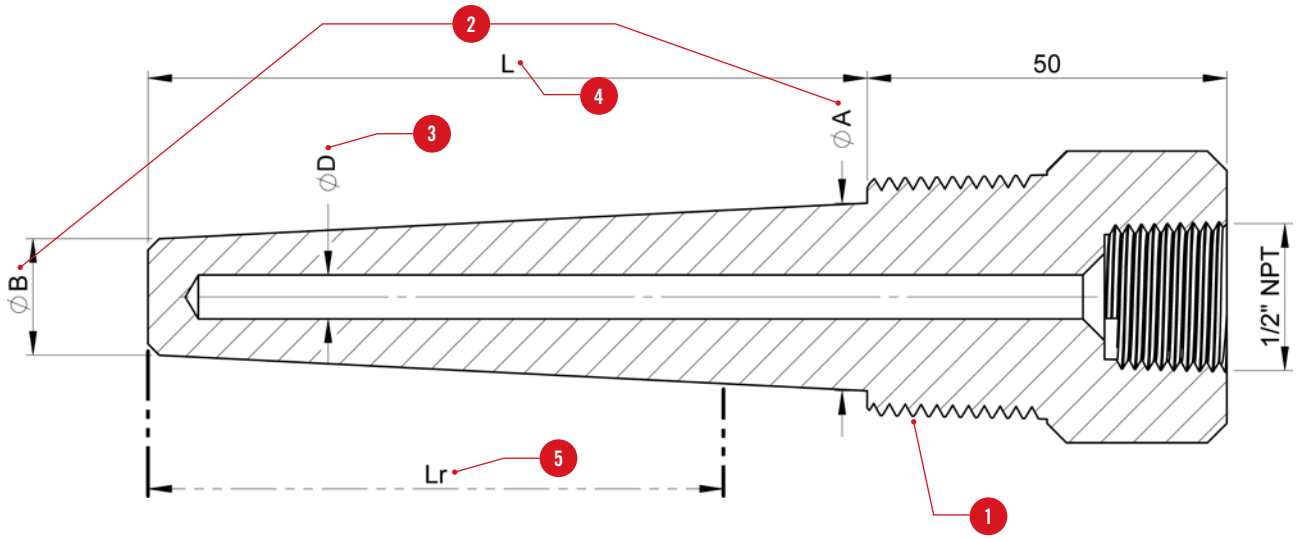
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	PROCESS CONNECTION	CONE AXB (mm)	Ø BORE	MATERIAL	LENGTH L (mm)	OPTION: COATING	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PCV	N10	21	65	AB	400	0000		NON	-
Référence tableau et schéma	1	2	3		4	5	6		
Choix possible	3/4"NPT : N34 1"NPT : N10 G3/4" : G34 G1": G10	21x16 : 21 26x19 : 26	6.5 : 65 8.5 : 85	304L : AB 316L : AC 321 : AR	50 to 500 mm	Without: 0000 Stellite: SXXX L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	Compliant with the PED directive 2014/68/EU (see table below).	YES NO	Personalized customer reference

DIAGRAM (MM)



NON-DESTRUCTIVE CONTROLS

6

X	X	X	For compliance with the PED directive 2014/68/EU
1			Material certificate: thermowell
	1		Pressure test (1.5xPN)
		1	PMI

For any other configuration, please contact us.

PCB-VS
THERMOWELL



ASME B16.5 | BORED FROM BAR STOCK | TAPERED | FLANGED

DESCRIPTION

Tapered thermowell bored from bar stock, with screw-on welded flange, for use in demanding operating conditions.
It offers an excellent mechanical pressure withstand.
Compatible with PED 2014/68/EU.

SPECIFICATIONS

Model		PCB-VS
Compliance with standards		ASME B16.5
Instrument connection		1/2"NPT
Process connection	Flange	As per table opposite
Thermowell shape AxB (mm)		21x16 - 26x19
Bore diameter d (mm)		6.5 - 8.5
Material		316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Stress withstand calculation note	As per ASME PTC19.3 TW-2016
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	Penetrant test	Performed according to EN ISO3452 and interpreted according to EN ISO23277 level 1 or ASME VIII div 1.
	PMI	2 points (flange + thermowell)
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

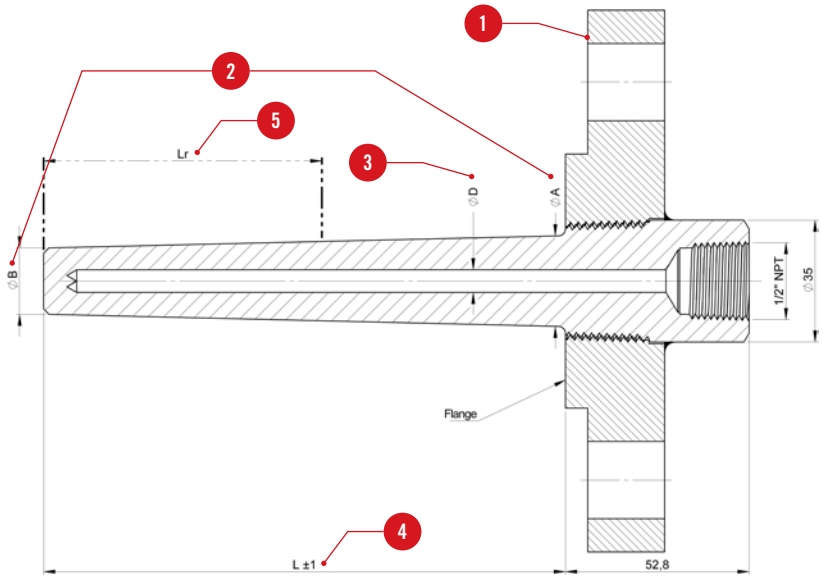
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	FLANGE	CONE AXB (mm)	Ø (mm)	MATERIAL	LENGTH L (mm)	OPTION: COATING	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PCB-VS	427	21	65	AR	250	S150		NO	-
Reference in table and diagram	1	2	3		4	5	6		
Possible choice	As per table below	21x16 : 21 26x19 : 26	6.5 : 65 8.5 : 85	316L : AC 321 : AR	50 to 500 mm	Without: 0000 Stellite: Sxxx L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table opposite).	YES NO	Personalized customer reference

SCHÉMA (MM)



NON-DESTRUCTIVE CONTROLS

6

X	X	X	X	For compliance with the PED directive 2014/68/EU
1				Material certificate: flange + thermowell
	1			Weld penetrant test (COFREND 2)
		1		Pressure test (1.5xPN)
			1	PMI

FLANGES

1

Flange code	Material	EN1092-1		
		DN	PN	Face
400	316L	10/40	40	B1
413	316L	10/40	50	B1

For any other configuration, please contact us.

FLANGES

1

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
411	316L	1"1/2	600	RJ	40	100	B1
245	321	1"1/2	600	RJ	40	100	B1
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1
219	316L	2"	150	RF	50	20	B1
409	316L	2"	300	RF	50	50	B1
448	316L	2"	600	RF	50	100	B1
238	316L	2"	600	RJ	50	100	
477	316L	2"	1500	RJ	50	250	
562	321	2"	150	RF	50	20	B1
269	321	2"	300	RF	50	50	B1
519	321	2"	600	RF	50	100	B1
563	321	2"	600	RJ	50	100	
564	321	2"	1500	RJ	50	250	

PCB-2S
THERMOWELL



ASME B16.5 | BORED FROM BAR STOCK | TAPERED | FLANGED

DESCRIPTION

Tapered thermowell bored from bar stock, with flange welded on both sides, for use in demanding operating conditions.
It offers an excellent mechanical pressure withstand.
Compatible with PED 2014/68/EU.

SPECIFICATIONS

Model		PCB-2S
Compliance with standards		ASME B16.5
Instrument connection		1/2"NPT
Process connection	Flange	As per table opposite
Thermowell shape AxB (mm)		21x16 - 26x19
Bore diameter d (mm)		6.5 - 8.5
Material		316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Stress withstand calculation note	As per ASME PTC19.3 TW-2016
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	Penetrant test	Performed according to EN ISO3452 and interpreted according to EN ISO23277 level 1 or ASME VIII div 1.
	PMI	2 points (flange + thermowell)
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

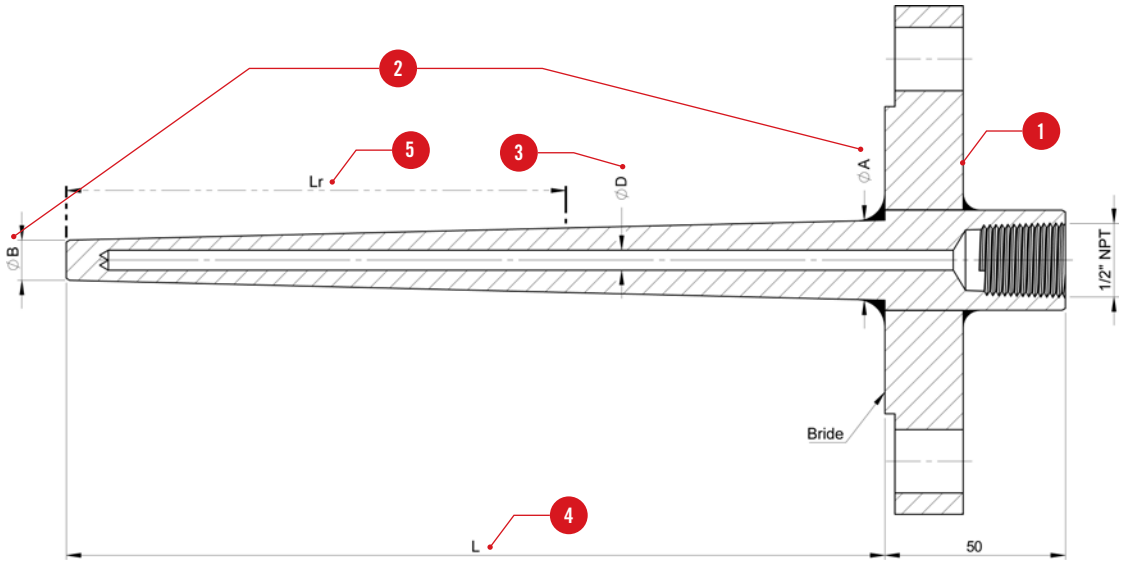
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	FLANGE	CONE AXB (mm)	Ø (mm)	MATERIAL	LENGTH L (mm)	OPTION: COATING	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PCB-VS	427	21	65	AR	250	S150		NO	-
Reference in table and diagram	1	2	3		4	5	6		
Possible choice	As per table below	21x16 : 21 26x19 : 26	6.5 : 65 8.5 : 85	316L : AC 321 : AR	50 to 500 mm	Without: 0000 Stellite: SXXX L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table opposite).	YES NO	Personalized customer reference

DIAGRAM (MM)



FLANGES

1

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
411	316L	1"1/2	600	RJ	40	100	B1
245	321	1"1/2	600	RJ	40	100	B1
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1
219	316L	2"	150	RF	50	20	B1
409	316L	2"	300	RF	50	50	B1
448	316L	2"	600	RF	50	100	B1
238	316L	2"	600	RJ	50	100	
562	321	2"	150	RF	50	20	B1
269	321	2"	300	RF	50	50	B1
519	321	2"	600	RF	50	100	B1
563	321	2"	600	RJ	50	100	

NON-DESTRUCTIVE CONTROLS

6

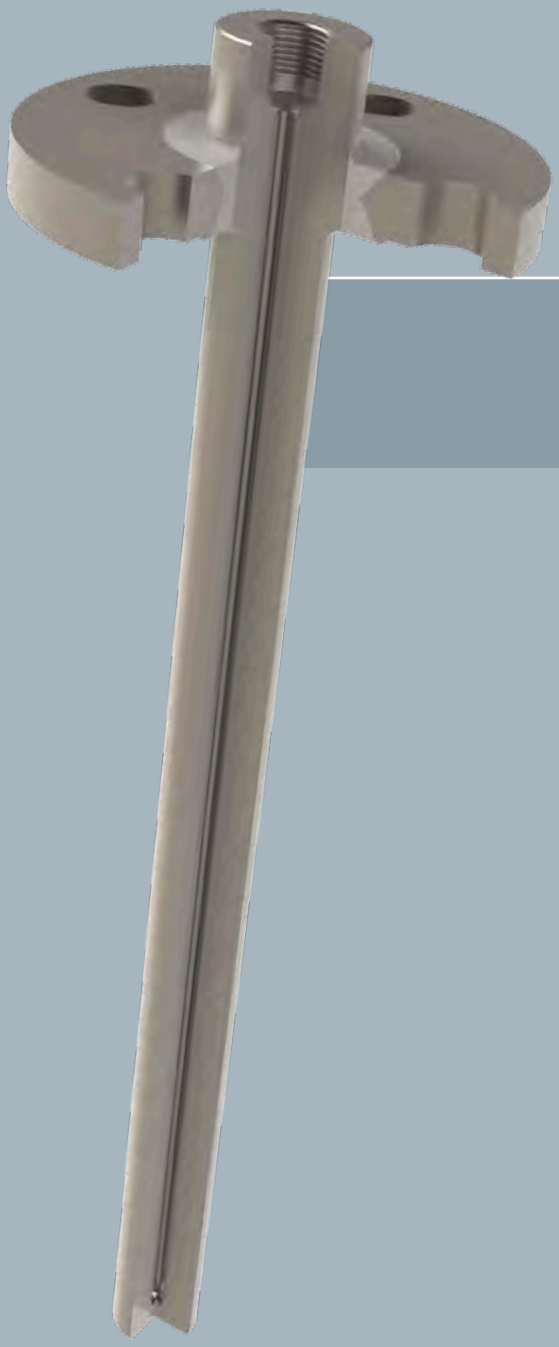
X	X	X	X	X	For compliance with the PED directive 2014/68/EU
1					Material certificate: flange + thermowell
	1				Calculation note as per ASME PTC19.3 TW-2016
		1			Weld penetrant test (COFREND 2)
			1		Pressure test (1.5xPN)
				1	PMI

FLANGES

1

Flange code	Material	EN1092-1		
		DN	PN	Face
400	316L	10/40	40	B1
413	316L	10/40	50	B1

For any other configuration, please contact us.



PCB-PP
THERMOWELL

ASME B16.5 | BORED FROM BAR STOCK | TAPERED | FLANGED

DESCRIPTION

Tapered thermowell bored from bar stock with full-penetration welded flange, for use in demanding operating conditions. It offers an excellent mechanical pressure withstand. Compatible with PED 2014/68/EU.

SPECIFICATIONS

Model		PCB-PP
Compliance with standards		ASME B16.5
Instrument connection		1/2"NPT
Process connection	Flange	As per table opposite
Thermowell shape AxB (mm)		21x16 - 26x19 - 31x26 - 36x33
Bore diameter d (mm)		6.5 - 8.5
Material		316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Stress withstand calculation note	As per ASME PTC19.3 TW-2016
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	Penetrant test	Root and final, internal and external, performed as per EN ISO3452 and interpreted as per EN ISO23277 level 1 or ASME VIII div 1 for auto TIG, level 2 for manual TIG.
	PMI	3 points (flange, thermowell and weld)
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

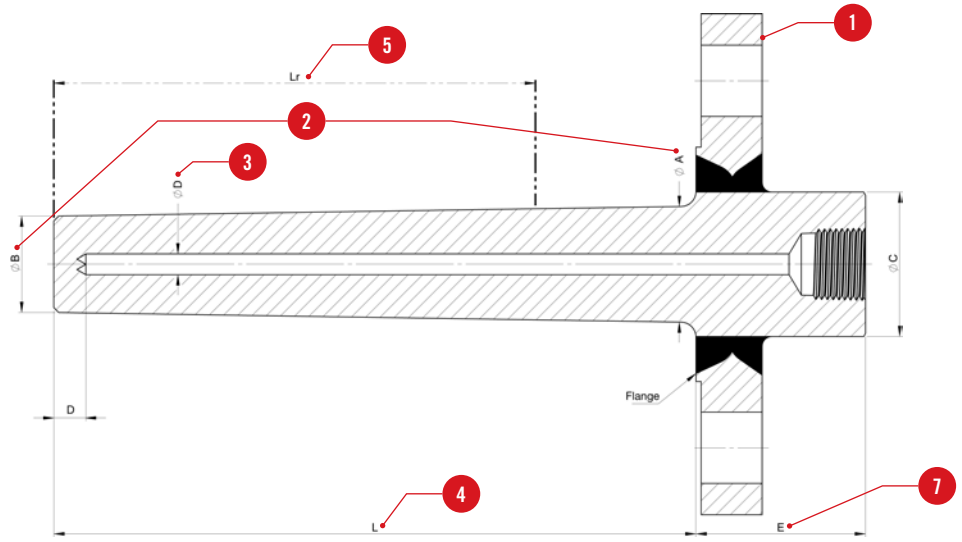
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	FLANGE	CONE AXB (mm)	Ø (mm)	MATERIAL	LENGTH L (mm)	OPTION COATING	OPTION NDC	OPTION PLUG + CHAIN	OPTION TAG
PCB-PP	245	26	65	AC	700	S200		NO	-
Reference in table and diagram	1	2	3		4	5	6		
Possible choice	As per table below	21x16 : 21 26x19 : 26 31x26 : 31 36x33 : 36	6.5 : 65 8.5 : 85	316L : AC 321 : AR	50 to 500 mm	Without: 0000 Stellite: SXXX L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table opposite).	YES NO	Personalized customer reference

DIAGRAM (MM)



HEAD AND THERMOWELL DEPTH

AxB (mm)	Diam. C (mm)	D (mm)
21x16	30	9.5
26x19	35	9.5
31x26	40	10
36x33	45	13.5

NON-DESTRUCTIVE CONTROLS

6

X	X	X	X	X	For compliance with the PED directive 2014/68/EU
1					Material certificate: flange + thermowell
	1				Calculation note as per ASME PTC19.3 TW-2016
		1			Weld penetrant test (COFREND 2)
			1		Pressure test (1.5xPN)
				1	PMI

DIMENSION LINKED TO FLANGE

7

Flange Class	E (mm)
≤ 600	52.8
>600	80

FLANGES

1

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
411	316L	1"1/2	600	RJ	40	100	B1
245	321	1"1/2	600	RJ	40	100	B1
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1
219	316L	2"	150	RF	50	20	B1
409	316L	2"	300	RF	50	50	B1
448	316L	2"	600	RF	50	100	B1
238	316L	2"	600	RJ	50	100	
477	316L	2"	1500	RJ	50	250	
562	321	2"	150	RF	50	20	B1
269	321	2"	300	RF	50	50	B1
519	321	2"	600	RF	50	100	B1
563	321	2"	600	RJ	50	100	
564	321	2"	1500	RJ	50	250	

For any other configuration, please contact us.

PCB-F
THERMOWELL



ASME B16.5 | FORGED | TAPERED | FLANGED

DESCRIPTION

Tapered thermowell bored from bar stock with flange, made from forging interstage, for use in very demanding operating conditions. It offers an excellent mechanical pressure withstand.
Compatible with PED 2014/68/EU.

SPECIFICATIONS

Model		PCB-F
Compliance with standards		ASME B16.5
Instrument connection		1/2"NPT
Process connection	Flange	As per table opposite
Thermowell shape AxB (mm)		26x19 - 31x26 - 36x33 - 41x36
Bore diameter d (mm)		6.5 - 8.5
Material		316L - 321
Length L min/max (mm)		50 to 500 mm
Roughness	Ra	0.8
Non-Destructive Controls for compliance with the PED directive 2014/68/EU	Material certificate	As per EN10204 3.1
	Stress withstand calculation note	As per ASME PTC19.3 TW-2016
	Pressure test	Internal at 1.5xPN for 15' (max. 600 bar) as per ASME Section XIII Division 1 Section UG-99
	PMI	1 point (forged bar)
Coating		Stellite, thickness 2 mm Halar, thickness 0.1mm Tantalum, thickness 0.5mm

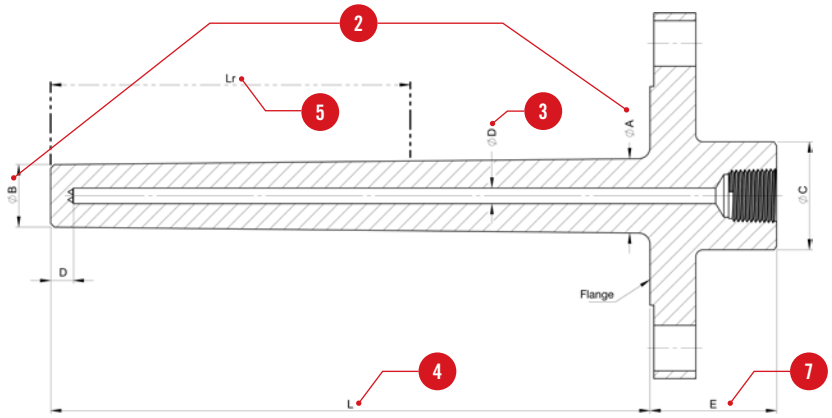
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL	FLANGE	CONE AxB (mm)	Ø (mm)	MATERIAL	LENGTH L (mm)	OPTION: COATING	OPTION: NDC	OPTION: PLUG + CHAIN	OPTION: TAG
PCB-F	219	26	65	AC	400	M200		NO	-
Reference in table and diagram	1	2	3		4	5	6		
Possible choice	As per table below	26x19 : 26 31x26 : 31 36x33 : 36 41x36 : 41	6.5 : 65 8.5 : 85	316L : AC 321 : AR	50 to 500 mm	Without: 0000 Stellite: SXXX L max.: 200mm Halar: Mxxx Tantalum: Txxx (xxx: length in mm from tip)	In compliance with the PED directive 2014/68/EU (see table opposite).	YES NO	Personalized customer reference

DIAGRAM (MM)



FLANGES

1

Flange code	Material	ASME B16.5			EN1759-1		
		DN	Class	Face	DN	PN	Face
217	316L	1"1/2	150	RF	40	20	B1
218	316L	1"1/2	300	RF	40	50	B1
427	316L	1"1/2	600	RF	40	100	B1
411	316L	1"1/2	600	RJ	40	100	
463	316L	1"1/2	1500	RJ	40	250	
540	321	1"1/2	150	RF	40	20	B1
481	321	1"1/2	300	RF	40	50	B1
482	321	1"1/2	600	RF	40	100	B1
245	321	1"1/2	600	RJ	40	100	
541	321	1"1/2	1500	RJ	40	250	
219	316L	2"	150	RF	50	20	B1
409	316L	2"	300	RF	50	50	B1
448	316L	2"	600	RF	50	100	B1
238	316L	2"	600	RJ	50	100	
477	316L	2"	1500	RJ	50	250	
502	316L	2"	2500	RJ	50	420	
562	321	2"	150	RF	50	20	B1
269	321	2"	300	RF	50	50	B1
519	321	2"	600	RF	50	100	B1
563	321	2"	600	RJ	50	100	
564	321	2"	1500	RJ	50	250	
565	321	2"	2500	RJ	50	420	

HEAD AND THERMOWELL DEPTH

4

DN	AxB (mm)	C (mm)	D (mm)
1"1/2	26x19	35	9.5
1"1/2 - 2"	31x26	40	10
	36x33	45	13.5
2"	41x36	50	15

DIMENSION LINKED TO FLANGE

7

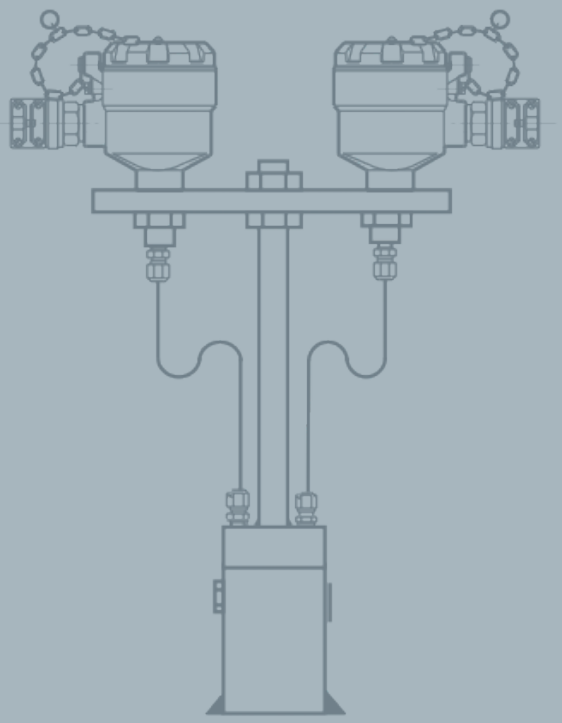
Flange Class	E (mm)
≤ 600	52.8
>600	80

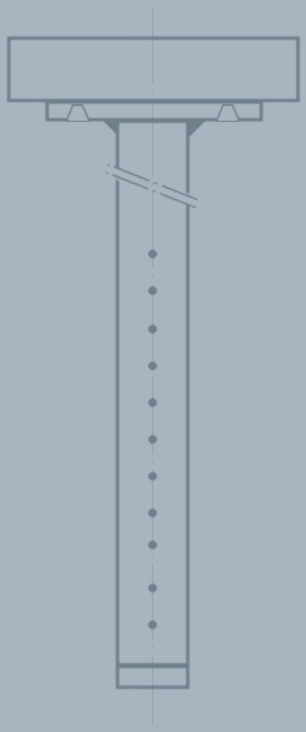
NON-DESTRUCTIVE CONTROLS

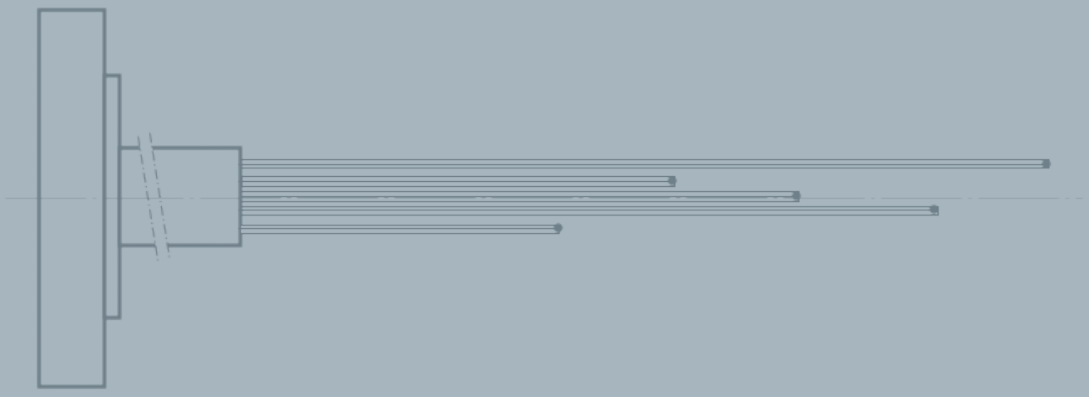
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X	X	X	X	For compliance with the PED directive 2014/68/EU
1				Material certificate: flange + thermowell
	1			Calculation note as per ASME PTC19.3 TW-2016
		1		Pressure test (1.5xPN)
			1	PMI

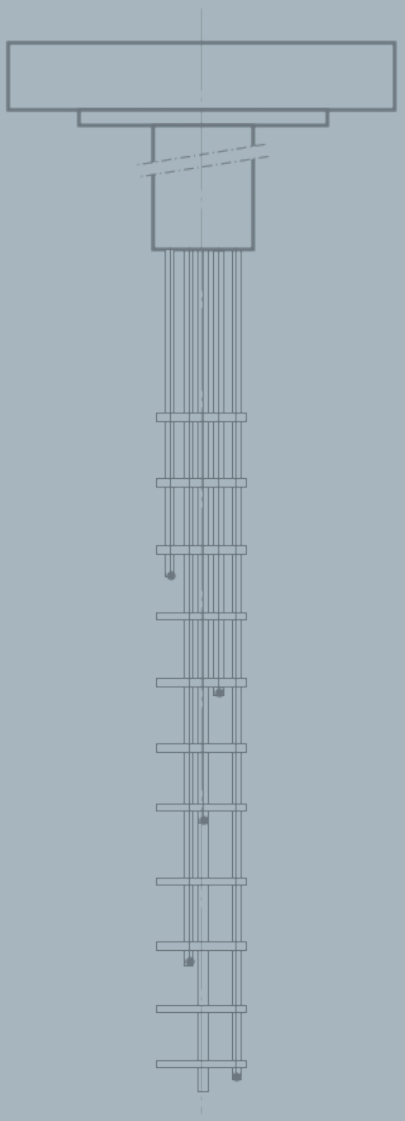
For any other configuration, please contact us.

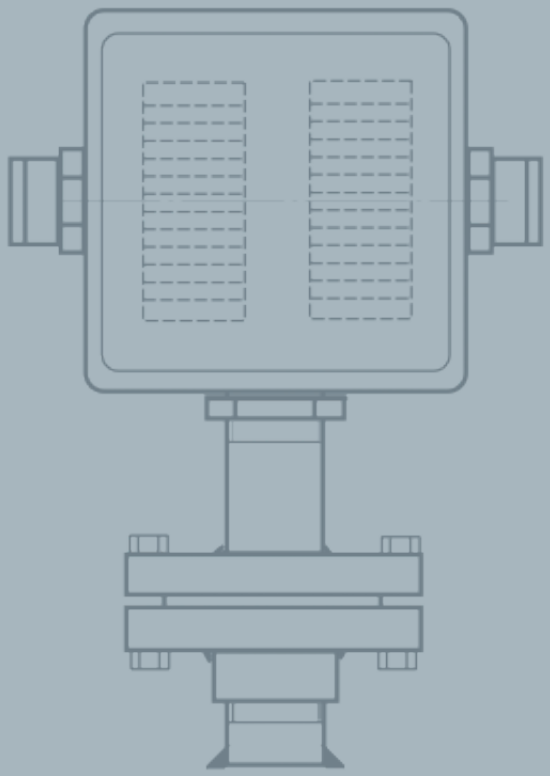






SENSORS FOR SPECIAL APPLICATIONS





SENSORS FOR THE SEMI-CONDUCTOR AND SOLAR POWER INDUSTRIES 294

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SENSORS FOR THE SEMI-CONDUCTOR AND POWER SOLAR INDUSTRIES



The manufacture of a semi-conductor component, whether it involves a discrete element (semi-conductor only containing one active component, such as a transistor) or integrated circuits (set of active or passive elements linked together on the same semi-conductor substrate and capable of performing at least one electronic circuit function), includes a large number of highly technical, specialized operations.

- Usually, one of those operations is oxidation, which is the first of the 6 major steps in the production of a component.
- An integrated circuit may be composed of millions de transistors (as well as diodes, resistors and capacitors) made of doped silicon, all linked together according to an appropriate wiring diagram to create a computer logic, a memory or other type of circuit. Hundreds of microcircuits may be made on a single wafer.

This first step in the processing of a semi-conductor component therefore involves oxidation of the board's external surface in order to form a thin layer (approx. 1 micron thick) of silicon dioxide (SiO2). This layer serves above all to protect the surface against impurities and to provide a mask for the subsequent diffusion operation. The possibility of forming this protective dioxide layer on silicon is why silicon wafers are the most widely-used substrate for semi-conductors. Oxidation, often called thermal oxidation, is performed in batches in a high-temperature diffusion oven. The layer of silicon dioxide is formed in atmospheres containing either oxygen (O2) (dry oxidation), or oxygen combined with water vapour (H2O) (wet oxidation). The temperatures in the oven range from 800 to 1,300 °C.

Photovoltaic cell manufacturing also requires the use of ovens with several zones in which the temperatures range from 600°C to 1,300°C.

- For these applications, we develop and manufacture multipoint profile sensors and spikes.

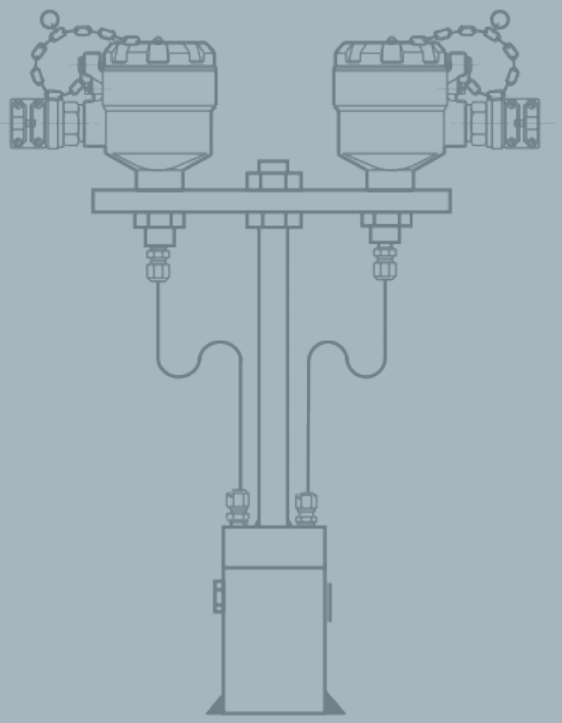
For profile sensors, we use a single ceramic sheath to insulate the TCs and an external quartz protective sheath. S, R or B thermocouples may be used. We can propose 2 to 6 thermocouples for a profile sensor. These sensors can be equipped with handles for easy, risk-free installation in the oven.

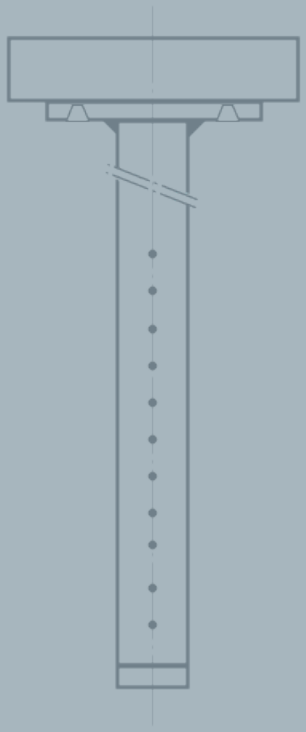
- **The spikes** may be single or duplex models.

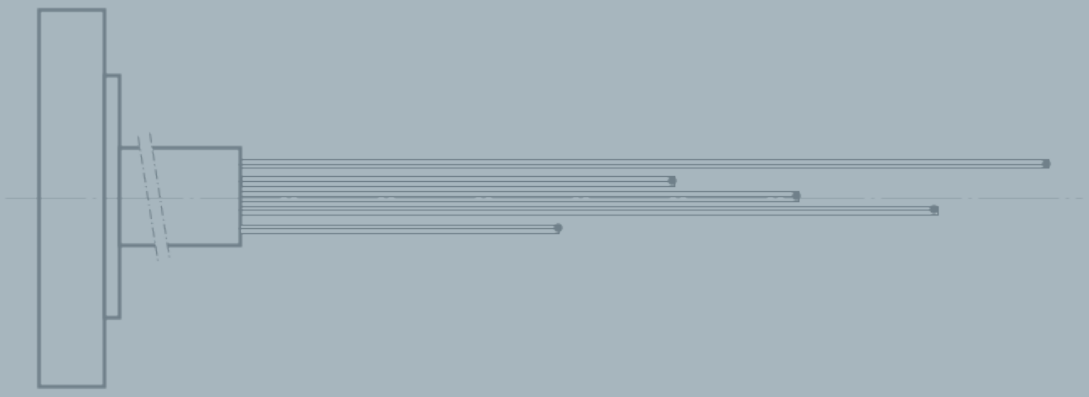
Numerous different versions can be produced, so please do not hesitate to ask us for a quotation.



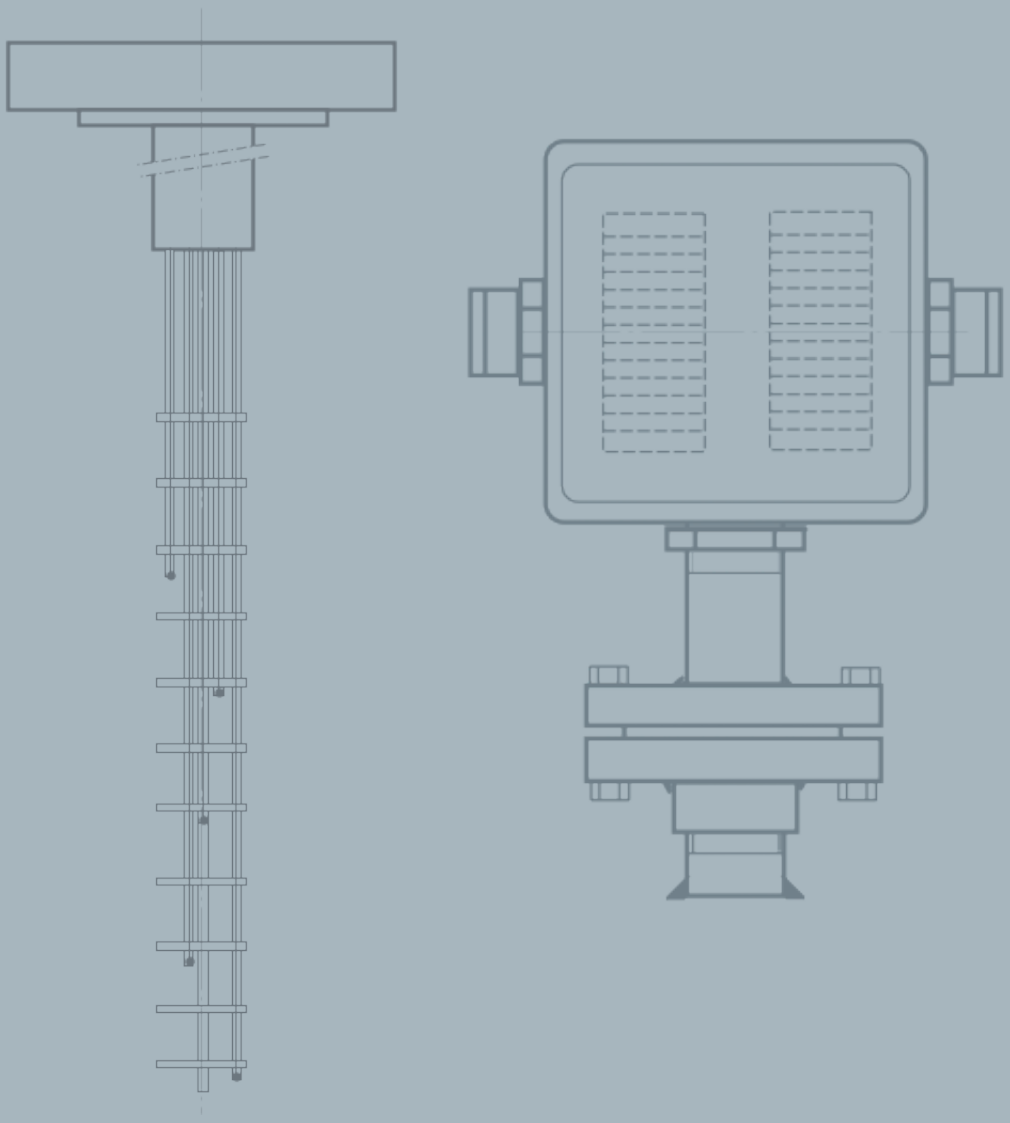








MULTIPOINT SENSORS FOR REACTORS



The chemical and petrochemical industries make use of cutting-edge technologies and are characterized by their demanding requirements in terms of productivity, quality, efficiency and safety. Pyrocontrole proposes sensors which are reliable, accurate and safe for multipoint temperature measurement in catalysers and reactors. These sensors are often used to determine the temperature profiles of the process so as to control and optimize conversion efficiency, while reducing installation costs.

Furthermore, precise control of the reactor temperature is important for the process, as well as for safety reasons due to the possibility of exothermic reactions.

Depending on the application and the constraints specific to each installation, Pyrocontrole designs and manufactures multipoint temperature sensor versions suitable for every situation. They can be made using thermocouples or resistive sensors, ATEX-compliant or not, with or without transmitters.

There may be up to 15 points in a 6 mm diameter to be as unintrusive as possible, over a length adapted to your process, and up to 40 when the elements are unattached.

DESCRIPTION

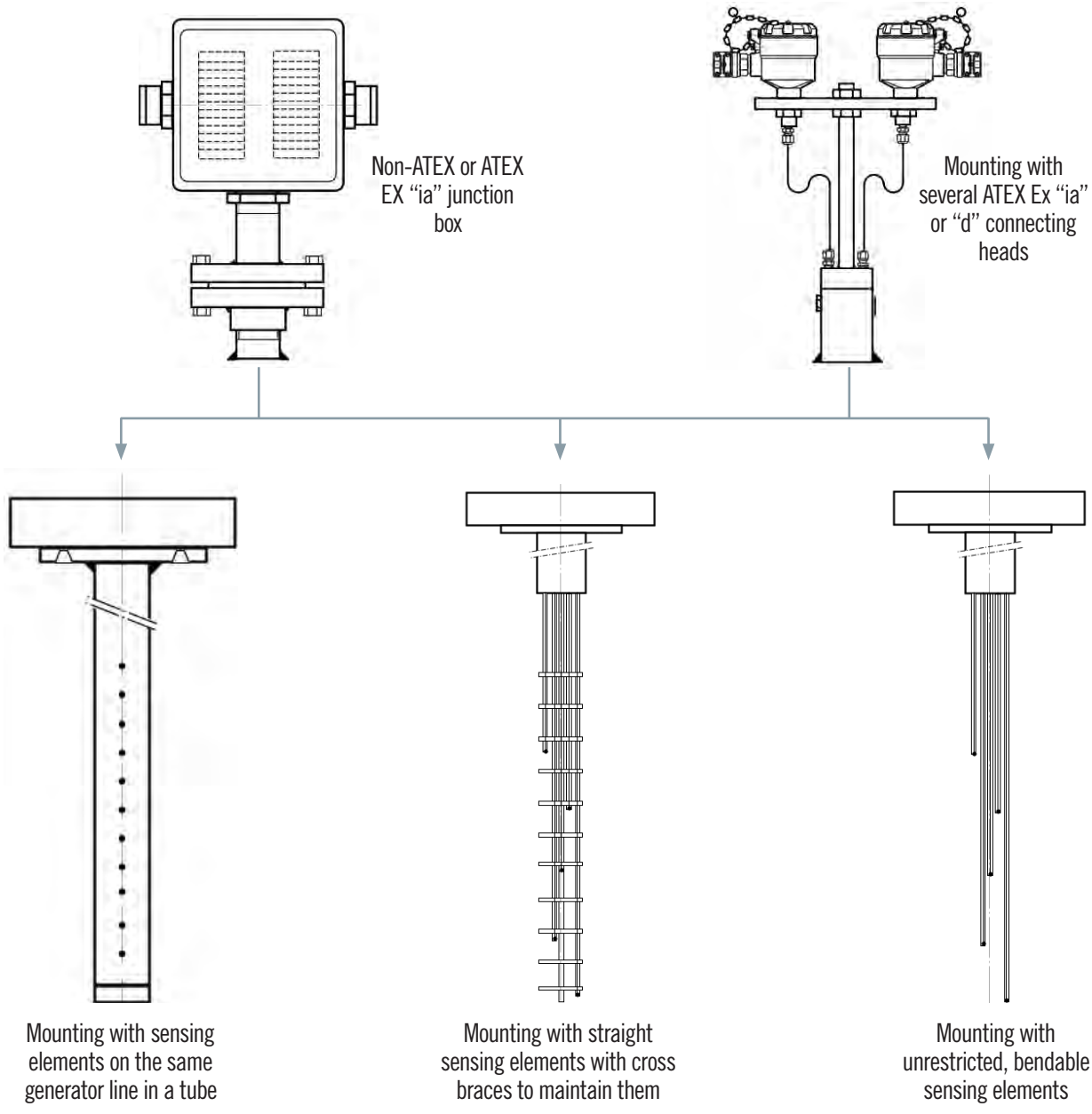
Our multipoint sensors are available in several configurations, depending on the customer's requirements. There may be from 3 to 40 measurement points depending on the sensor model.

Multipoint temperature measurement assemblies can be installed in ATEX or non-ATEX zones and are certified as benefiting from protection mode "ia" or "d" depending on the type of mounting.

Multipoint sensors comprise:

- a junction box (ATEX: Ex "ia", Ex "d" or non-ATEX) or connecting heads (ATEX Ex "d" or Ex "ia")
- an extension which may or may not be equipped with a secondary containment chamber
- a mounting flange on the customer process
- a bundle of sensors (thermocouples on the same generator line, straight, unattached and bendable thermocouples, or Pt100 sensors with straight sheathed cable)
- protection of the bundle (cross brace, tube, flexible sheath, etc.) or no protection if you want to handle the sensing elements freely.

DIAGRAM OF SENSORS

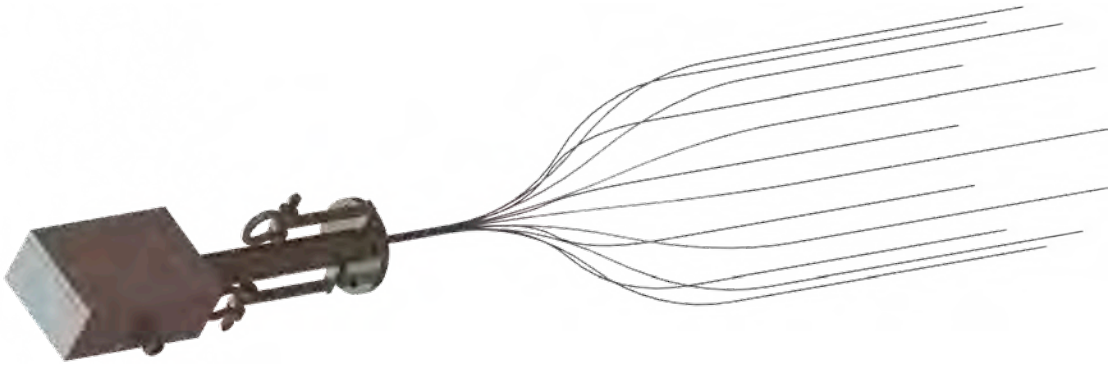


Non-contractual document - Please confirm specifications when ordering.

OUR STANDARDS

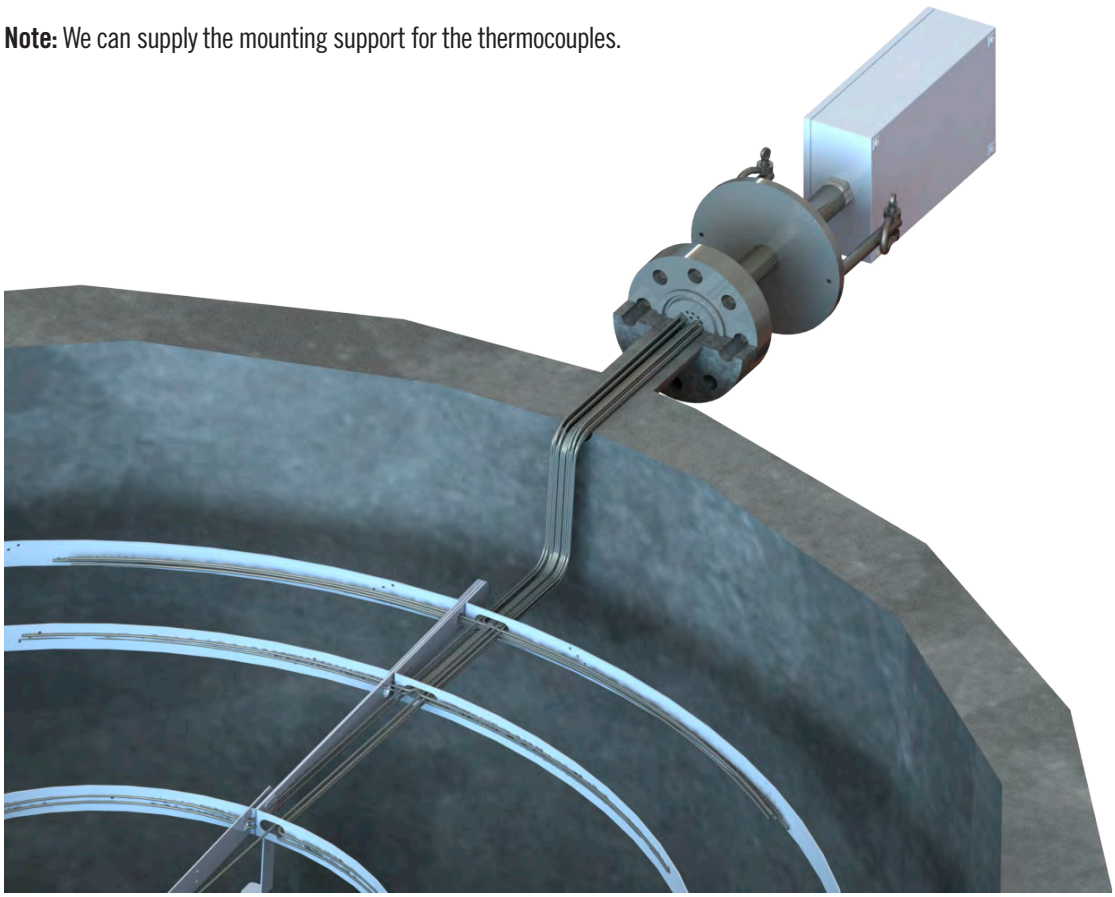
Temperature measurement assemblies with free, bendable elements:

Model: PiPD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
1	8 to 40	36	550	550
2	8 to 28			
3	4 to 12	30		

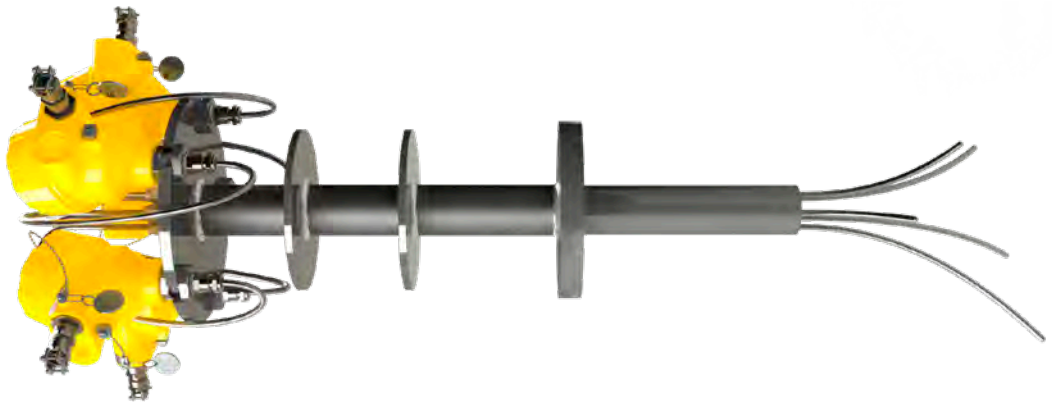


Model: PiGD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
4.5	4 to 30	20	600	550
6				
8				

Note: We can supply the mounting support for the thermocouples.



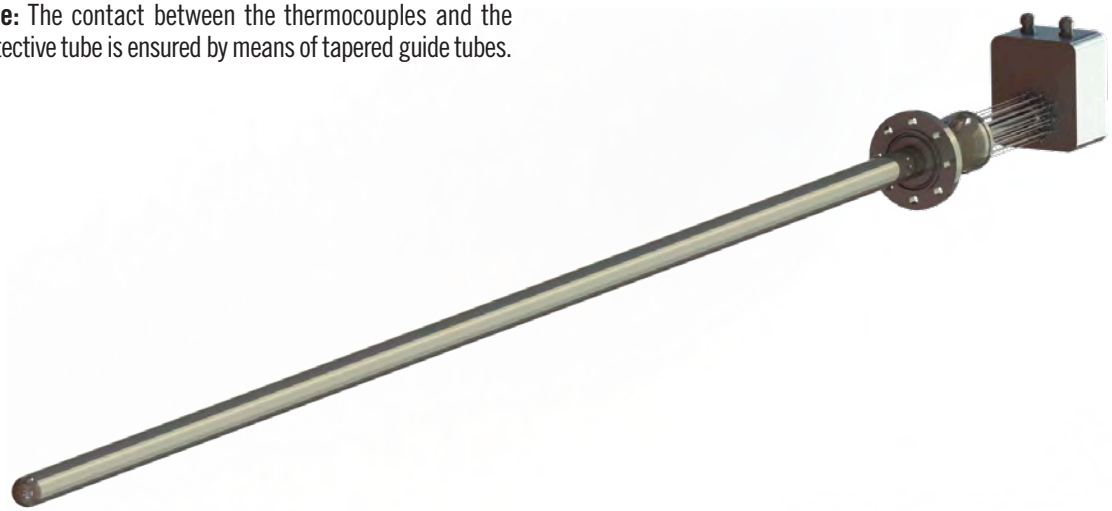
Model: PiTD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
4.5	5	30	600	450
6				
8				



Assemblies in large-diameter protective tube:

Model: STGD					
Thermocouple diameter (mm)	Number of measuring points	Protective tube type (standard)	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
3	5 to 35	3" Sch.80 SS 321	6	850	150

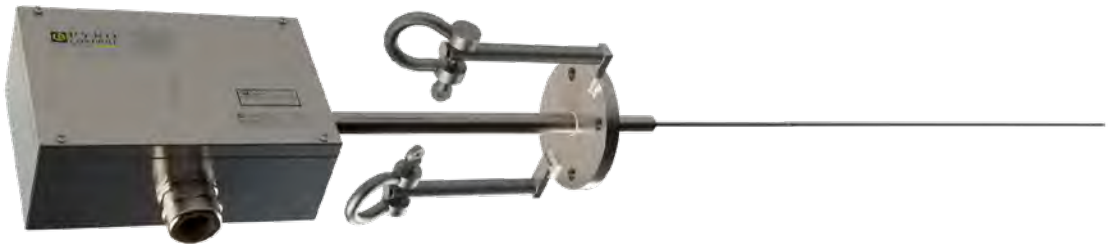
Note: The contact between the thermocouples and the protective tube is ensured by means of tapered guide tubes.



Assemblies with elements in small-diameter protective tube:

Model: STPD					
Thermocouple diameter (mm)	Number of measuring points	Protective tube type (standard)	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
1	6 to 15	Ø6 mm SS 316L	10	800	200
1.5	6 to 8				

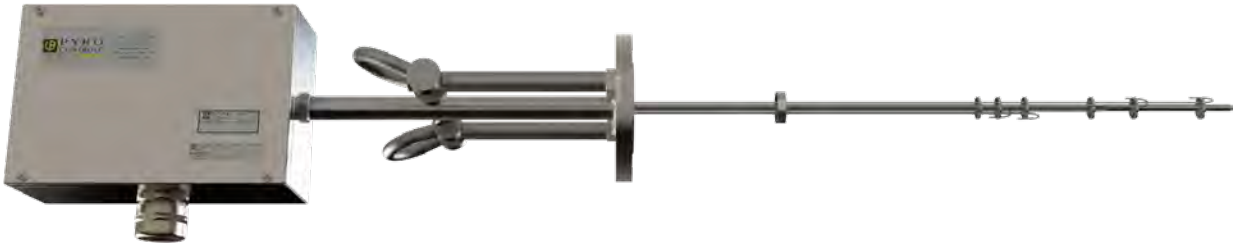
Note: Variant with cylindrical cover and compensation cable available.



Assemblies with positioning spacers:

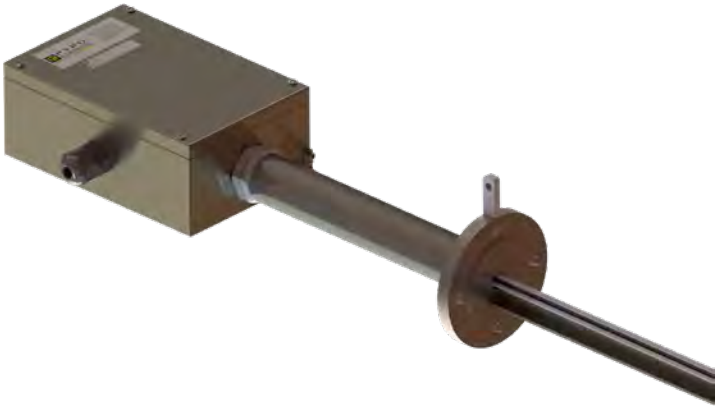
Model: EPPD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
2	4 to 12	10	700	550

Note: Variant with cylindrical cover and compensation cable available.

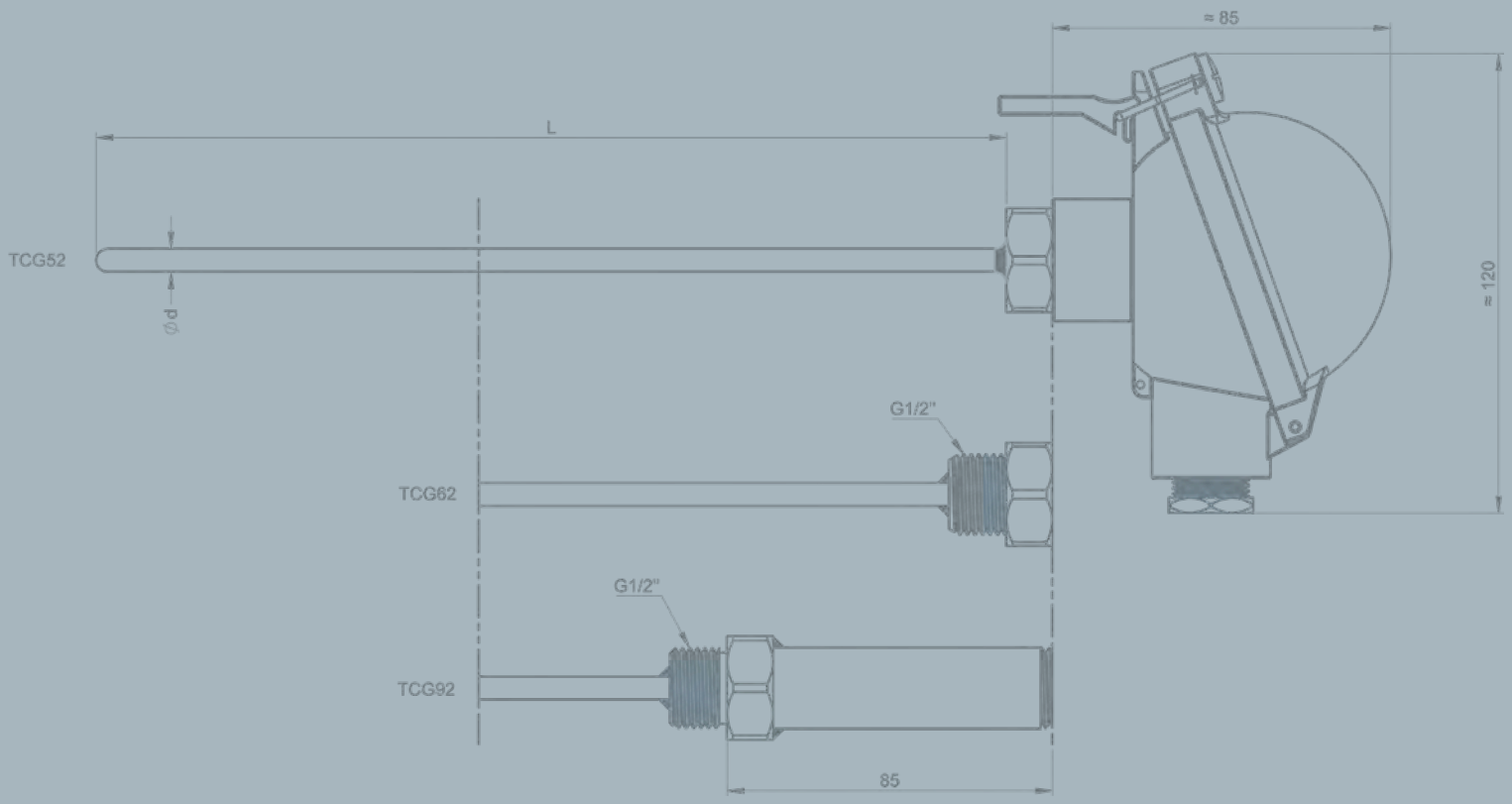


Teebar assemblies:

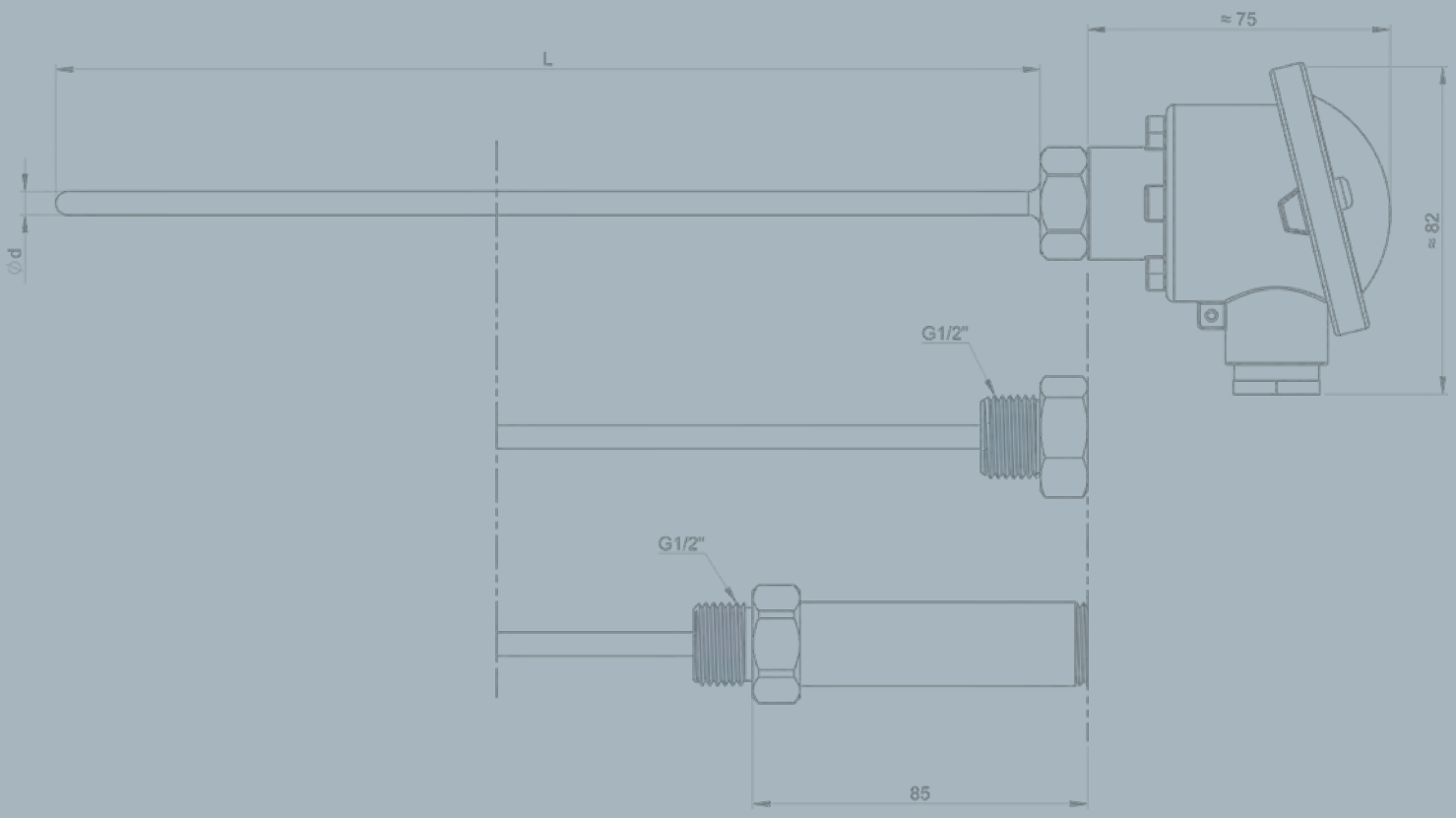
Model: TTPD					
Thermocouple diameter (mm)	Number of measuring points	Protective tube type (standard)	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
3	3 to 5	Ø6 mm SS 316L	6	700	350



* The pressure and temperature levels indicated are given as indications and may vary according to your conditions.



SENSORS FOR HIGH-PRESSURE APPLICATIONS



Some processes in the chemicals sector require very high pressures to produce quality products. One such process is the manufacture of low-density polyethylene (LDPE).

The LDPE production process is divided into five operations:

- Compression of the gas: after intake of ethylene, the gas is compressed in the first compressor with unreacted gas from the process. This initial compressed gas is remixed with unreacted gas and then enters the second compressor.
- Polymerization: an initiator (organic peroxide) is added to this second compressed gas in the reactor. It is mixed by a stirring device. Polymerization is achieved under specific pressure and temperature conditions.
- Separation of the gas: the unreacted gas is then separated by passing it through 3 distinct separators. This separated gas is then recovered for reinjection upstream of the two compressors. It should be noted that some of the gas will be excluded from the process.
- Extrusion: once the unreacted gas has been removed, the polymers can be extruded in granulate form.
- Storage and conditioning: the granules are dried and stored according to their particle size. Degassing is performed by hot air injection.

The pressure in the polymerization process may be between 1,000 and 3,000 bar. Furthermore, the temperature is a critical quantity for the polymerization process, so it is crucial to monitor it. This means being capable of designing and manufacturing quick, accurate temperature sensors which can withstand these high pressures.

Pyrocontrole proposes temperature sensors capable of withstanding up to 4,700 bar (i.e. more than 1.5xPN). A design can be developed which is tailored to suit your installation and operating constraints. Please do not hesitate to contact us for a quotation.



HPTEMP

CLASS 1 | IEC 584-1 | UP TO 5150 BAR | up to 350°C

DESCRIPTION

Temperature Sensor for high pressures up to 4,700 bars. HPtemp is designed to measure temperature in extreme pressure environments such as LDPE units.

Developed to measure temperatures in high-pressure environments, this qualified sensor can be used for reliable, accurate measurement of fluid temperatures, with a response time under one second.

Comprising a part immersed in the fluid, it is mounted using a screwed fitting and fixed with a double socket taper providing very high-level leak-tightness.

SPECIFICATIONS

Operating temperature	Up to 350°C
Response time	0.6 s
Maximum pressure	3,600 bars
Test pressure	5,150 bars
Fluid speed supported	100 m/s
Measuring element	Duplex K thermocouple
Protective sheath	Diameter from 1.5 to 6 mm Metal, 316L Fastening by screwed fitting Double socket taper for tightness

STRENGTHS

- Pressure range up to 4,700 bars
- Very short response time: less than one second
- Withstands shocks and vibrations
- ATEX/ IECEx-compliant
- Particularly compact: from 1.5 to 6 mm diameter

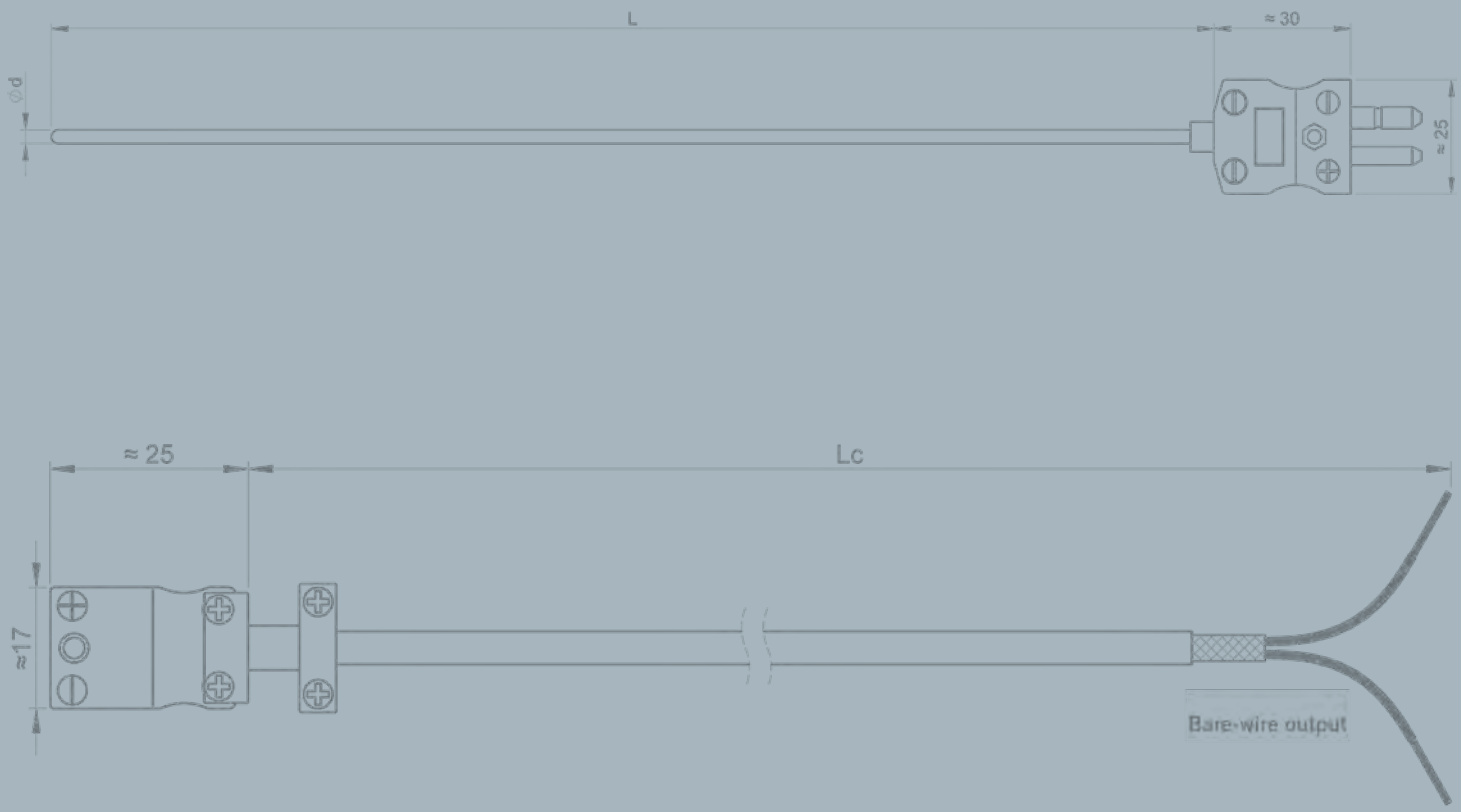
EXAMPLES



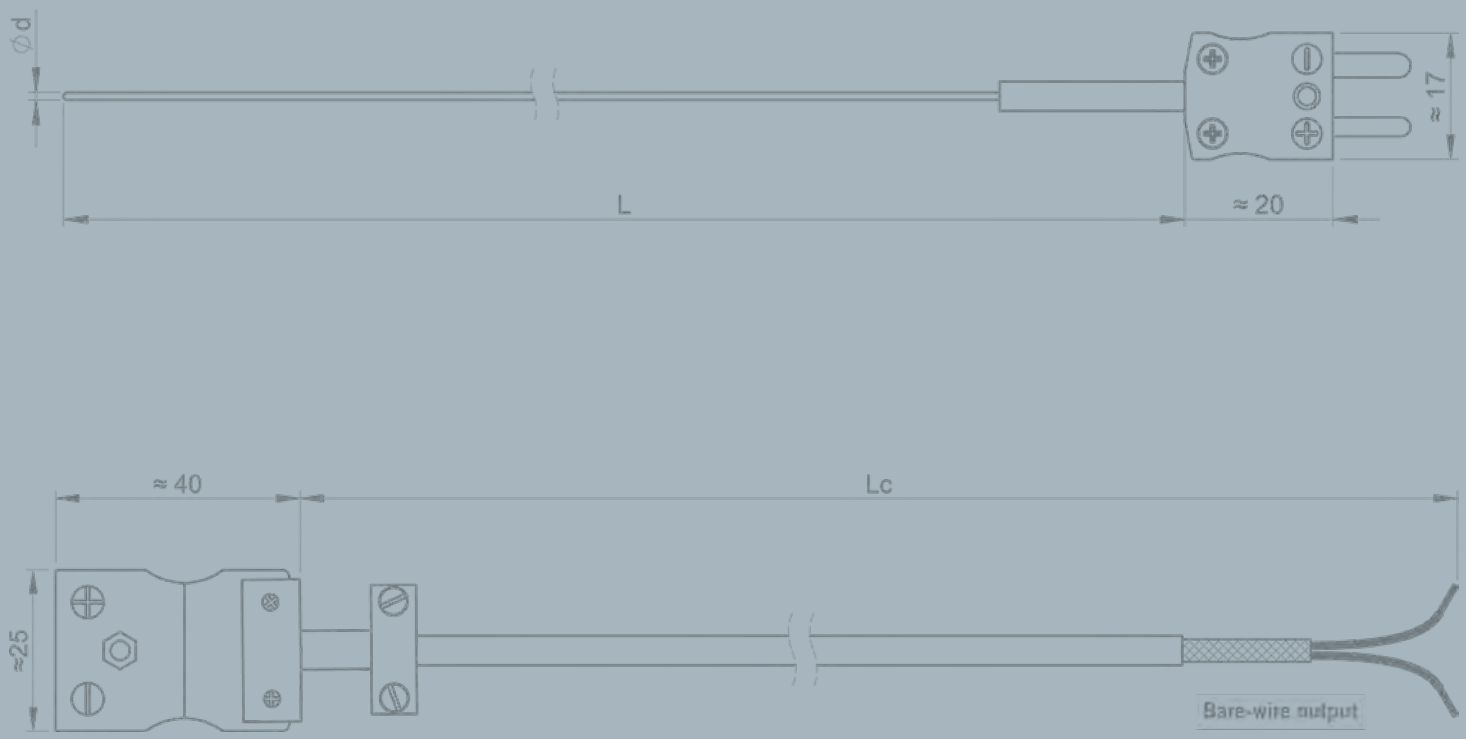


CONTACT US FOR OTHER REQUESTS

Our R&D team can develop tailored temperature sensors according to your specifications.



SENSORS COMPLIANT WITH AMS 2750



AMS 2750 THERMOCOUPLE APPLICATIONS 308

AMS 2750 CERTIFICATION 309

DESCRIPTION

Aerospace Material Specifications (AMS 2750) defines a certain number of rules concerning the thermal treatments of metals in the aerospace sector. As a specialist in pyrometric measurement, Pyrocontrole has a complete range of thermocouples compliant with the requirements of this standard.

Discover the various applications of these sensors installed in industrial furnaces.

Providing reliable, accurate measurements, **the thermocouple range** fulfils the four control functions required by the AMS 2750 standard for **heat-treatment furnaces in classes 1 to 6**. The higher the requirements of the furnace's class, the more the instruments need to be accurate.

SPECIFICATIONS

Furnace class	TUS (Temperature Uniformity Surveys)	Maximum SAT (System Accuracy Test) difference
	°C	°C
1	± 3	± 1.1
2	± 6	± 1.7
3	± 8	± 2.2
4	± 10	± 2.2
5	± 14	± 2.8
6	± 28	± 5.6

AMS 2750 THERMOCOUPLE APPLICATIONS

AMS 2750 thermocouples can be used for four applications.

- Sensors for ensuring temperature uniformity in the furnace (TUS - Temperature Uniformity Survey),
- Sensors for checking the accuracy of the reading (SAT -System Accuracy Test)
- Sensors for controlling and recording the process
- Sensors for monitoring the temperatures of the loads (sensors installed on the parts)
- The SAT/TUS tests must be performed by the customer with temperature sensors which operate independently from the instruments in the furnace.

AMS 2750 E REQUIREMENTS CONCERNING THERMOCOUPLE

- § 3.1.2.6.2: Thermocouple accuracy: ±1.1°C or 0.4 % of ITI; whichever is larger.
- § 3.1.2.6.3: maximum difference tolerated between the couples: ± 1.1° C

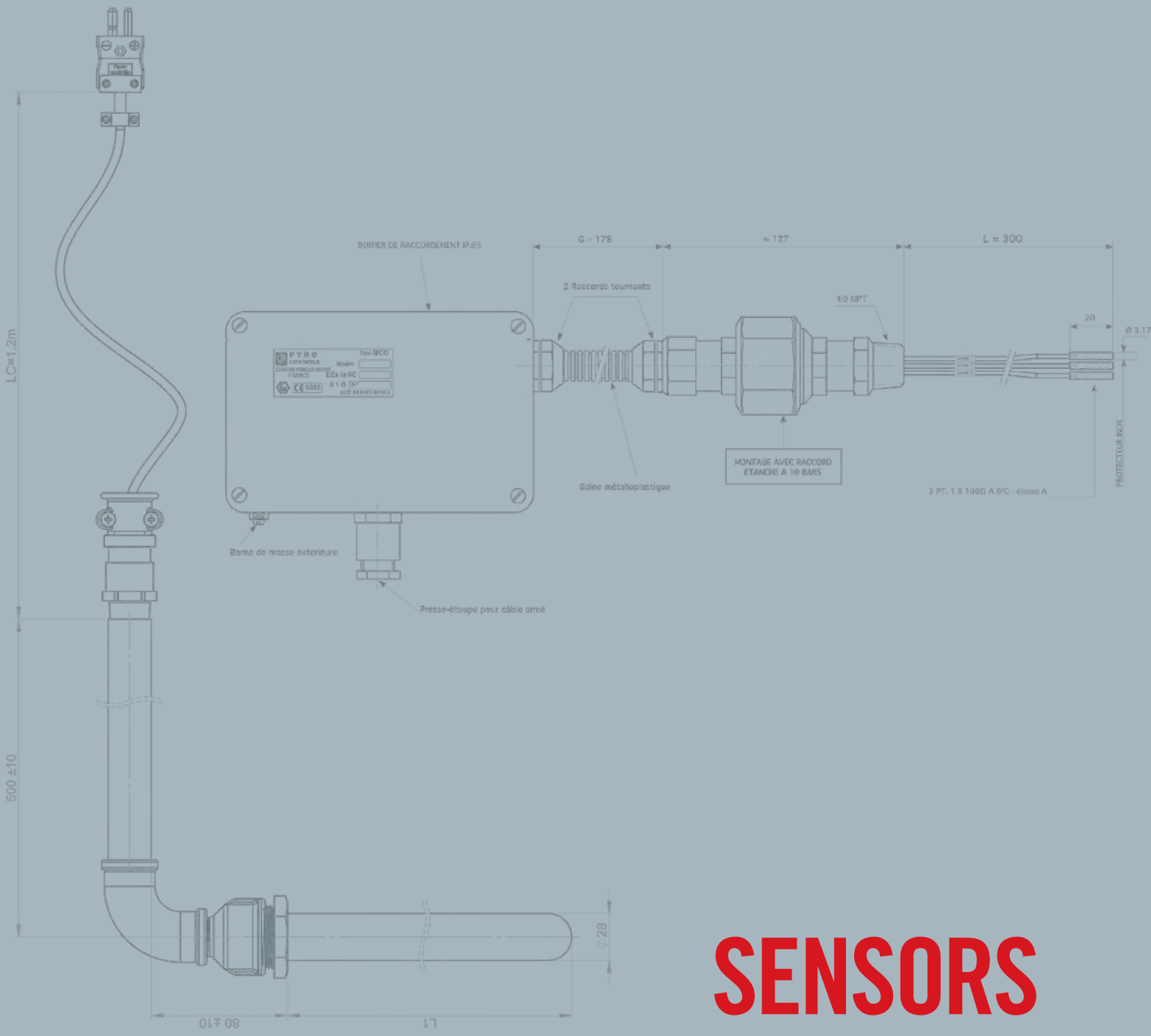
OUR CALIBRATION SERVICES

Equipped with its own COFRAC-accredited metrology laboratory, Pyrocontrole can supply COFRAC-accredited calibration certificates and specific reports concerning the requirements mentioned above:

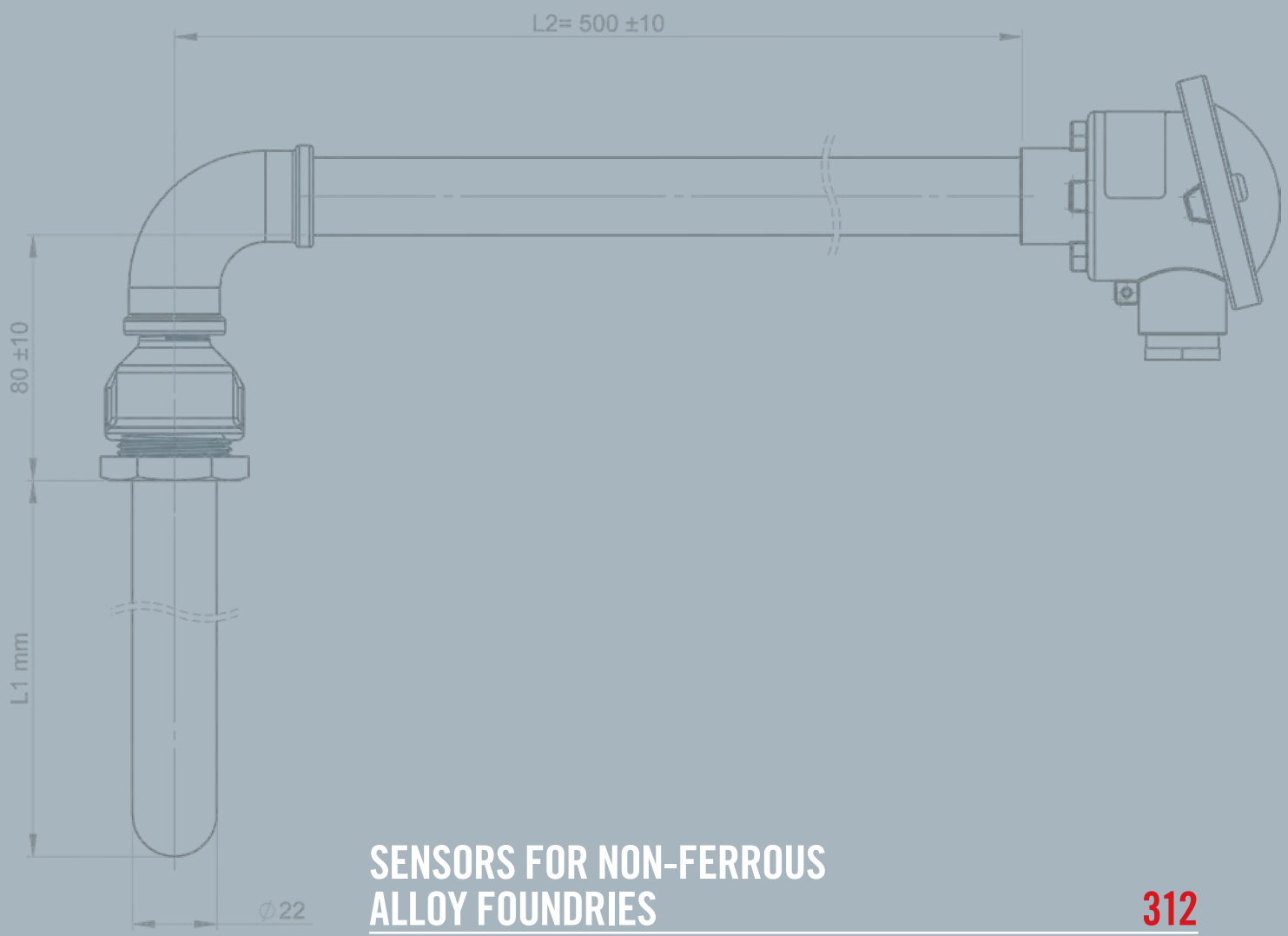
- Calibration of the beginning and end of the coil of sheathed cables used to manufacture the sensors.
- Calibration every 140°C across the sensor's operating range.
- See page 24

In addition, we can also perform calibration per batch to guarantee that the batch of sensors is homogeneous.

Certification of the AMS 2750E standard					PYROCONTROLE offering	
Application (AMS classification)		**Reference standard**	**Calibration frequency**	**Max. error**	**TC**	**Temperature range**
Reference standard (3.1.2 reference standard)		National ref. standard	Before 1st use + every 5 years	None	-	-
Primary standard (3.1.3 primary standard)		Reference standard	Before 1st use + every 3 years	± 0.6 or ± 0.001 x t	-	-
Secondary standard (3.1.4 secondary standard)		Reference standard or primary standard	Before 1st use + every year	± 1.1 or ± 0.004 x t	N	-40°C ≤ t ≤ 1000°C (2)
			Before 1st use + every 2 years	± 0.6 or ± 0.005 x t	B	600°C ≤ t ≤ 1700°C
Mapping (3.1.5 temperature uniformity survey)		Reference standard or primary standard	Before 1st use + every 3 months	± 2.2 or ± 0.0075 x t	J	375°C ≤ t ≤ 750°C
					N	-40°C ≤ t ≤ 1200°C
			Before 1st use - Prohibited afterwards		K	-40°C ≤ t ≤ 1200°C
			Before 1st use + every 6 months	± 1°C or ± 0.0025 x t	S / R	0°C ≤ t ≤ 1600°C
				± 1% or ± 0.005 x t	B	600°C ≤ t ≤ 1700°C
Measurement chain variations (3.1.6 system accuracy test)		Reference standard or primary standard	Before 1st use + every 3 months	± 1.1 or ± 0.004 x t	N	-40°C ≤ t ≤ 1000°C (2)
			Before 1st use - Prohibited afterwards		K	-40°C ≤ t ≤ 1000°C
			Before 1st use + every 6 months	± 1 or ± 0.005 x t	B	600°C ≤ t ≤ 1700°C
Process (3.1.7 control, recording and monitoring)	Furnace class 1 and 2	Reference standard or primary standard	Before 1st use	± 1.1 or ± 0.004 x t	K / N	-40°C ≤ t ≤ 1000°C
					S / R	0°C ≤ t ≤ 1600°C
					B	600°C ≤ t ≤ 1700°C
	Furnace class 3 to 6		Before 1st use	± 2.2 or ± 0.0075 x t	J	375°C ≤ t ≤ 750°C
					K / N	-40°C ≤ t ≤ 1200°C
					S / R	0°C ≤ t ≤ 1600°C
					B	600°C ≤ t ≤ 1700°C
Load (3.1.8 load)		Reference standard or primary standard	Before 1st use - Prohibited afterwards	± 2.2 or ± 0.0075 x t	J	375°C ≤ t ≤ 750°C
					K/N	-40°C ≤ t ≤ 1000°C
			Before 1st use + every 6 months		S / R	0°C ≤ t ≤ 1600°C
					B	600°C ≤ t ≤ 1700°C



SENSORS FOR MISCELLANEOUS APPLICATIONS



SENSORS FOR NON-FERROUS ALLOY FOUNDRIES 312

LK SENSOR..... 312
PYROJET SENSOR..... 314

ASPIRATED SENSOR 316

MULTIPAL: BEARING SENSOR 322

LK SENSOR
THERMOCOUPLE



IP 54 | CLASS 1 | IEC 584-1 | up to 800°C

DESCRIPTION

Sensors for non-ferrous alloy foundries. Due to its excellent mechanical properties, the silicon nitride sheath offers very good resistance to breakage and abrasion.

SPECIFICATIONS

Model		LK
Compliance with standards		IEC 584-1
Type		K
Class		1
Sheathed thermocouple diameter (mm)		4.5
Thermocouple		Single
Operating temperature (°C)		800°C
Length L1 Min/Max (mm)		360 to 1160 mm
Length L2 Min/Max (mm)		500 mm
Support tube		Diameter 21.3 mm
Protective tube	Material	Silicon nitride Si3N4
	Diameter	22 mm
Output	Head type	DIN B
	Material	Light alloy
	Output	1 cable gland M20x1.5
	Cable diam.	5.5 to 7.5 mm
	Equipment	Ceramic terminal strip
	IP	IP54
Accessories		Extension cables, compensation cables

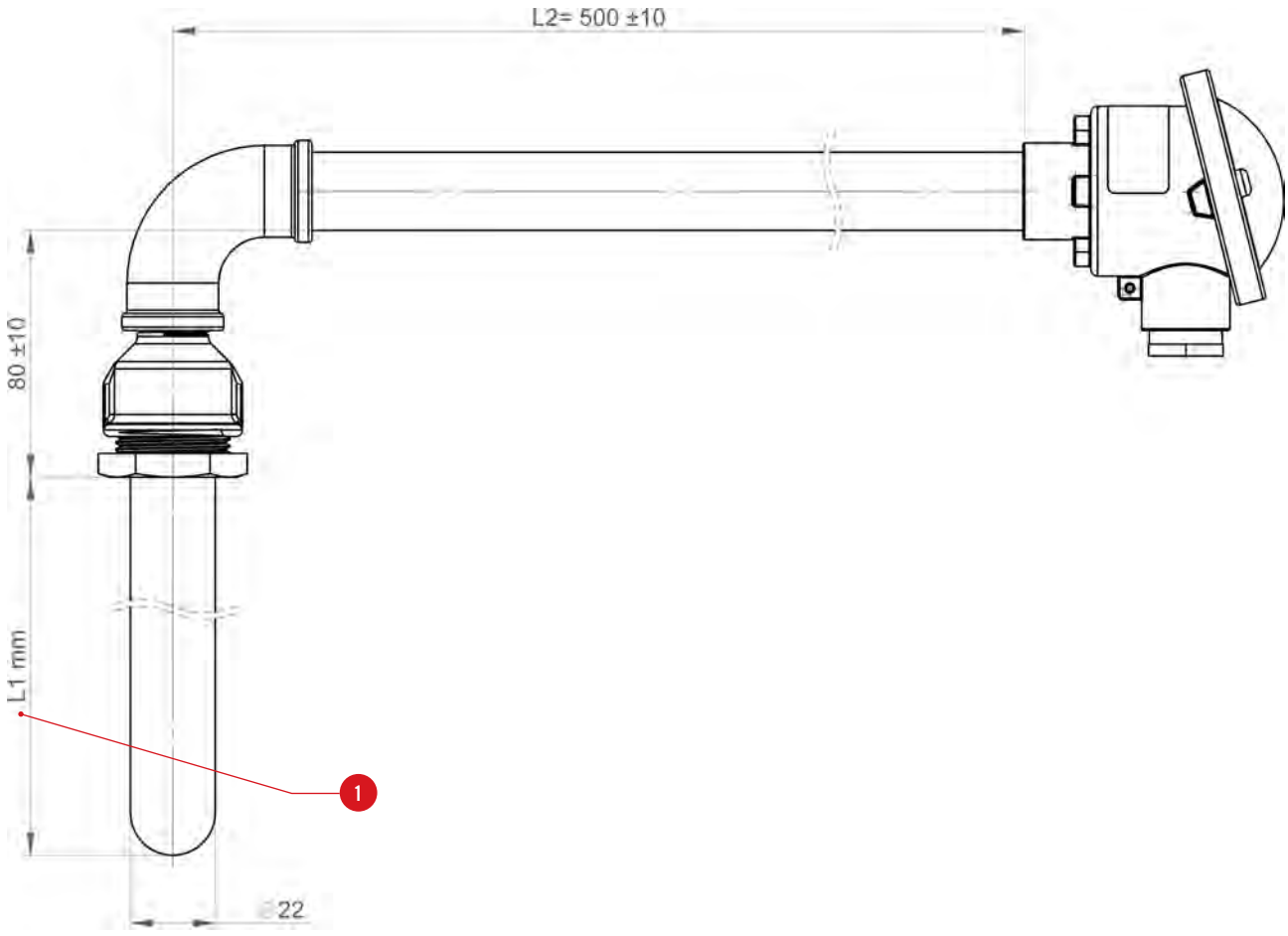
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		LENGTH L1 (mm)
LK	-	560
Reference in table and diagram		1
Possible choice		360 460 560 660 1060 1160

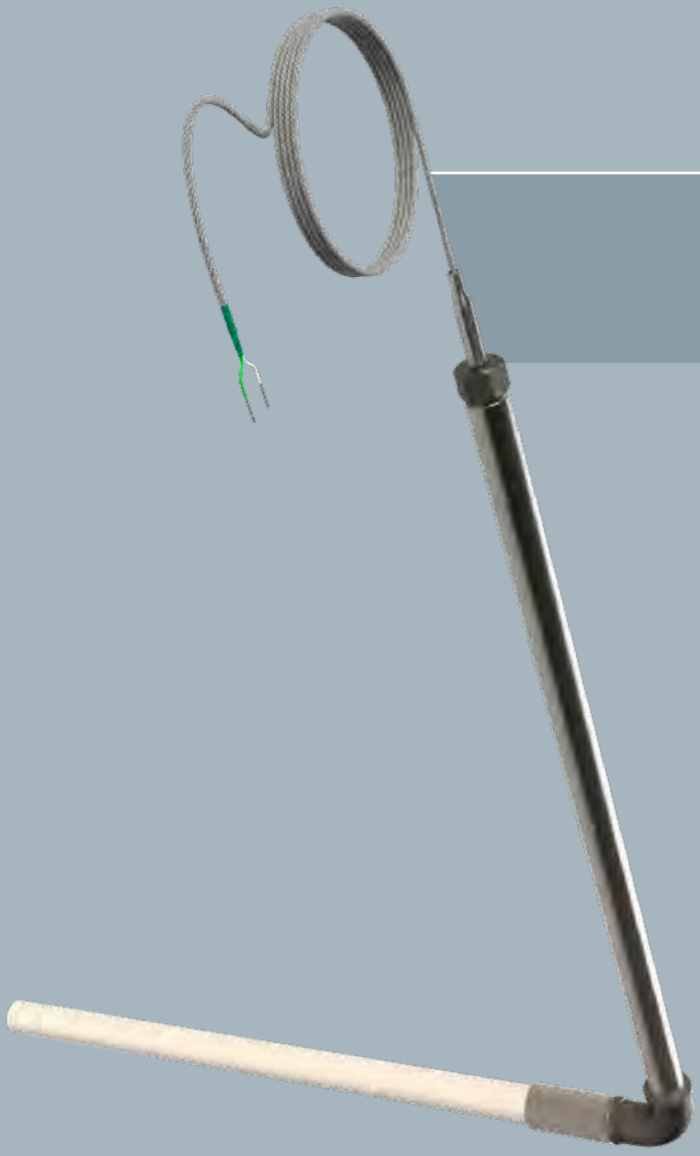
DIAGRAM (MM)



THERMOCOUPLE INFORMATION

Conductor type		Temperature °C		Tolerance values
		Min.	Max.	
K	Nickel chrome / Nickel alloy	0	+1,000	1.5°C or 0.4% of t

PYROJET
THERMOCOUPLE



CLASS 1 | IEC 584-1 | CABLE OUTPUT | up to 800°C

DESCRIPTION

Sensors for non-ferrous alloy foundries. Due to its excellent mechanical properties, the silicon nitride sheath offers very good resistance to breakage and abrasion.

SPECIFICATIONS

Model		PYROJET
Compliance with standards		IEC 584-1
Type		K
Class		1
Sheathed thermocouple diameter (mm)		4.5
Thermocouple		Single
Operating temperature (°C)		800°C
Length L1 Min/Max (mm)		460 and 900 mm
Length L2 Min/Max (mm)		500 mm
Support tube		Diameter 21.3 mm
Protective tube	Material	Silicon nitride Si3N4
	Diameter	28 mm
Output	Cable	flexible extension under metal braid
	Length (mm)	1200
	Dimensions	4X6
	Operating temperature	250°C
	Connector	male compensated with cable clamp

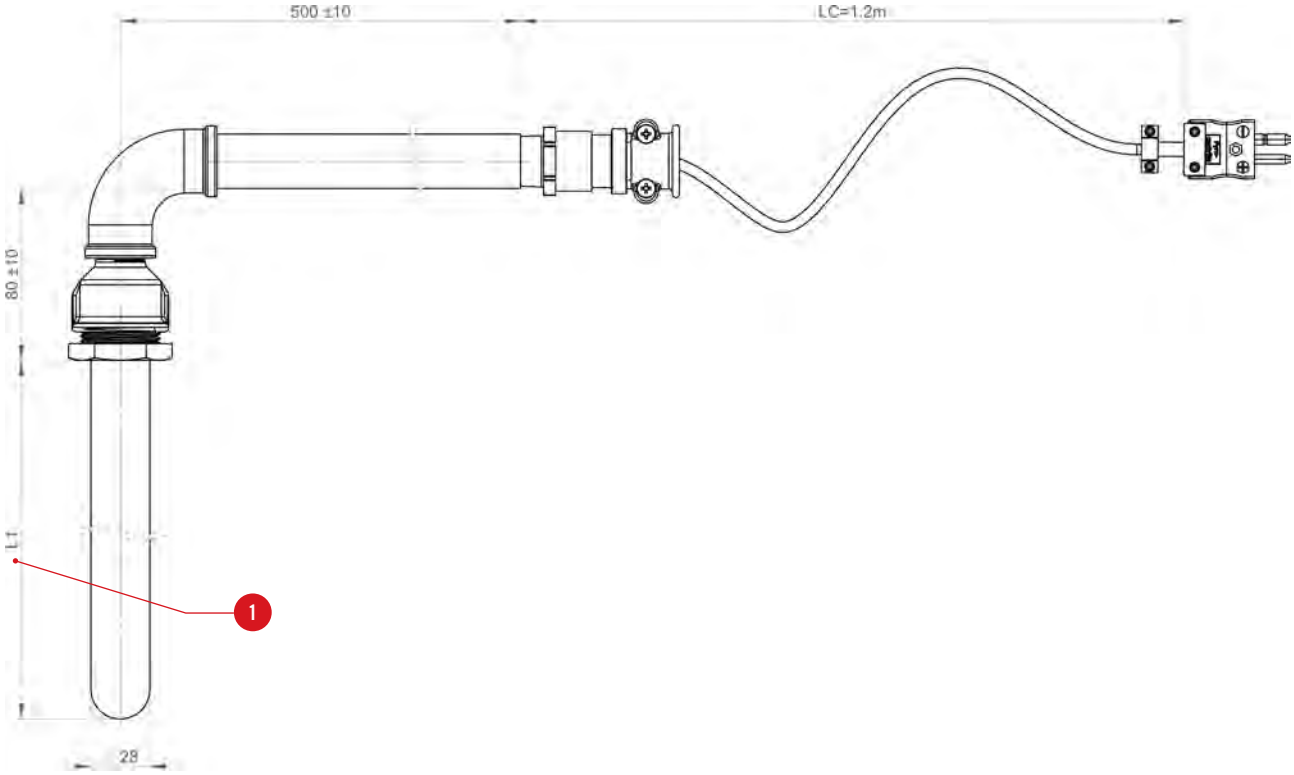
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		LENGTH L1 (mm)
Pyrojet	-	900
Reference in table and diagram		1
Possible choice		460 900

DIAGRAM (MM)



THERMOCOUPLE INFORMATION

Conductor type		Temperature °C		Tolerance values
		Min.	Max.	
K	Nickel chrome / Nickel alloy	0	+1,000	1.5°C or 0.4% of t

ASPIRATED SENSORS

These sensors are designed to measure the temperature of gaseous environments, and particularly flames and fumes.

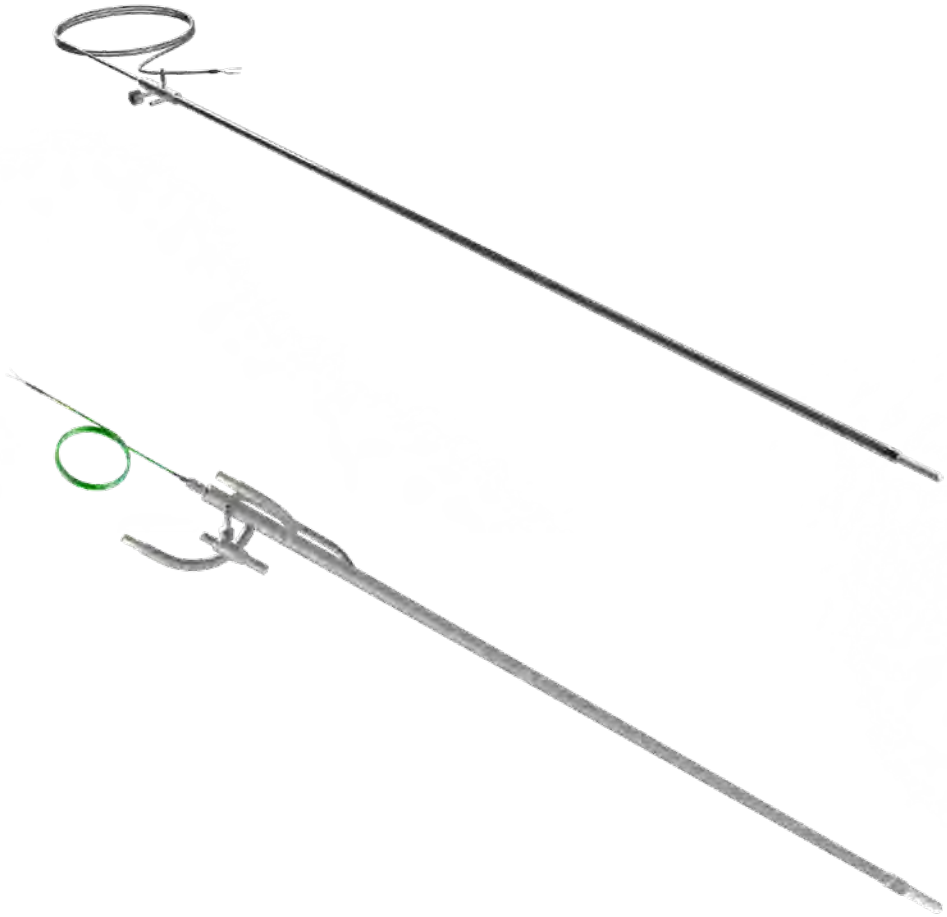
The temperature indicated by a thermocouple plunged into a gas is usually different from the gas's actual temperature. This indication is rendered false at the thermocouple's hot junction by:

- Poor heat exchange between the gas and the thermocouple,
- Losses through radiation due to heat exchange between the hot junction and the surrounding environment,
- Thermal conductivity along the thermocouple wires.

CA PYROCONTROLE proposes three types of sensors whose purpose is to:

- Encourage heat exchange by convection between the thermocouple and the gas. To achieve this, the speed of the gas must be increased at the level of the hot junction. The principle is therefore to aspirate part of the gas to be measured around the thermocouple.
- Reduce the various losses and, above all, the losses due to radiation from the hot junction.

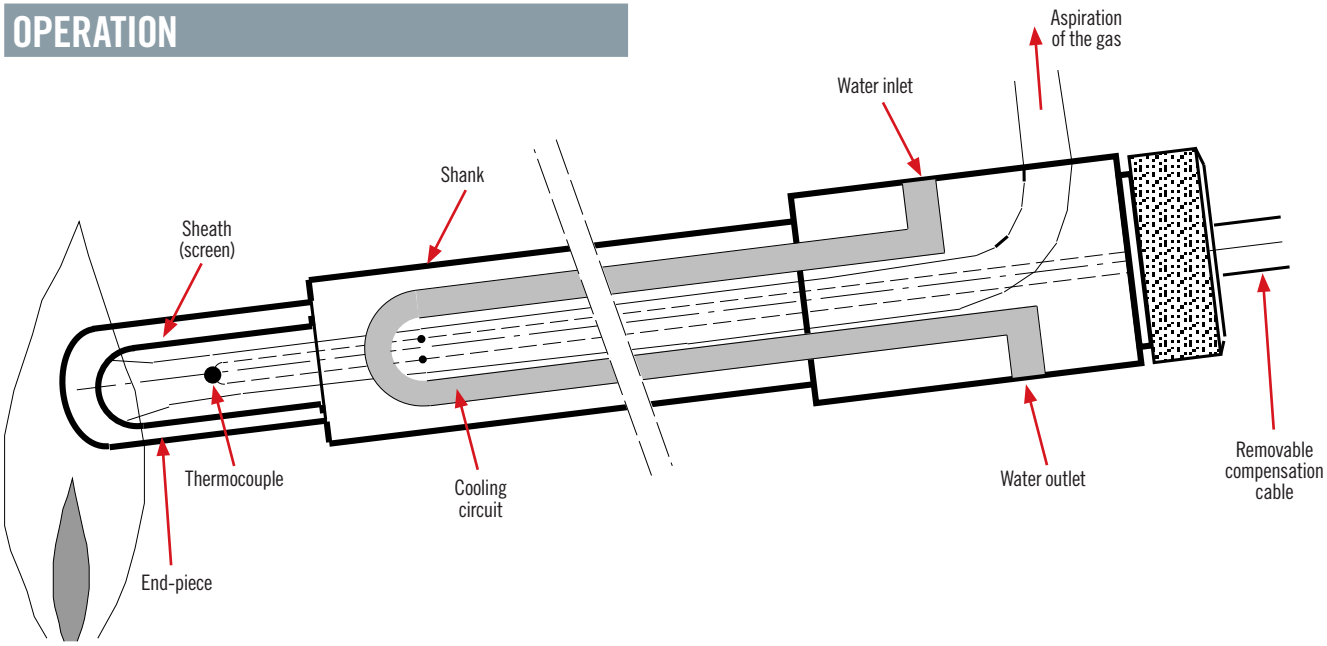
The use of aspirated sensors requires prior experimental determination of an efficiency coefficient specific to the instrument and depending on the speed of aspiration.



MINIATURE ASPIRATED SENSOR

INDUSTRIAL ASPIRATED SENSOR

OPERATION



The flame or fumes are aspirated into the sensor by means of a pump. This aspiration facilitates heat exchange by convection between the thermocouple and the gas. A thermocouple measures the temperature at the hot spot. The efficiency coefficient is determined "in situ". It enables you to calculate the actual temperature of the gas sampled by correcting the influence of the nominal aspiration chosen.

Heat loss by radiation from the hot junction is reduced by one or more sheaths placed inside the sensor's end-piece.

THE SHANK

This contains the aspiration and cooling circuit, the systems for connecting and fastening the sensing element and the fastening elements for the end-piece.

THE END-PIECE

Its role is mainly to reduce losses due to radiation. The gas required for the measurement is aspirated via an orifice located at the tip of the end-piece. The end-piece is simple to remove.

EXPERIMENTAL DETERMINATION OF THE EFFICIENCY COEFFICIENT "E%"

NOTATION

- **F**: Form factor calculated on the basis of a "static" temperature reading
- **F'**: Form factor calculated on the basis of a "dynamic" temperature reading
- **To**: Temperature reading with zero aspiration
- **Tn**: Temperature reading with nominal aspiration
- **T 0.25** : Temperature reading with aspiration at 1/4 of its nominal value
- **Tg** : Actual gas temperature
- **E%** : Efficiency coefficient

$$E\% = 100\ \frac{Tn - To}{Tg - To} \qquad F = \frac{Tn - To}{Tn - T0.25} \qquad F' = \frac{\Delta to}{\Delta tn}$$

- **WHERE ΔTO** = time necessary to go from Tn to To by shutting down the aspiration
- **Δtn** = time necessary go from To to Tn by restarting the aspiration

These various coefficients depend on the temperature level, the characteristics of the gas and the sensor. They must therefore be measured "in situ".

Recommended nominal aspiration speed: 50 to 60 m/s at the level of the hot junction. In other words, for a thermocouple Ø1.6 with a sheath Ø 3: approximately 200 l/h STP by aspiration.

E% can be determined on the basis of F or F', using one of the two calculation charts attached.

METHOD OF DETERMINATION

Mount the sensor with the cooling circuit and the gas aspiration system. Keep the probe slightly tilted downwards to prevent air-bubble formation at the tip of the sensor).

- If you choose to determine F, measure To, Tn and T0.25

$$F = \frac{Tn - To}{Tn - T0.25}$$

- If you choose to determine F', measure Δto and Δtn

$$F' = \frac{\Delta to}{\Delta tn}$$

- use one of the attached calculation charts to determine E%

Note the values which you have determined for: E%, Tn, To, T0.25, Δto and Δtn

The value of E% can be used to determine Tg by means of the following equation:

$$Tg = 100 \frac{Tn-To}{E\%} + To$$

MINIATURE ASPIRATED SENSOR

USE

Based on the principles described above, this sensor is characterized by its small dimensions and its operating temperature. It is intended mainly for measuring the temperature of gases with a low flow-rate or small flames in the laboratory.

THE END-PIECE

This comprises two concentric sheaths enveloping the thermocouple. The end-piece material, rhodium-platinum, enables it to withstand temperatures up to 1900° C for 15 min.

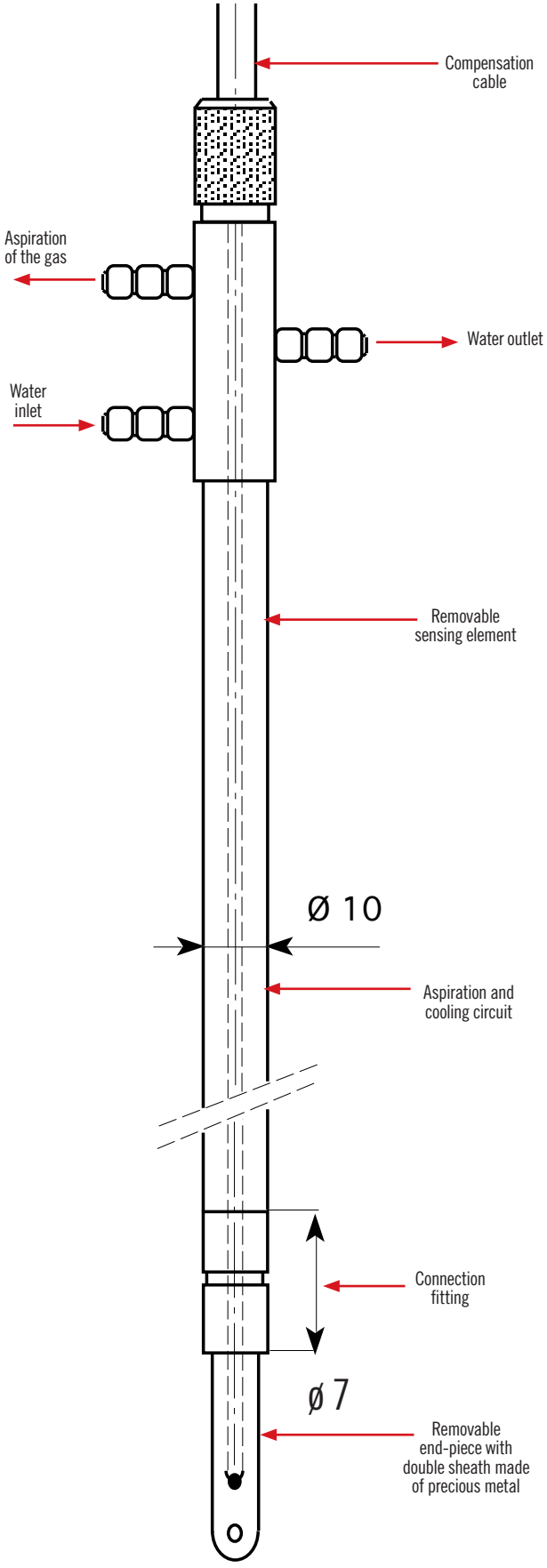
THE SENSING ELEMENT

This is a thermocouple whose type depends on the temperature to be measured.

- Type K: 1100 °C
- Type S or R: 1500 °C
- Type B: 1600 °C

With each sensor, a specific calibration table is provided for the batch of wires from which the thermocouple was assembled.

This table can be used to establish the temperature/emf correspondence specific to the thermocouple used.



SEMI-INDUSTRIAL ASPIRATED SENSOR

USE

This is intended for semi-intensive use at temperatures up to de 1600° C, depending on the type of thermocouple with which it is equipped.

Its design and light weight make it particularly easy to handle. It is used for checking combustion in fire boxes.

THE END-PIECE

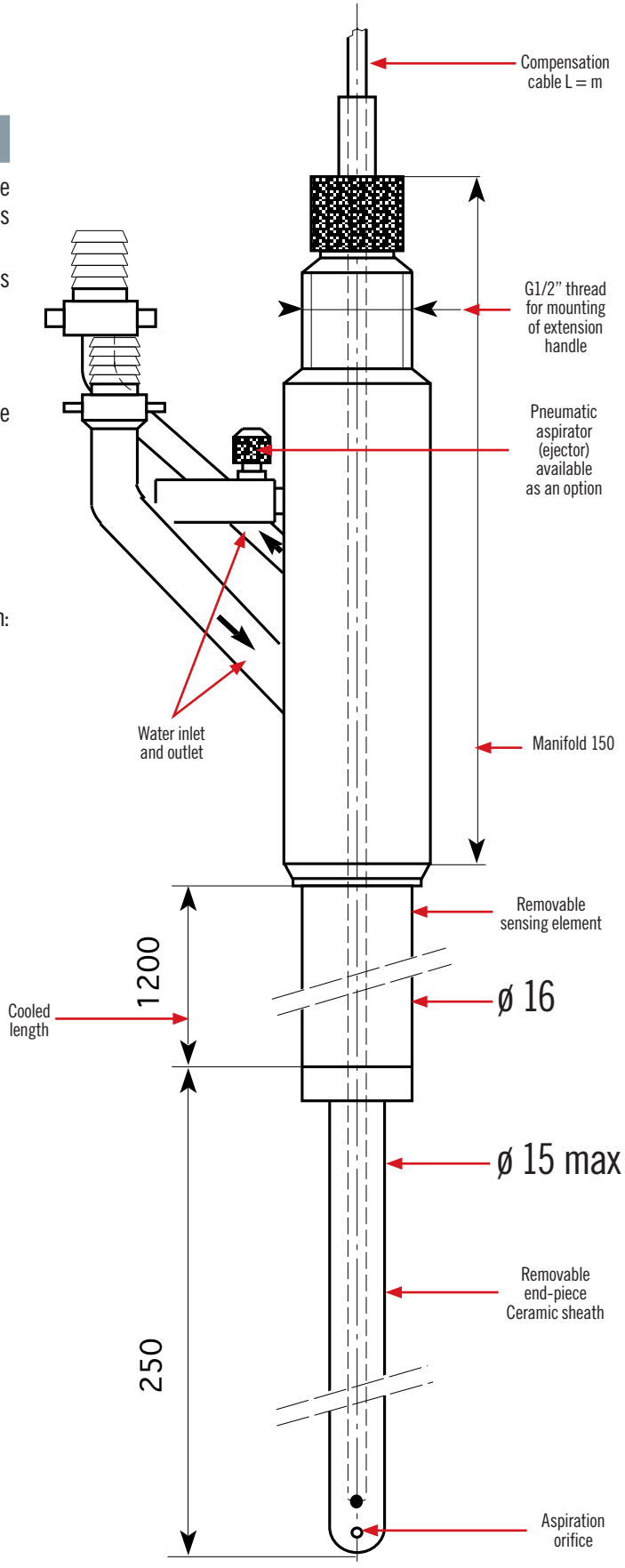
This comprises 2 ceramic sheaths which act as screens to reduce losses by radiation.

THE SENSING ELEMENT

There are several possibilities:

- sheathed K thermocouple with inconel sheath: 1100 °C
- sheathed S or R thermocouple with 10% rhodium-platinum sheath: 1500 °C
- sheathed B thermocouple with 10% rhodium-platinum sheath: 1600 °C.

In each case, the output is provided by a compensation cable - length to be defined.



INDUSTRIAL ASPIRATED SENSOR

USE

Intended for intensive use at temperatures up to 1600° C.

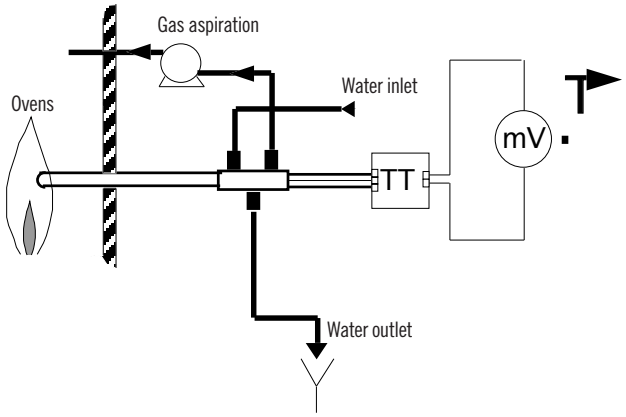
The type of thermocouple depends on the temperature to be measured:

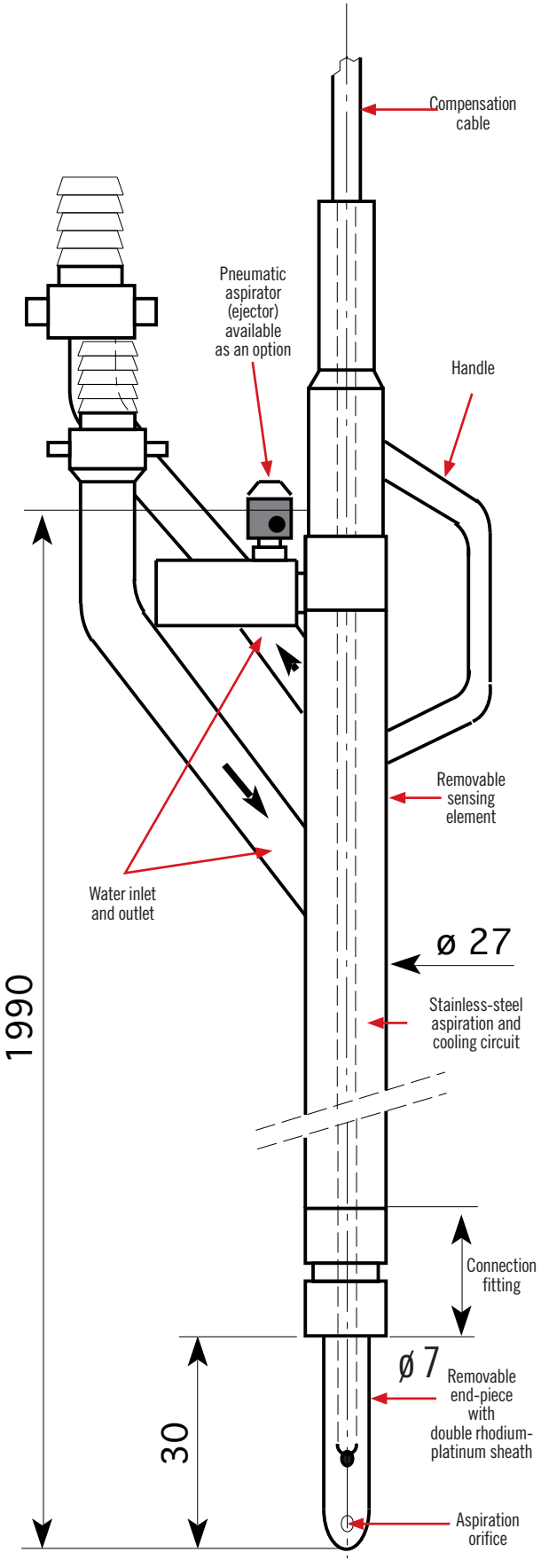
- K thermocouple: 1100 °C
- S or R thermocouple: 1500 °C
- B thermocouple: 1600 °C

THE END-PIECE

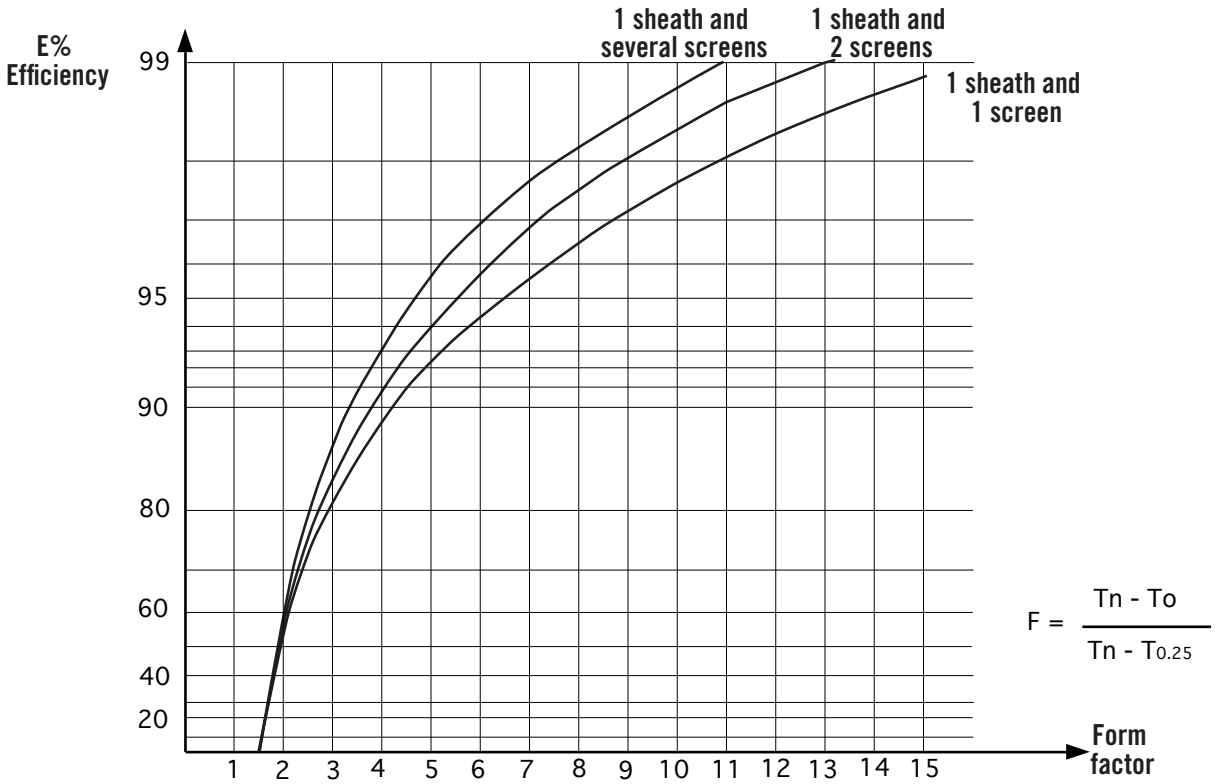
This comprises two rhodium-platinum sheaths which act as screens. The end-piece can be removed quickly. The gas necessary for the measurement is aspirated via two orifices at the tip of the end-piece.

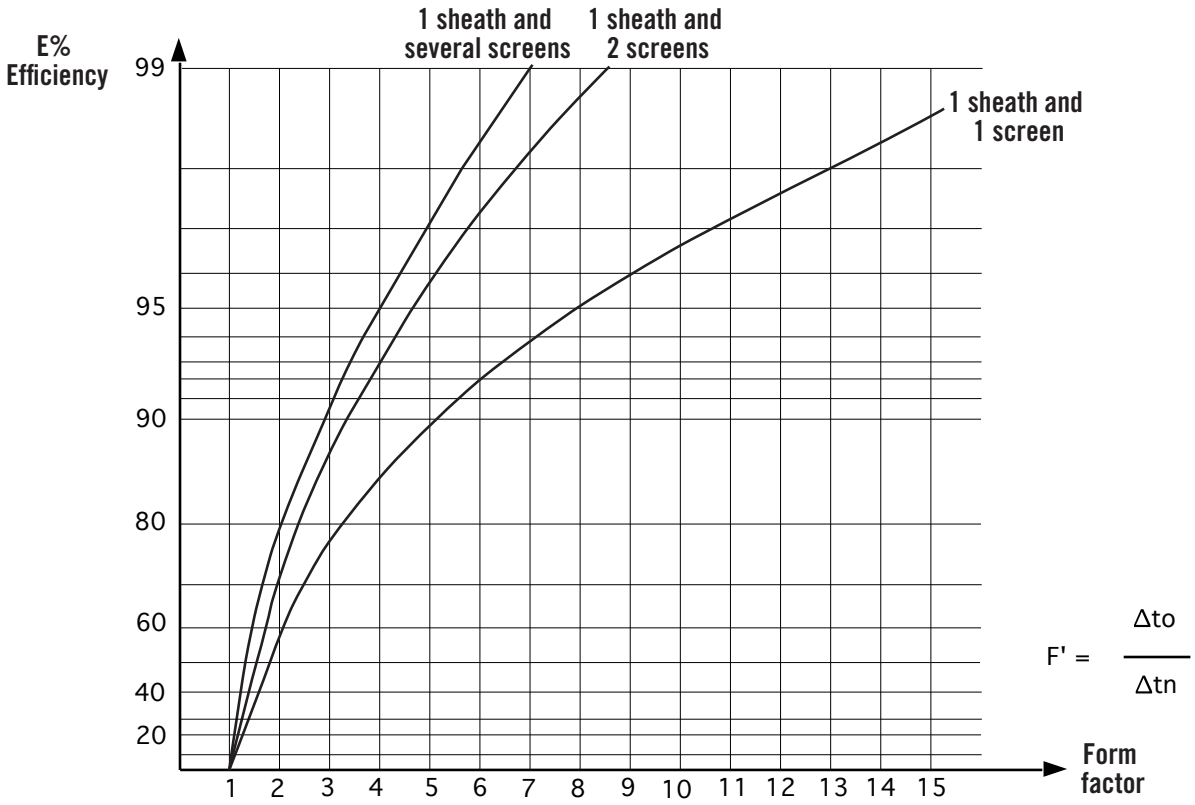
EXAMPLE OF INSTALLATION





ASPIRATED SENSOR







MULTIPAL

Pt100

CLASS 1 | IEC 60751 | ATEX | up to 200°C

DESCRIPTION

Bearing temperature sensor for rotating machines. The Multipal sensor is designed to measure bearing temperatures at the heart of pumps, motors, gear motors, grinders, centrifuges, electrical generator sets, turbines and alternators.

Equipped with a junction box on the frame of the rotating machine, this oil-tight multipoint sensor can be used to measure bearing temperatures inside the machine. The slightest overheating is detected by this detector with its quick response time so that the control system can be warned of a possible risk.

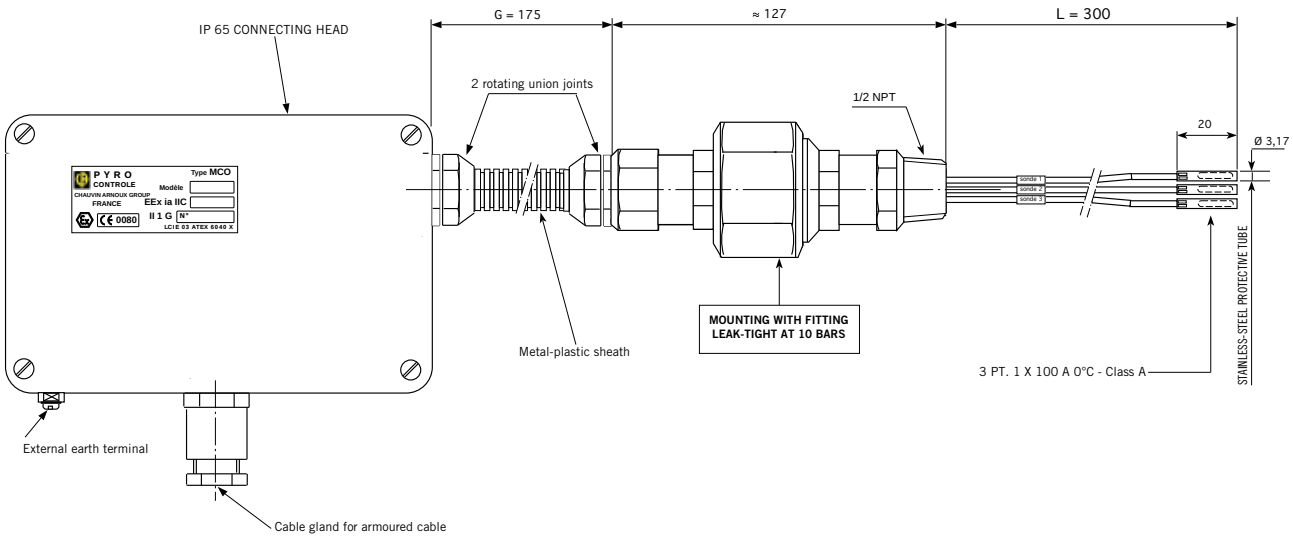
SPECIFICATIONS

Operating temperature	Up to 200°C
Response time	< 3s. for Pt100, diameter 3 mm
Extension cable	Stainless-steel or Teflon sheath, 2, 3 or 4 conductors (with shielding braid for Teflon)
Measuring element	Pt100 or Pt1000, mounting designed to withstand strong vibrations
Leak-tightness	Up to 20 bar oil pressure
Junction box	Certification: ATEX ia, IECEx Connection: direct or via a temperature transmitter
Measurement tube	Stainless steel 316L, diameter 3, 4.5 or 6 mm
Transmitter	Clippable on DIN rail Input: Pt100 or Pt1000 / Output 4...20mA Hart or Fieldbus Foundation or Profibus DP

STRENGTHS

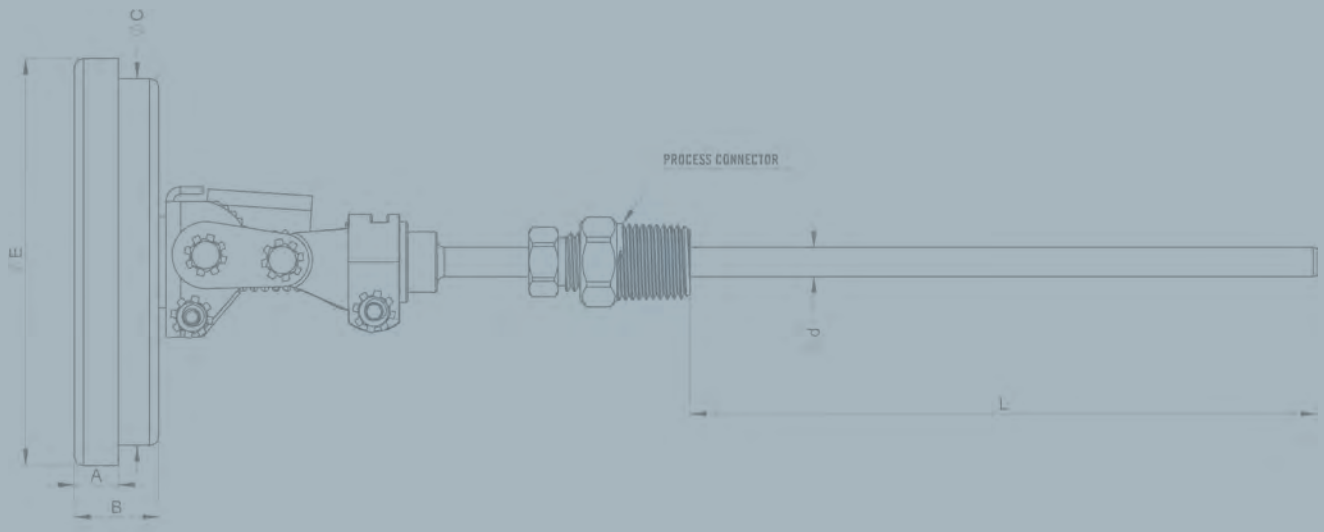
- Withstands strong vibrations
- Quick response time
- 1 or more measuring points
- Qualified for explosive zones
- Output via HART transmitter

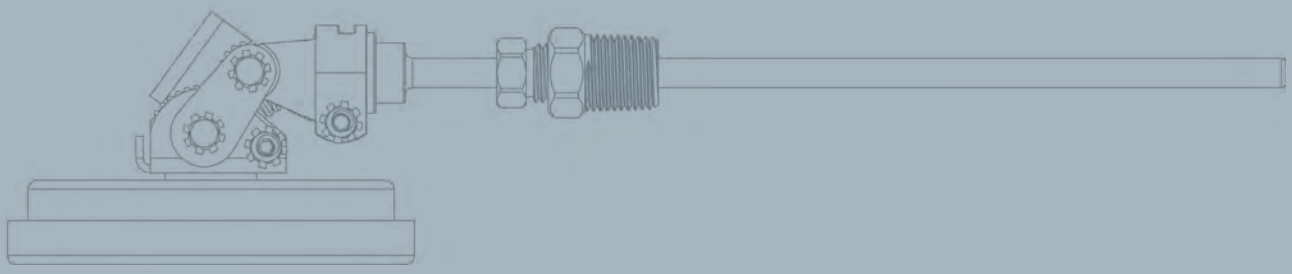
DIAGRAM (MM)

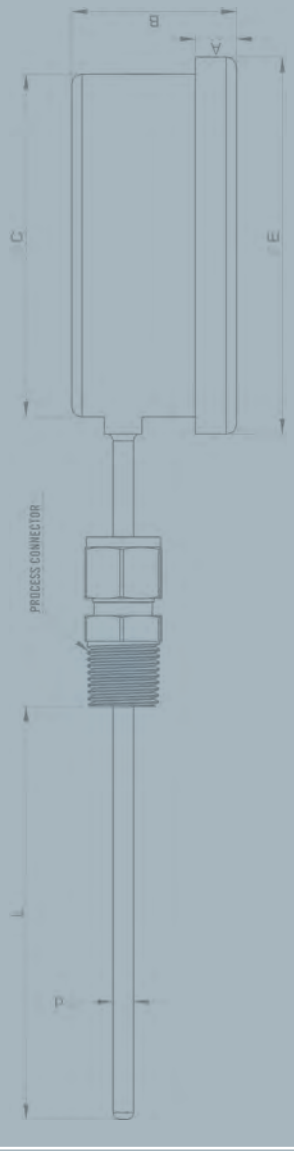


ORDERS: PLEASE CONTACT US

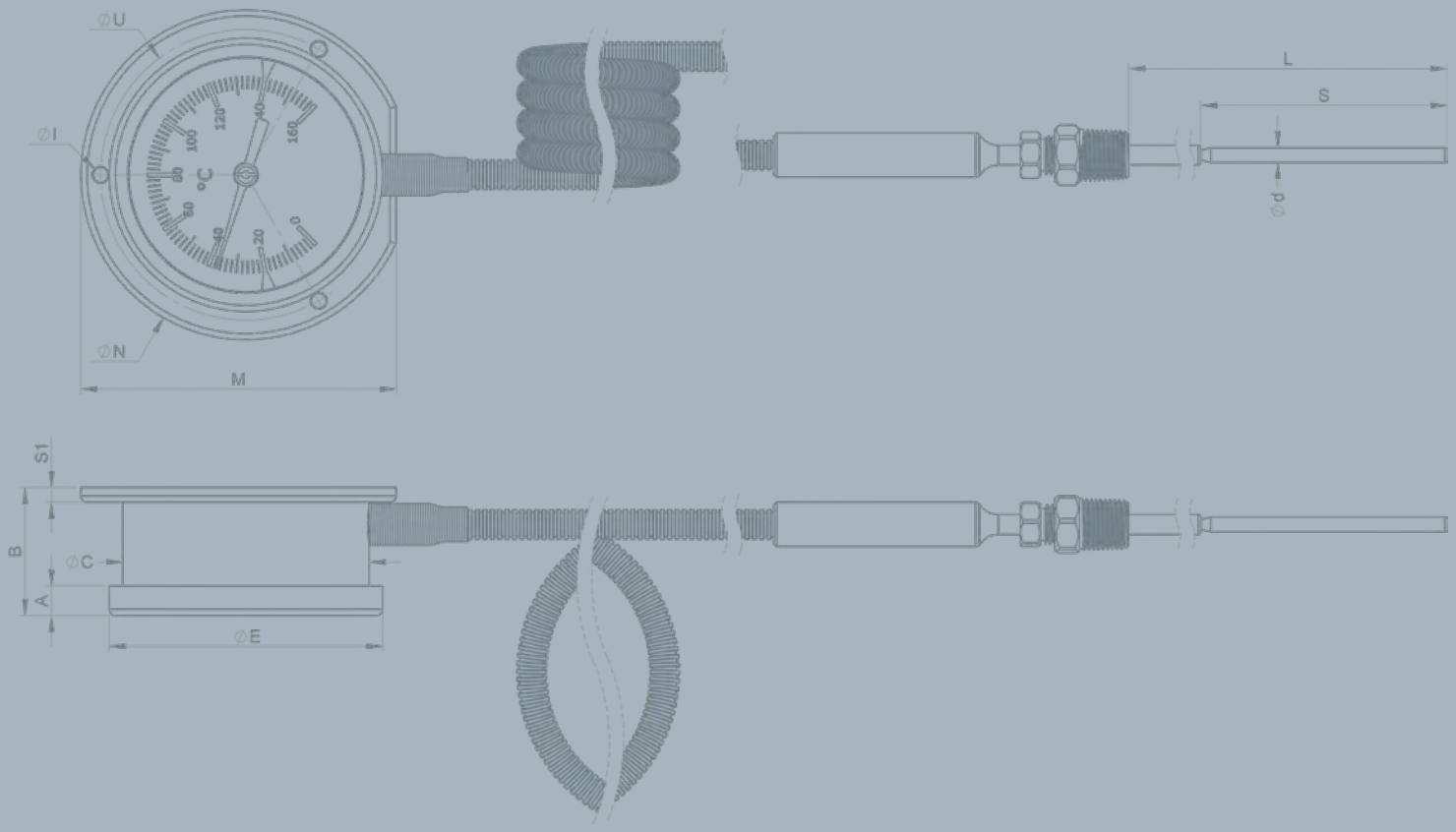
Our R&D team can develop tailored temperature sensors to your specifications.







BIMETALLIC THERMOMETERS



BIMETALLIC THERMOMETER WITH FIXED DIAL 326

TBM1 326

BIMETALLIC THERMOMETER WITH MULTIDIRECTIONAL DIAL 330

TBM2 330

GAS EXPANSION THERMOMETER 334

TDG1 334

TBM1
WITH FIXED DIAL

IMMERSED UP TO 1500 MM | DIAL DIAMETER 50 TO 150 MM | IP 67 | CLASS 1

DESCRIPTION

ATEX bimetallic thermometer, with adjustable zero available as an option. For corrosive liquids and gases in the agri-food industry, pharmacy, chemicals, petrochemicals and the nuclear sector.

SPECIFICATIONS

Accuracy class		Class 1 (CL 1.0)
Ambient temperature		-20...+60 °C
Storage temperature		-50...+70 °C
Scale overrun		110 % of full scale (E.m.)
Plunger PN		25 bar (without thermowell)
Weld seams		Arc welding / Argon TIG
Measuring element		Helicoidal bimetallic
Materials	Casing and frame	Stainless steel AISI 304
	Plunger and connector	Stainless steel AISI 316
	Dial	Aluminium, black graduations on white background
	Needle	Aluminium, black coating, adjustable zero
	Window	Glass, SEKURIT glass
	Seals	Neoprene
Process connection		1/2" NPT or BsP / male, 1/2" NPT / female
		1/4" NPT or BsP / male (for plunger Ø ≤ 6.35 mm)
		3/8" BsP / male (for plunger Ø ≤ 10 mm)
		3/4" NPT or BsP / male, 3/4" NPT / female
		m20 x 1.5 / male, m27 x 2 / male
Protection		IP 65, IP 66, IP 67, hermetically sealed

up to 600°C

ATEX OPTION



DESIGN YOUR THERMOMETER

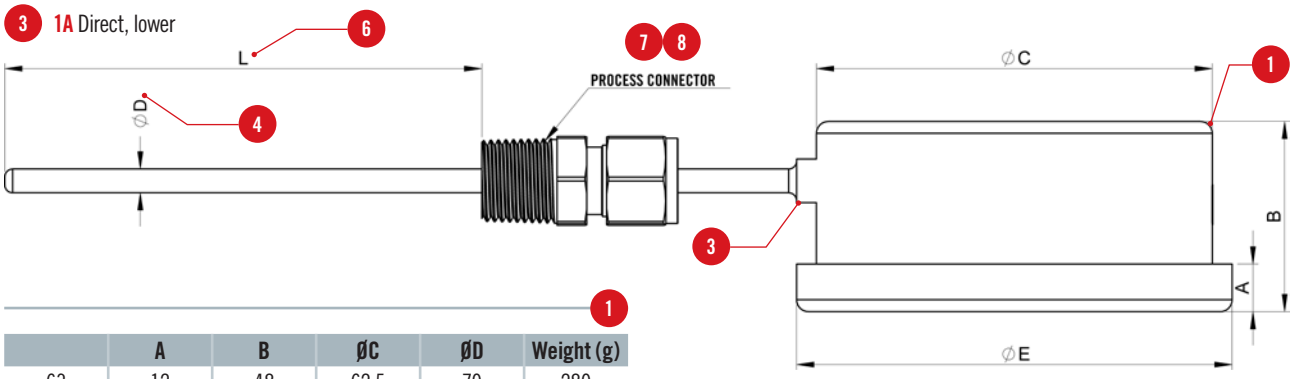
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

STANDARD MODEL	CASING	RANGE	MOUNTING	IMMERSED Ø	PROT.	IMMERSED LENGTH	PROCESS CONNECTION TYPE	PROCESS CONNECTOR	OPTION OPTIONS
TBM1	- 50	- EB2	- 1A	- 60	- P6	- 750	- RX	- NM12	- 7
Reference in table and diagram	1	2	3	4	5	6	7	8	9
Possible choice	50 63 80 100 125 150	EA1 / EA2 / EB2 / EB3 ED1 / EE1 / EG1 / EG2 EG3 / EG4 / EG5 / EG6 EG8 / EG9 / EH1 /EH2 EH3 / EH4	1A 2A	60 14 80 95 10 12	P5 P6 P7 HS	50 mm to 1500 mm	RX RG RT	NM12 / BM12 NM14 / BM14 MM20 / BM38 TR15 / NM34 BM34 / NM27 NF12 / NF34	1 / 2 3 / 4 5 / 6 7 / A B / C D

DIAGRAM (MM)

3 **1A** Direct, lower



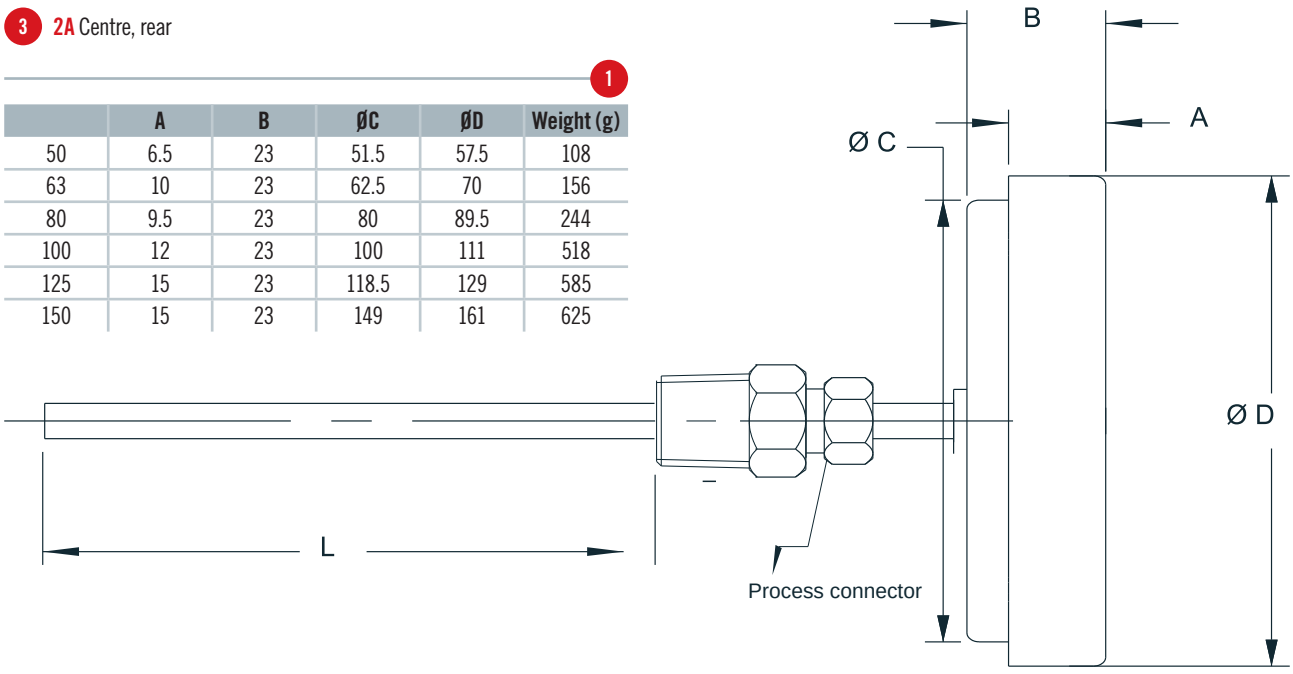
1

	A	B	ØC	ØD	Weight (g)
63	12	48	62.5	70	280
80	9.5	48	80	89.5	350
100	12	48	100	111	500
125	15	48	118.5	129	580
150	15	48	149	161	800

3 **2A** Centre, rear

1

	A	B	ØC	ØD	Weight (g)
50	6.5	23	51.5	57.5	108
63	10	23	62.5	70	156
80	9.5	23	80	89.5	244
100	12	23	100	111	518
125	15	23	118.5	129	585
150	15	23	149	161	625



CASING 1

050	50mm / 2"	100	100mm / 4"
063	63mm / 2"1/2	125	125mm / 4"1/2
080	80mm / 3"	150	150mm / 6"

MEASUREMENT RANGE (°C) 2

EA1	-20…+40 °C	EG1	0…+50 °C	EG8	0…+200 °C
EA2	-20…+60 °C	EG2	0…+60 °C	EG9	0…+250 °C
EB2	-30…+70 °C	EG3	0…+80 °C	EH1	0…+300 °C
EB3	-30…+120 °C	EG4	0…+100 °C	EH2	0…+400 °C
ED1	-50…+100 °C	EG5	0…+120 °C	EH3	0…+500 °C
EE1	-80…+120 °C	EG6	0…+150 °C	EH4	0…+600 °C

MOUNTING 3

1A	Direct, lower	2A	Centre, rear

IMMERSED DIAMETER 4

60	6.0 mm	95	9.5 mm
14	1/4" (6.35mm)	10	10 mm
80	8.0 mm	12	12 mm

PROTECTION 5

P5	IP65	P7	IP67
P6	IP66	HS	Hermetically sealed

IMMERSED LENGTH 6

xxxx	50 mm to 1500 mm

MIN. IMMERSED LENGTH 6

Immersed diameter	6 mm - 1/4"	8 mm	10 mm	12 mm
Measurement range (°C)	Min. immersed length (mm)			
0…50	130	110	110	110
0…60	110	95	95	95
0…80	95	70	70	70
0…100	75	70	70	70
0…120	70	60	60	60
0…150	60	50	50	50
0…200	50	45	45	45
0…250	40	35	35	35
0…300	60	50	50	50
0…400	50	45	45	45
0…500	45	40	40	40
0…600	40	35	35	35

PROCESS CONNECTION TYPE 7

RX	Fixed	RG	Adjustable	RT	Pivoting / Rotary

PROCESS CONNECTOR 8

NM12	1/2"NPT (M)	MM20	M20*1.5mm (M)	BM34	3.4" BSP (M)
BM12	1/2"BSP(M)	BM38	3/8" BSP (M)	NM27	M27 x 1.5mm (M)
NM14	1/4"NPT(M)	TR15	1.5" Triclover	NF12	/2"NPT (F)
BM14	1/4"BSP (M)	NM34	3/4"NPT (M)	NF34	3/4"NPT (F)

OPTIONS 9

Several options are available; they should be indicated one after the other.

1	316L casing and ring
2	SEKURIT window
3	External adjustment of zero
4	Priming liquid (silicone oil -200°C)
5	Priming liquid (glycerine -65°C)
6	VITON seal
7	Certificate 2.2
A	316L label
B	304L label
C	Label on casing
D	Atex

For any other configuration, please contact us.

TBM2
WITH MULTIDIRECTIONAL DIAL

IMMERSED UP TO 1500 MM | DIAL DIAMETER 80 TO 150 MM | IP 67 | CLASS 1

DESCRIPTION

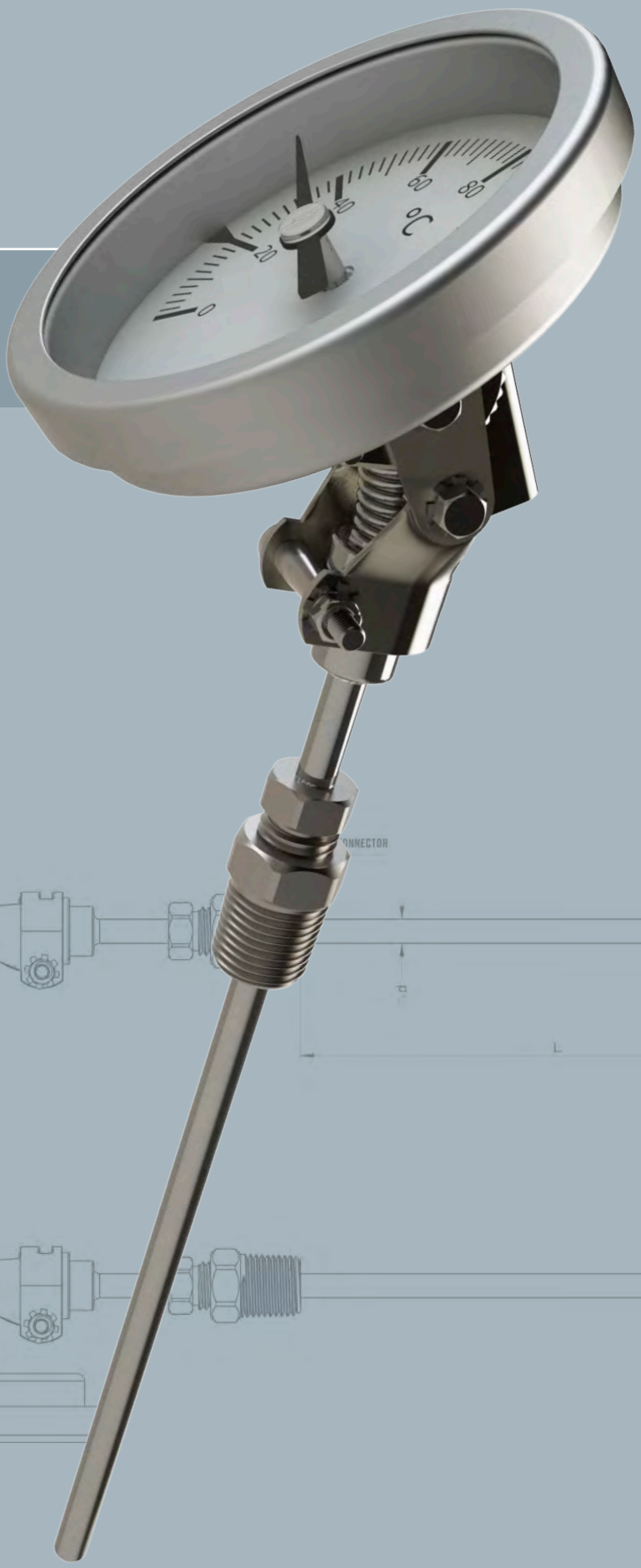
Bimetallic thermometer with multidirectional dial. Adjustable zero. For corrosive liquids and gases in the agri-food industry, pharmacy, chemicals, petrochemicals and the nuclear sector.

SPECIFICATIONS

Accuracy class		Class 1 (CL 1.0)
Ambient temperature		-20...+60 °C
Storage temperature		-50...+70 °C
Scale overrun		110 % of full scale (E.m.)
Plunger PN		25 bar (without thermowell)
Weld seams		Arc welding / Argon TIG
Measuring element		Helicoidal bimetallic
Materials	Casing and window	Stainless steel AISI 304
	Plunger and connector	Stainless steel AISI 316
	Dial	Aluminium, black graduations on white background
	Needle	Aluminium, black coating, adjustable zero
	Window	Glass, SEKURIT glass
	Seals	Neoprene
Process connection		1/2" NPT or BsP / male
		1/4" NPT or BsP / male (for plunger Ø ≤ 6.35 mm)
		3/8" BsP / male (for plunger Ø ≤ 10 mm)
		3/4" NPT or BsP / male
		m20 x 1.5 / male, m27 x 2 / male
Protection		IP 65, IP 66, IP 67

up to 600°C

ATEX OPTION



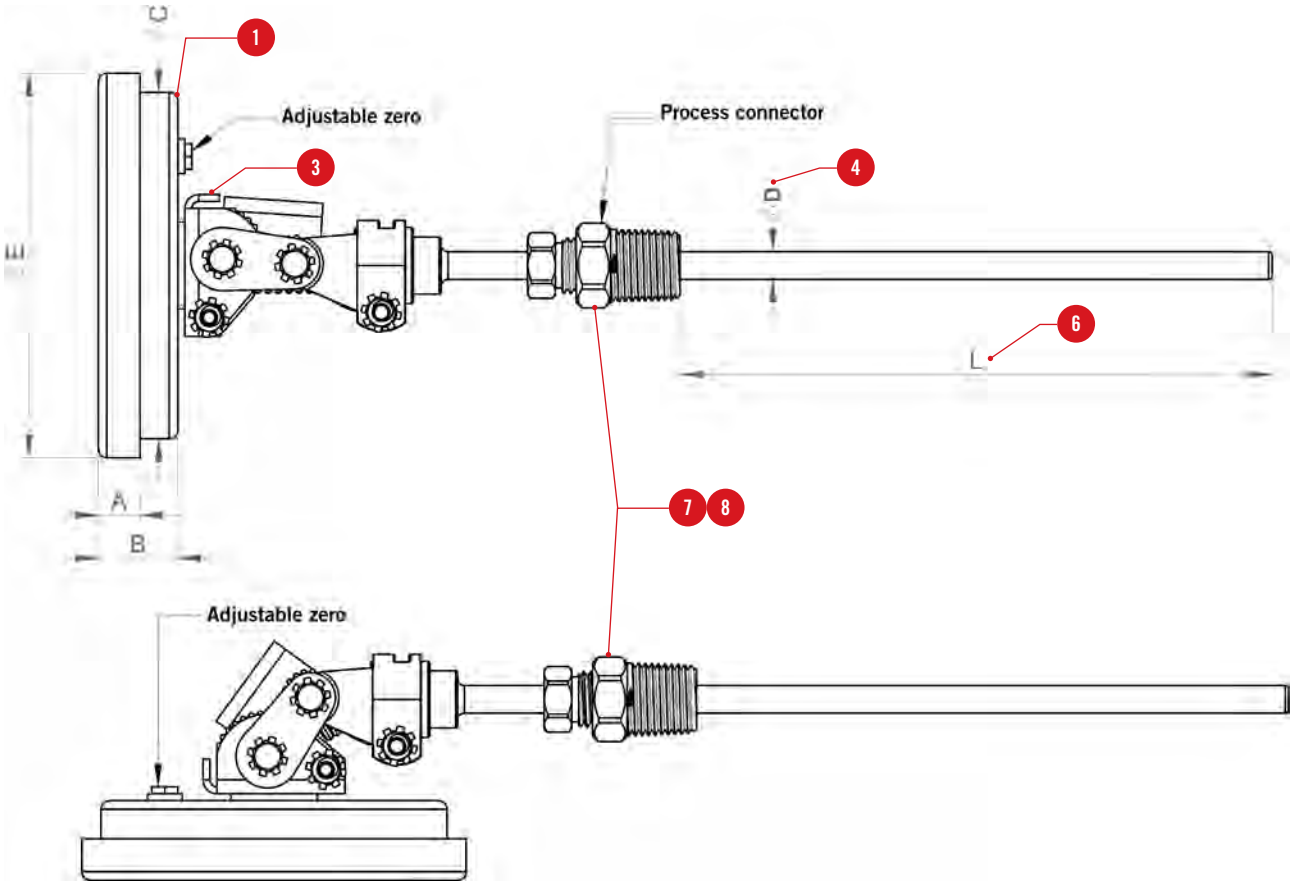
DESIGN YOUR THERMOMETER

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

STANDARD MODEL	CASING	RANGE	MOUNTING	IMMERSED Ø	PROT.	IMMERSED LENGTH	PROCESS CONNECTION TYPE	PROCESS CONNECTOR	OPTION OPTIONS
TBM2	- 150	- EG3	- 2D	- 14	- P5	- 250	- RT	- NM27	- D
Reference in table and diagram	1	2	3	4	5	6	7	8	9
Possible choice	80 100 125 150	EA1 / EA2 / EB2 / EB3 EG1 / EG2 / EG3 / EG4 EG5 / EG6 / EG8 / EG9 EH1 /EH2 / EH3 /EH4	2D	60 14 80 95 10 12	P5 P6 P7 HS	110 mm to 1500 mm	RX RG RT	NM12 / BM12 NM14 / BM14 MM20 / BM38 TR15 / NM34 BM34 / NM27	1 / 2 3 / 4 5 / 6 7 / A B / C D

DIAGRAM (MM)



1

	A	B	ØC	ØD	Weight (g)
80	9.5	23	80	89.5	-
100	12	23	100	111	-
125	15	23	118.5	129	662
150	15	23	149	161	839

CASING 1

080	80mm / 3"	125	125mm / 4"1/2
100	100mm / 4"	150	150mm / 6"

MEASUREMENT RANGE (°C) 2

EA1	-20…+40 °C	EG3	0…+80 °C	EH1	0…+300 °C
EA2	-20…+60 °C	EG4	0…+100 °C	EH2	0…+400 °C
EB2	-30…+70 °C	EG5	0…+120 °C	EH3	0…+500 °C
EB3	-30…+120 °C	EG8	0…+200 °C	EH4	0…+600 °C
EG1	0…+50 °C	EG9	0…+250 °C		
EG2	0…+60 °C	EG6	0…+150 °C		

MOUNTING 3

2D	Centre, rear, multidirectional

IMMERSED DIAMETER 4

60	6.0 mm	95	9.5 mm
14	1/4" (6,35mm)	10	10 mm
80	8.0 mm	12	12 mm

PROTECTION 5

P5	IP65	P7	IP67
P6	IP66	HS	Hermetically sealed

IMMERSED LENGTH 6

xxxx	110 mm to 1500 mm

MIN. IMMERSED LENGTH 6

Immersed diameter	6 mm - 1/4"	8 mm	10 mm	12 mm
Measurement range (°C)	Min. immersed length (mm)			
0…50	130	110	110	110
0…60	110	95	95	95
0…80	95	70	70	70
0…100	75	70	70	70
0…120	70	60	60	60
0…150	60	50	50	50
0…200	50	45	45	45
0…250	40	35	35	35
0…300	60	50	50	50
0…400	50	45	45	45
0…500	45	40	40	40
0…600	40	35	35	35

PROCESS CONNECTION TYPE 7

RX	Fixed	RG	Adjustable	RT	Pivoting / Rotary

PROCESS CONNECTOR 8

NM12	1/2"NPT (M)	MM20	M20*1.5mm (M)	BM34	3.4" BSP (M)
BM12	1/2"BSP(M)	BM38	3/8" BSP (M)	NM27	M27 x 1.5mm (M)
NM14	1/4"NPT(M)	TR15	1.5" Triclover		
BM14	1/4"BSP (M)	NM34	3/4"NPT (M)		

OPTIONS 9

Several options are available. They should be indicated one after the other.

1	316L casing and ring
2	SEKURIT window
3	External adjustment of zero
4	Priming liquid (silicone oil -200°C)
5	Priming liquid (glycerine -65°C)
6	VITON seal
7	Certificate 2.2
A	316L label
B	304L label
C	Label on casing
D	Atex

For any other configuration, please contact us.

TDG1

GAS EXPANSION THERMOMETER

CAPILLARY UP TO 25 M

IMMERSED UP TO 2 M

DIAL DIAMETER 100 TO 250 MM

IP 67

DESCRIPTION

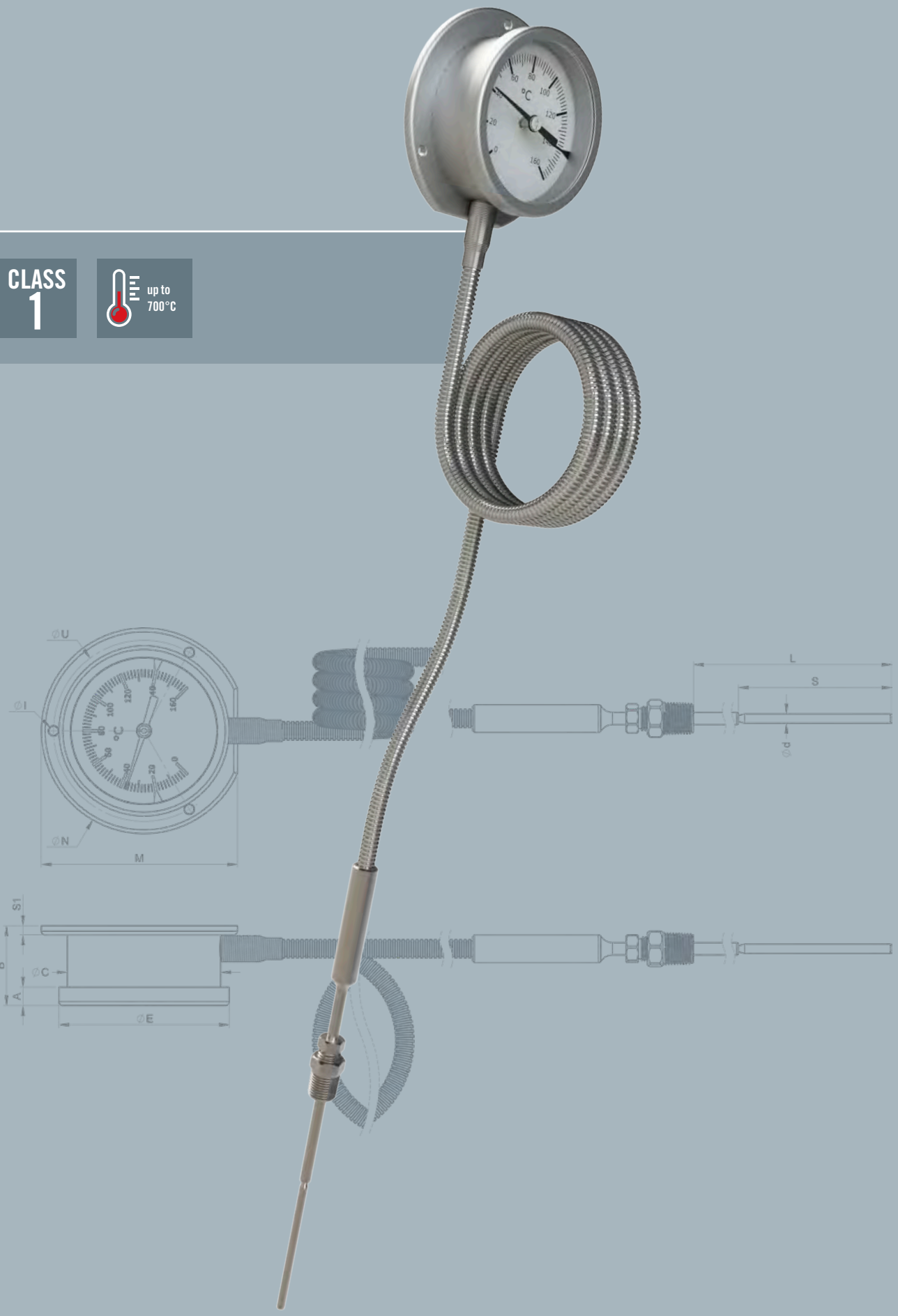
Gas expansion thermometer. Multiple mounting possibilities. For corrosive liquids and gases in the chemicals and petrochemicals sectors.

SPECIFICATIONS

Accuracy class		Class 1 (CL 1.0)
Ambient temperature		0...40 °C
Storage temperature		-50...+70 °C (without filler liquid) / -20...+60 °C (with filler liquid)
Scale overrun		110 % of full scale (E.m.)
Plunger PN		25 bar (without thermowell)
Weld seams		arc welding / Argon TIG
Measuring element		Capsule of inert, non-toxic gas
Materials	Casing and window	Stainless steel AISI 304
	Plunger and connector	Stainless steel AISI 316
	Dial	Aluminium, black graduations on white background
	Needle	Aluminium, black coating, adjustable zero
	Window	Glass or SEKURIT glass (depending on filling)
	Seals	Neoprene or NBr (depending on filling)
Process connection		1/2" NPT or BsP / male
		1/4" NPT or BsP / male (for plunger Ø ≤ 6.35 mm)
		3/8" BsP / male (for plunger Ø ≤ 10 mm)
		m20 x 1.5 / male
Protection		IP 65, IP 66, IP 67

CLASS 1

up to 700°C



DESIGN YOUR THERMOMETER

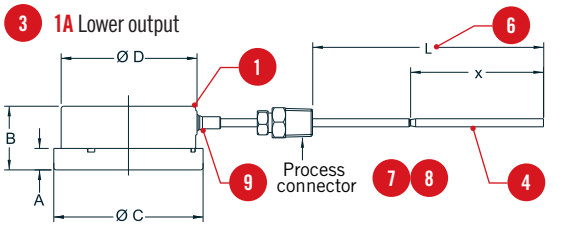
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL TYPE		CASING		RANGE		MOUNTING		Ø IMMERSED		PROTECTION		IMMERSED LENGTH
TDG1	-	100	-	EA2	-	1A	-	60	-	P6	-	820
Reference in table and diagram		1		2		3		4		5		6
Possible choice		100 125 150 250		EA1 / EA2 / EA3 / EA4 / EA5 / EA6 EB1 / EB2 / EC1 / EC2 / ED1 / EF1 EG1 / EG2 / EG3 / EG4 / EG5 / EG6 EG7 / EG8 / EG9 / EH1 / EH2 / EH3 EH4 / EH5 / EJ1 / EK1 / Ek2		1A / 1B / 1C 1D / 2A / 2B		60 / 14 80 / 95 10 / 12		P5 P6 P7 HS		100 mm to 2000 mm

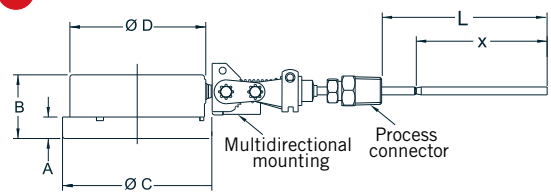
DIAGRAM (MM)

3 1A Lower output



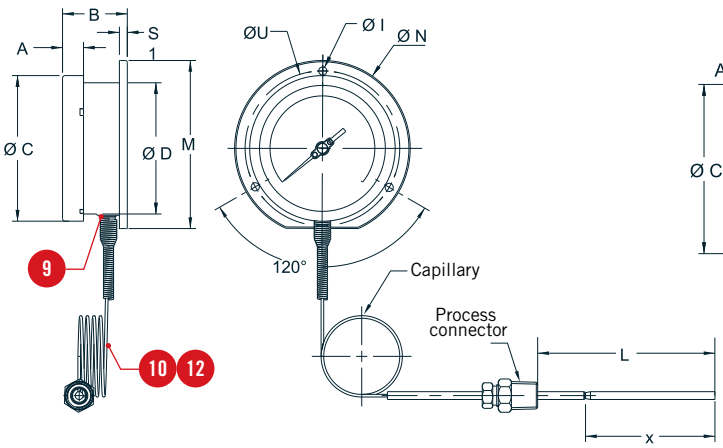
1	A	B	ØC	ØD
100	12	48	111	100
125	15	48	129	118,5

3 1B



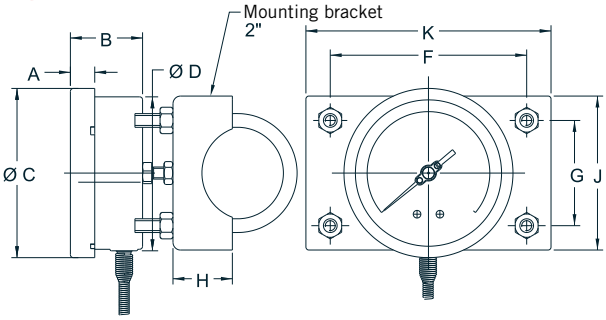
1	A	B	ØC	ØD
150	15	48	161	149
250	18,5	50	263	250

3 1C



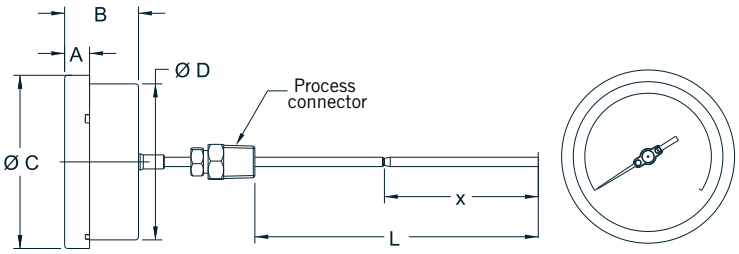
1	A	B	ØC	ØD	ØI	ØN	M	S1	ØU
100	12	52	111	100	6	134	128	6	118
125	15	50	129	118.5	6	150	143.5	4	137
150	15	52	161	149	6	186	172.4	6	168
250	18.5	51.5	263	250	7	290	286.5	1.5	276

3 1D

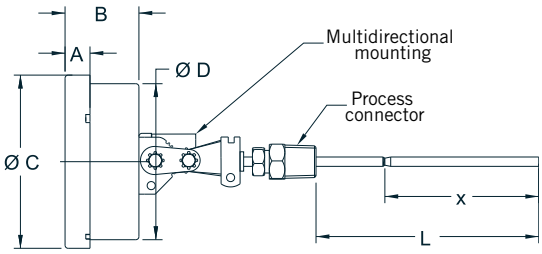


1	A	B	ØC	ØD	F	G	H	J	K
For casing dimensions, please see 1A, 1B					129	69	39	101	161

3 2A Central output



3 2B



For casing dimensions, please see 1A, 1B

PROCESS CONNECTION TYPE		PROCESS CONNECTOR		ASSEMBLY		CAPILLARY MATERIAL		ARMOURING		CAPILLARY LENGTH		OPTION OPTIONS
RX	-	NM34	-	CT	-	AC	-	AC	-	2,850	-	D
7		8		9		10		11		12		13
RX RG RT		NM12 / BM12 / NM14 / BM14 MM20 / BM38 / TR15 / NM34 BM34 / NM27 / NF12 / NF34		ST CT		304L : AB 316L : AC		304L : AB 316L : AC PVC : HF		250 mm to 25,000 mm		1 / 2 / 3 / 4 5 / 6/ 7 / 8 9 / A/ B / C D

CASING 1

100	100mm / 4"	150	150mm / 6"
125	125mm / 4"1/2	250	250mm /10"

MEASUREMENT RANGE (°C) 2

EA1	-20…+40 °C	ED1	-50…+100°C	EG9	0…+250 °C
EA2	-20…+60 °C	EF1	-100…+60°C	EH1	0…+300 °C
EA3	-20…+80 °C	EG1	0…+50 °C	EH2	0…+400 °C
EA4	-20…+100 °C	EG2	0…+60 °C	EH3	0…+500 °C
EA5	-20…+120 °C	EG3	0…+80 °C	EH4	0…+600 °C
EA6	-20…+180 °C	EG4	0…+100 °C	EH5	0…+650 °C
EB1	-30…+50 °C	EG5	0…+120 °C	EJ1	50…+650 °C
EB2	-30…+70 °C	EG6	0…+150 °C	EK1	100…+600 °C
EC1	-40…+40 °C	EG7	0…+160 °C	EK2	150…+700 °C
EC2	-40…+60 °C	EG8	0…+200 °C		

MOUNTING 3

Lower output		Central output	
1A	Direct	2A	Rear
1B	Multidirectional	2B	Multidirectional
1C	Mounting on wall / surface		
1D	2" pipe mounting		

IMMERSED DIAMETER 4

60	6.0 mm	95	9.5 mm
14	1/4" (6.35mm)	10	10 mm
80	8.0 mm	12	12 mm

PROTECTION 5

P5	IP65	P7	IP67
P6	IP66	HS	Hermetically sealed

For any other configuration, please contact us.

IMMERSED LENGTH 6

xxxx	100 mm to 2000 mm

PROCESS CONNECTION TYPE 7

RX	Fixed	RG	Adjustable	RT	Pivoting / Rotary

PROCESS CONNECTOR 8

NM12	1/2"NPT (M)	MM20	M20*1.5mm (M)	BM34	3.4" BSP (M)
BM12	1/2"BSP(M)	BM38	3/8" BSP (M)	NM27	M27 x 1.5mm (M)
NM14	1/4"NPT(M)	TR15	1.5" Triclover	NF12	/2"NPT (F)
BM14	1/4"BSP (M)	NM34	3/4"NPT (M)	NF34	3/4"NPT (F)

ASSEMBLY 9

ST	direct (plunger)	CT	remote (capillary)

CAPILLARY MATERIAL 10

AB	304L	AC	316L

ARMOURING 11

AB	304 L	AC	316 L	HF	PVC (Max. ambient temp. 60°C)

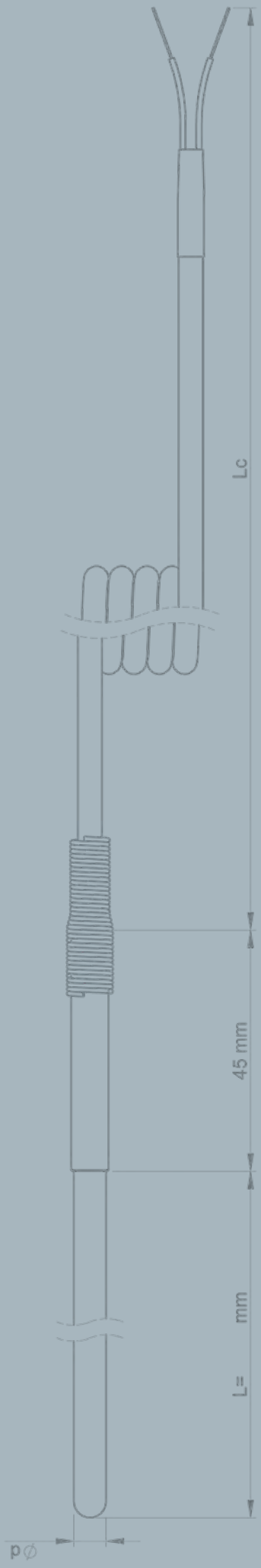
CAPILLARY LENGTH 12

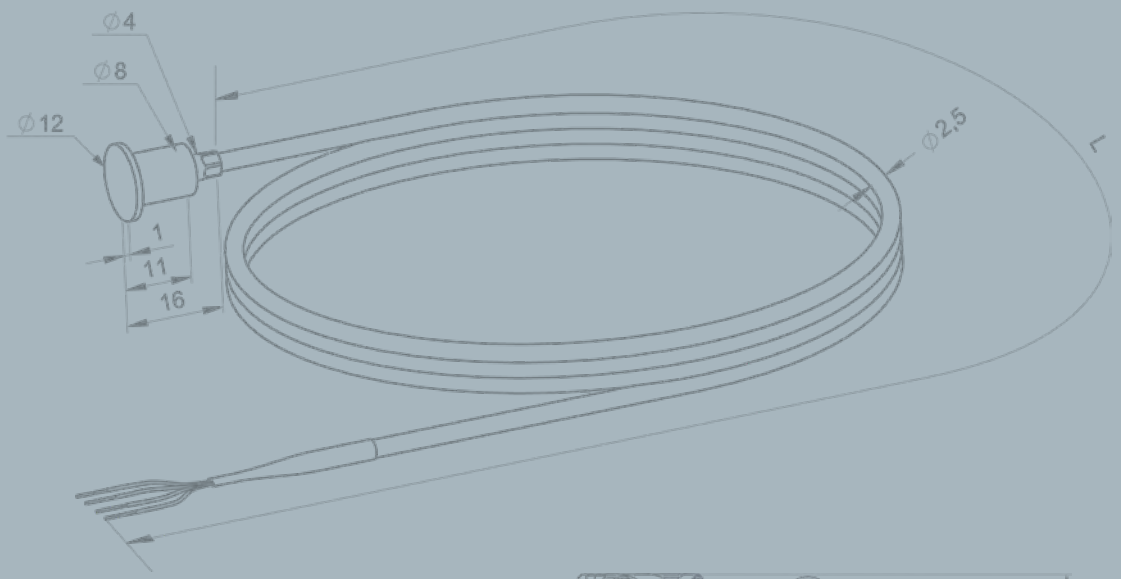
xxxx	250 to 25,000mm

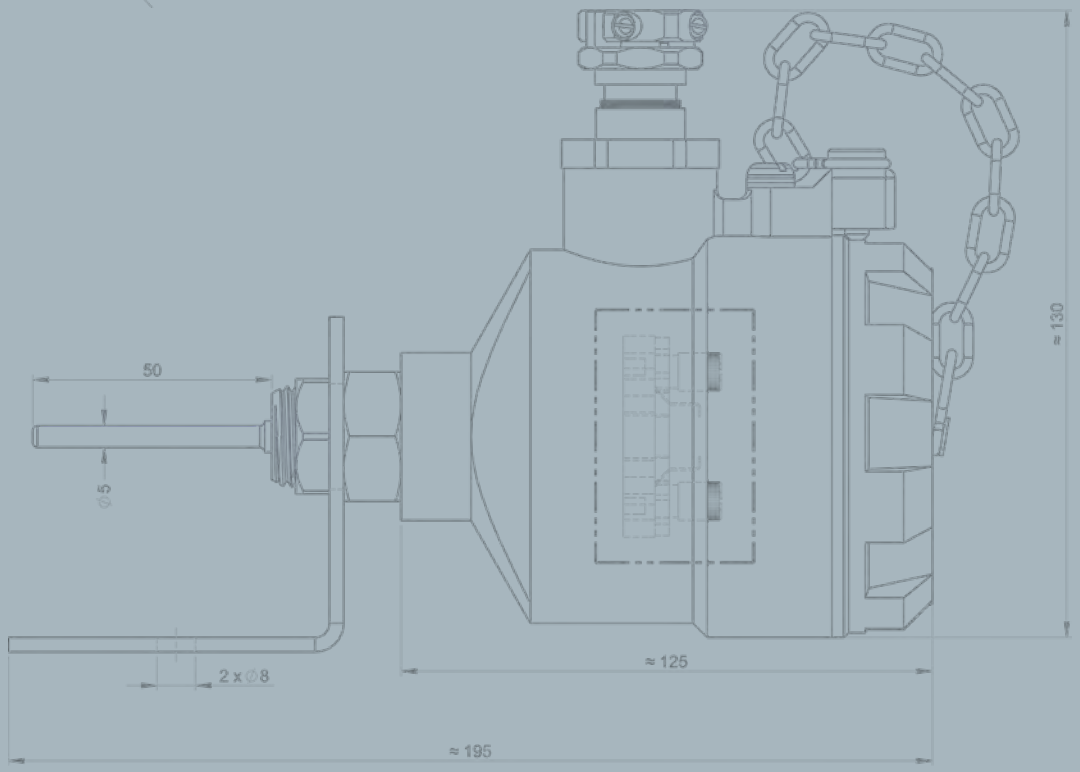
OPTIONS 13

Several options are available. They should be indicated one after the other.

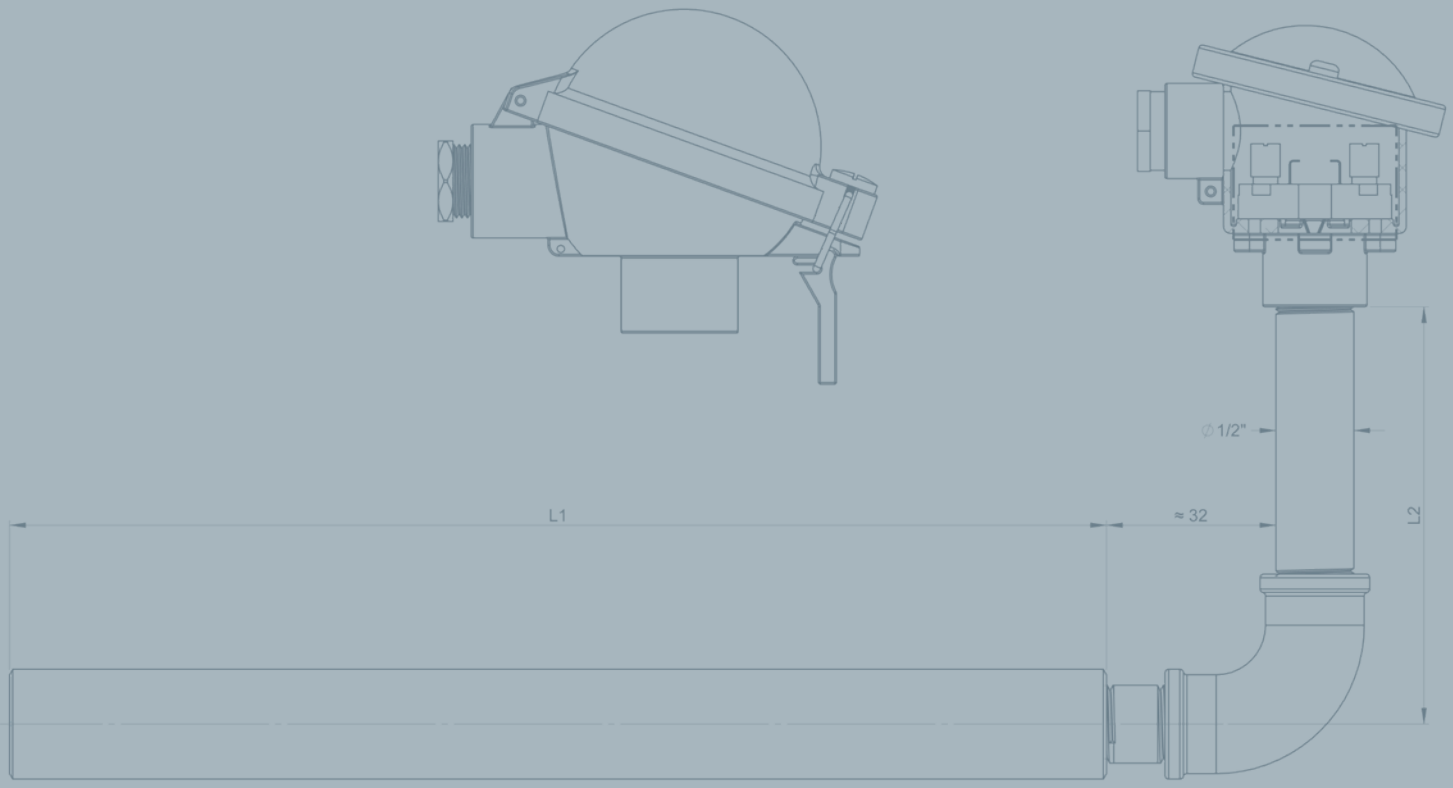
1	316L casing and ring
2	SEKURIT window
3	External adjustment of zero
4	Priming liquid (silicone oil -200°C)
5	Priming liquid (glycerine -65°C)
6	VITON seal
7	Certificate 2.2
8	Filling with helium
9	Maximum reading pointer
A	316L label
B	304L label
C	Label on casing
D	Atex







ACCESSORIES



ELECTRICAL CONNECTIONS 340

WIRES AND CABLES 342

FASTENING COMPONENTS 344

TERMINAL STRIPS - ASSEMBLY-HEAD TRANSMITTERS 346

HEADS - CABLE GLANDS 347

PORTABLE DIGITAL THERMOMETERS 348

ELECTRICAL CONNECTIONS

CONNECTORS FOR PT100 Ω

- For Pt100 Ω sensors, 3-wire mounting
- Temperature withstand -50°C to +210 °C
- Cable clamp for the miniature and standard connectors available as an option



Standard connector



Miniature connector

Male or female	Type	No. of pins	Dimensions L x w x h	Code
Male	Standard	3	35 x 25 x 12.5	L018290-000
Female				L018211-004
Cable clamp for standard 3-pin connector				L018250-017
Male	Miniature	3	19 x 24 x 8	L018280-000
Female				L018200-005
Cable clamp for miniature 3-pin connector				L018200-006

COMPENSATED CONNECTORS FOR THERMOCOUPLES



Standard connector



Miniature connector

Male or female	Single or duplex	Type of thermocouple							
		Size	Section	Type J	Type K	Type T	Type N	Type S	Cu-Cu Type B
Male	Single	Standard	Rectangle	L12547J-000	L12547K-000	L12547T-000	L12547N-000	L12547S-000	L12547C-000
		Miniature	Rectangle	L12587J-000	L12587K-000	L12587T-000	L12587N-000	L12587S-000	L12587C-000
	Duplex	Standard	Rectangle	L12543J-000	L12543K-000	L12543T-000	L12543N-000	L12543S-000	L12543C-000
Female	Single	Standard	Rectangle	L12548J-000	L12548K-000	L12548T-000	L12548N-000	L12548S-000	L12548C-000
		Miniature	Rectangle	L12588J-000	L12588K-000	L12588T-000	L12588N-000	L12588S-000	L12588C-000
	Duplex	Standard	Rectangle	L12544J-000	L12544K-000	L12544T-000	L12544N-000	L12544S-000	L12544C-000
Female socket for panel	Single	Standard	Rectangle	L12545J-000	L12545K-000	L12545T-000	L12545N-000	L12545S-000	L12545C-000
		Standard	Circular	L12546J-000	L12546K-000	-	-	L12546S-000	-
		Miniature	Rectangle	L12585J-000	L12585K-000	L12585T-000	L12585N-000	L12585S-000	L12585C-000
			Rectangle*	L12584J-000	L12584K-000	L12584T-000	L12584N-000	L12584S-000	L12584C-000

* With two mounting lugs

TERMINAL STRIPS FOR THERMOCOUPLES

Number of circuits	Size	Type J	Type K	Type T	Type S	Cu-Cu Type B
1	Standard	L12549J-000	L12549K-000	L12549T-000	L12549S-000	L12549C-000

CABLE CLAMP

- For connecting thermocouple wires, extension cables or compensation cables
- Temperature withstand -50 °C to +210 °C
- Colour coding as per IEC 584-3 (NFC42324)

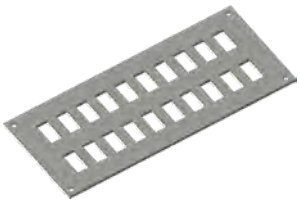


Miniature cable clamp



Standard cable clamp

Connector type	Single or duplex	Code
Standard	Single	L125490-000
Miniature	Single	L125890-000
Standard	Duplex	L125499-000



Standard size panel

PANELS FOR FEMALE THERMOCOUPLE CONNECTORS

Connector type	Number of circuits	Code
Standard size, rectangular face	1	L125401-000
	2	L125402-000
	3	L125403-000
	4	L125404-000
	5	L125405-000
	6	L125406-000
	8	L125408-000
	10	L125410-000
	12	L125412-000
	16	L125416-000
	20	L125420-000
	24	L125424-000
Miniature size, rectangular face	1	L125801-000
	2	L125802-000
	3	L125803-000
	4	L125804-000
	5	L125805-000
	6	L125806-000
	8	L125808-000
	10	L125810-000
	12	L125812-000
	16	L125816-000
	20	L125820-000
	24	L125824-000

WIRES AND CABLES

FOR THERMOCOUPLE COMPENSATION

Type	Coating	"Tolerance class"	"Ø wire"	"External Ø"	Conditioning	Code
Type T	Bare wire	2	1.5mm		by the metre	L209114-000
	FEP insulation		0.2 mm	0.4 mm	25 m coil	L218101-000
			0.3 mm	1.1 mm	25 m coil	L218102-000
			0.5 mm	1.3 mm	25 m coil	L218103-000
			0.2 mm	0.4 mm	100 m coil	L217101-000
			0.3 mm	1.1 mm	100 m coil	L217102-000
			0.5 mm	1.3 mm	100 m coil	L217103-000
	Glass silk insulation		0.5 mm	1.5 x 2.4	by the metre	L219123-000
Type J	Bare wire	2	1.60 mm		by the metre	L209214-000
	FEP insulation		0.2 mm	0.4 mm	25 m coil	L218201-000
					100 m coil	L217201-000
			0.3 mm	1.1 mm	25 m coil	L218202-000
					100 m coil	L217202-000
			0.5 mm	1.3 mm	25 m coil	L218203-000
					100 m coil	L217203-000
	Glass silk insulation		0.5 mm	1.5x 2.4	by the metre	L219223-000
			0.8 mm	2 x 3	by the metre	L219225-000
			7 x 0.2 mm	1.4 x 2.2	by the metre	L219228-000
			1 mm	2.7 x 4.2	by the metre	L219246-000
	Glass silk insulation with stainless-steel braid		7 x 0.2 mm	3	by the metre	L219237-000
			7 x 0.2 mm	2.2 x 3.2	by the metre	L219238-000
Type K	Bare wire	1	0.51 mm		by the metre	L209409-000
			0.60 mm		by the metre	L209410-000
			1.02 mm		by the metre	L209412-000
			1.62 mm		by the metre	L209414-000
			2.3 mm		by the metre	L209415-000
			2.9 mm		by the metre	L209417-000
	FEP insulation	2	0.2 mm	0.4 mm	25 m coil	L218401-000
					100 m coil	L217401-000
			0.3 mm	1.1 mm	25 m coil	L218402-000
					100 m coil	L217402-000
			0.5 mm	1.3 mm	25 m coil	L218403-000
					100 m coil	L217403-000
	Glass silk insulation	1	0.51 mm	1.02 mm	by the metre	L219413-000
			0.25 mm	0.9 x 1.3	by the metre	L219421-000
			0.3 mm	1.1 x 1,8	by the metre	L219422-000
			0.5 mm	1.3 x 2.2	by the metre	L219423-002
			0.6 mm	1.6 x 2.6	by the metre	L219424-000
			1 mm	2.7 x 4.2	by the metre	L219446-000
	Ceramic coating	1	0.2 mm	2.3 x 3.2	by the metre	L219438-000
	Glass silk insulation with stainless-steel braid	1	0.8 mm	2.4 x 4.0	by the metre	L219465-000
Type S	Bare wire	2	0.35 mm		by the metre	L209608-000
	Bare wire		0.50 mm		by the metre	L209609-000
Type R	Bare wire	2	0.50 mm		by the metre	L209709-000
Type W/Re	Bare wire		0.50 mm		by the metre	L209909-000



Cable type A



Cable type B



Cable type C

EXTENSION AND PROLONGATION FOR THERMOCOUPLES

TC type	No. TC	External sheath	Ext. Ø mm	X/C(1)	Class(2)	Ø cond.	Cable Type	By metre	50 m coil	100 m coil	250 m coil
T	1 TC	PVC	4	X	1	3 x 0.3	B	L929101-120	L921101-120	L922101-120	L923101-120
J	1 TC	PVC	4	X	1	3 x 0.3	B	L929201-120	L921201-120	L922201-120	L923201-120
			5	X	2	7 x 0.3	B	L929215-120	L921215-120	L922215-120	L923215-120
			7	X	2	14 x 0.3	B	L929214-110	L921214-110	L922214-110	L923214-110
			7.5	X	2	19 x 0.3	A	L929208-110	L921208-110	L922208-110	L923208-110
			7.8	X	2	19 x 0.3	B	L929203-110	L921203-110	L922203-110	L923203-110
		Silicone	5	X	1	7 x 0.3	B	L929206-120	L921206-120	L922206-120	L923206-120
		FEP	3.5	X	1	7 x 0.2	B	L929210-120	L921210-120	L922210-120	L923210-120
		GS(3)	4 x 6	X	1	19 x 0.3	C	L929209-120	L921209-120	L922209-120	L923209-120
			4 x 6	X	1	14 x 0.3	C	L929218-120	L921218-120	L922218-120	L923218-120
	2 TC	PVC	5	X	1	3 x 0.3	B	L929301-120	L921301-120	L922301-120	L923301-120
K	1 TC	PVC	4	X	1	3 x 0.3	B	L929401-120	L921401-120	L922401-120	L923401-120
			5	C	2	7 x 0.3	B	L929515-110	L921515-110	L922515-110	L923515-110
			7	C	2	14 x 0.3	B	L929514-110	L921514-110	L922514-110	L923514-110
			7.5	C	2	19 x 0.3	A	L929408-110	L921408-110	L922408-110	L923408-110
			7.8	C	2	19 x 0.3	B	L929403-110	L921403-110	L922403-110	L923403-110
		Silicone	4.2	X	1	7 x 0.2	B	L929416-120	L921416-120	L922416-120	L923416-120
			5	X	1	7 x 0.3	B	L929406-120	L921406-120	L922406-120	L923406-120
		FEP	3.5	X	1	7 x 0.2	B	L929410-120	L921410-120	L922410-120	L923410-120
		GS(3)	4 x 6	C	2	19 x 0.3	C	L929409-110	L921409-110	L922409-110	L923409-110
			4 x 5	X	1	14 x 0.3	C	L929417-120	L921417-120	L922417-120	L923417-120
			4 x 6	X	1	14 x 0.3	C	L929418-120	L921418-120	L922418-120	L923418-120
	2 TC	PVC	5	C	2	3 x 0.3	B	L929701-110	L921701-110	L922701-110	L923701-110
S	1 TC	PVC	4	C	2	3 x 0.3	B	L929601-110	L921601-110	L922601-110	L923601-110
			5	C	2	7 x 0.3	B	L929615-110	L921615-110	L922615-110	L923615-110
			7.5	C	2	19 x 0.3	A	L929608-110	L921608-110	L922608-110	L923608-110
			7.8	C	2	19 x 0.3	B	L929603-110	L921603-110	L922603-110	L923603-110
		Silicone	5	C	2	7 x 0.3	B	L929606-110	L921606-110	L922606-110	L923606-110
		FEP	3.5	C	2	7 x 0.2	B	L929610-110	L921610-110	L922610-110	L923610-110
		GS(3)	4 x 6	C	2	19 x 0.3	C	L929609-110	L921609-110	L922609-110	L923609-110
B	1 TC	FEP	3.5	C	2	7 x 0.2	B	L929620-110	L921620-110	L922620-110	L923620-110
N	1 TC	PVC	4	X	1	3 x 0.3	B	L929901-110	L921901-110	L922901-110	L923901-110
		FEP	3.5	X	1	7 x 0.2	B	L929910-120	L921910-120	L922910-120	L923910-120
		GS(3)	4 x 6	X	1	14 x 0.3	C	L929919-120	L921919-120	L922919-120	L923919-120

(1) - X: extension cable - C: compensation cable. (2) - Class: tolerance class as per IEC 584. (3) - GS: glass silk

EXTENSION AND PROLONGATION FOR PT100 Ω

Wire or cable	Metal	No. wires	External sheath	External Ø	Ø wires	Conductor insulation	Internal braid	External braid	Code (by the metre)
Fil	Ag	1			0.5 mm	None			L063105-000
	Ni	1			0.5 mm	None			L063205-000
	Ag	1		1.1 mm	0.5 mm	Glass silk			L063404-000
Câble	Cu	2	Silicone	4.6 mm	16 x 0.2 mm	Silicone	None		L067824-000
		3	PVC	4.2 mm	7 x 0.2 mm	PVC	Tin-plated Cu		L067803-000
			PVC	3.7 mm	7 x 0.2 mm	PVC	None		L067810-000
			Silicone	4.6 mm	7 x 0.2 mm	PVC	None		L067805-000
			FEP	2.1 mm	7 x 0.06 mm	FEP	Silver-plated Cu		L067813-000
			Glass silk	3.5 mm	7 x 0.2 mm	Glass silk	None	Stainless steel	L067836-000
		4	PVC	5.0 mm	7 x 0.2 mm	PVC	Tin-plated Cu		L067804-000
			FEP	3.3 mm	7 x 0.2 mm	FEP	Silver-plated Cu		L067815-000

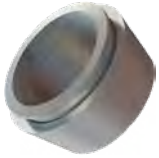
FASTENING COMPONENTS



CABLE GLANDS

Stainless steel cable gland

Body material	Ferrule material	For sheath Ø	Threading	Code
Stainless steel	Stainless steel	1.5mm	1/8" NPT	L078827-000
		2 mm	1/8" NPT	L078828-000
		3 mm	1/8" NPT	L078829-000
		3 mm	1/4" NPT	L078830-000
		3.2 mm	1/4" NPT	L078834-000
		4.5 mm	1/4" NPT	L078833-000
		4.5 mm	1/2" NPT	L078934-000
		6.0 mm	1/4" NPT	L078836-000
		6.0 mm	1/2" NPT	L078938-000
		6.0 mm	G1/2	L078946-000
		6.35 mm	1/4" NPT	L078835-000
		8.0 mm 8.0 mm	1/4" NPT 1/2" NPT	L078841-000 L078952-000
		8.0 mm	G1/2	L078937-000
		1.5 mm	1/8" NPT	L228123-000
		2.0 mm	1/8" NPT	L228124-000
		3.0 mm	1/4" NPT	L228125-000
		3.0 mm	1/2" NPT	L078940-000
	FEP	4.5 mm 5,0 mm	1/4" NPT 3/8 G tapered	L228126-000 L078849-000
		6.0 mm	1/4" NPT	L228127-000
		6.0 mm	3/8 G tapered	L078847-000
		6.0 mm	G1/2	L078838-000
		6.0 mm	1/2" NPT	L078939-000
		8.0 mm	1/4" NPT	L228128-000
Brass		1.5 mm	1/8" NPT	L228143-000
		3.0 mm	1/4" NPT	L228145-000
	FEP	3.2 mm 4.5 mm	G1/8 1/4" NPT	L078948-000 L228146-000
		6.0 mm	G1/4	L078845-000
		6.0 mm	1/4" NPT	L228147-000
		8.0 mm	G3/8	L078846-000
		1.5mm	1/8" NPT	L078927-000
	Brass	3.0 mm	1/4" NPT	L078930-000
		6.0 mm	1/4" NPT	L078936-000
		8.0 mm	1/4" NPT	L078941-000



Stainless steel ferrules

SPARE FERRULES

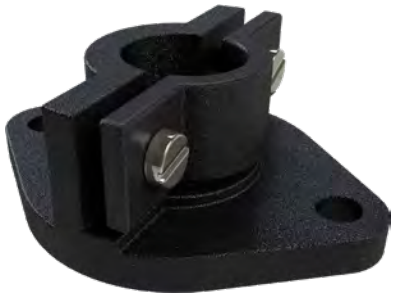
Material	For sheath Ø	Code
Stainless steel	1.5 mm	L228173-000
	3 mm	L228175-000
	4.5 mm	L228176-000
	6 mm	L228177-000
Brass	3 mm	L228185-000
	6 mm	L228187-000
FEP	2 mm	L228194-000
	3 mm	L078857-000
	4.5mm	L078859-000
	6.0 mm	L078864-000
	8.0 mm	L078873-000

LEAK-TIGHT FITTINGS FOR WELDING - FOOD INDUSTRY

Body material	Ferrule material	For sheath Ø “d”	Length	Code
Stainless steel	Stainless steel	5.0 mm	54 mm	L228109-000
Stainless steel	Teflon	6.0 mm	54 mm	L228117-000

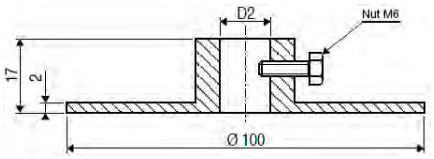
LEAK-TIGHT FITTINGS FOR WELDING - CEMENT

Body material	Ferrule material	For welding Ø "d" mm (inches)	Thread	Code
Steel	Steel	21,3 (1/2")	G1"	LU78978-000
Steel	Steel	21,3 (1/2")	G1"1/4	L079110-000
Steel	Steel	30 (-)		L078981-000
Steel	Steel	21,3 (1/2")	G1"1/2	LU78825-001
Steel	Steel	30,1 (-)		LU78866-001
Stainless steel	Stainless steel	21,3 (1/2")		L079112-000
Stainless steel	Stainless steel	21,3 (1/2")	1"NPT	L078984-000



EBA FLANGES

Description	Ø of protective tube	Material	Spacing	Code
Flange	15 mm	Cast iron	56 mm	L077310-000
Flange	21 mm		70 mm	L077311-000
Flange and companion flange	22 mm			L077312-000
Flange	27 mm			L077314-000
Flange and companion flange	27 mm			L077316-000
Flange	32 mm			L077319-000
Flange and companion flange	32 mm			L077320-000



BRAKE DISCS

Tube diameter	D2	Code
21,3 mm	21,6	L077916-000
26,9 mm	27,2	LEL1711-000
32 mm	32,2	LM43049-001

TERMINAL STRIPS
ASSEMBLY-HEAD TRANSMITTERS



BB12 terminal strips

TERMINAL STRIPS

Type	Head type	Sensor type	No. of terminals	V/V: screwed/screwed V/S: screwed/welded	Code
BM04	MA	Pt 100 Ω / TC	4	V/V	L015007-000
BB02	DIN	Pt 100 Ω / TC	2	V/V	L015015-000
BA02	DIN A	TC	2	V/V	L015054-000
BB12	DIN	Pt 100 Ω / TC	2	V/S	L015055-000
BB13	DIN	Pt 100 Ω / TC	3	V/S	L015060-000
BB04	DIN	Pt 100 Ω / TC	4	V/V	L015062-000
BA04	DIN A	TC	4	V/V	L015065-000



Standard transmitters

TRANSMITTERS IN ASSEMBLY HEAD

Output signal	Protection mode	Input	Insulation	Code
4-20 mA	Standard	Universal: Pt 100 / all thermocouples	1.5Kv	LC5331A-321
		Pt 100	None	LC5333A-100
		All thermocouples	1.5Kv	LC5334A-100
	ATEX EEx"i"a	Universal: Pt 100 / all thermocouples	1.5Kv	LC5331B-221
		Pt 100	None	LC5333B-100
4-20 mA+ HART	Standard	Universal: Pt 100 / all thermocouples	1.5Kv	LC5335A-100
	ATEX EEx"i"a	Universal: Pt 100 / all thermocouples	1.5Kv	LC5335B-100
Programming kit				LC59050-000

Download free of charge the software for configuring your sensor head transmitters from www.pyrocontrole.com/en/support/download

HEAD - CABLE GLANDS

CONNECTING HEADS

Type	Material	Process connection	Cable feed	Ø cable (mm)	Protection	Terminal strip	ATEX certificate		Code
MA	Aluminium	M10	PE9	3.5 - 5.5	IP54	BM04	Without		L015001-000
DAN	Aluminium	G1/2	M20	4 - 12.5	IP54	BB			L015300-000
DAN-V	Epoxy-coated alu	G1/2	M20	4 - 12.5	IP65	BB			L015305-000
DAN	Aluminium	G1/2	1/2"NPT	4 - 12.5	IP54	BB			L015017-000
DIN B	Aluminium	G1/2	M20	6.5 - 8.5	IP54	BB			L015320-000
DIN A	Aluminium	G1/2	M20	6.5 - 8.5	IP54	BB			L015330-000
DIN A	Aluminium	G3/4	M20	6.5 - 8.5	IP54	BB			L015332-000
KNE	Aluminium	G1/2	M20	4.5 - 7.5	IP68	BB			L015042-000
KST	Inox	G1/2	M20	4.5 - 7.5	IP68	BB			L015035-000
LSX-D	Epoxy-coated alu	G1/2	M20	See cable glands M20	IP67	BB	With	Controlled sale (see ID50 system p. 192)	L015340-000
LSX-W	Epoxy-coated alu	G1/2	2xM20		IP67	BB	With		L015345-000
LSX-D	Stainless steel	G1/2	M20		IP67	BB	With		L015350-000
LSX-W	Stainless steel	G1/2	2xM20		IP67	BB	With		L015355-000



DAN



DIN A



DIN B



LSX-W



LSX-D



MA



Nickel-plated brass cable gland

CABLE GLANDS

Type	Material	Nb of cable feed	Fastening	Reinforced cable	Internal cable Ø (mm)	Internal cable Ø (reinforced cable) (mm)	ATEX certicate	Code
PE9	Nickael-plated brass	1	Yes	No	5 - 9.5	-	Without	L017211-000
1/2" NPT	Nickael-plated brass	1	No	No	4 - 8	-	Without	L017128-000
1/2" NPT	Nickael-plated brass	1	Yes	No	4 - 8	-	Without	L017225-000
1/2" NPT	Nickael-plated brass	1	Yes	No	7 - 12	-	ATEX "d"	L017395-000
3/4" NPT	Nickael-plated brass	1	Yes	Yes	10 - 16	7 - 12	ATEX "d"	L017350-000
3/4" NPT	Nickael-plated brass	1	Yes	No	7 - 12	-	ATEX "d"	L017396-000
M20	Polyamide	1	No	No	7 - 12	-	Without	L017640-000
M20	Nickael-plated brass	2	No	No	4 - 6	-	Without	L017669-000
M20	Nickael-plated brass	1	Yes	No	7 - 12	-	ATEX "d"	L017690-000
M20	Nickael-plated brass	1	Yes	Yes	7 - 12	4.5 - 8	ATEX "d"	L017668-000
M20	Polyamide	1	No	No	6 - 12	-	ATEX "ia"	L017235-000

CONTACT THERMOMETERS THERMOCOUPLES

C.A 1821 - C.A 1822

Ref. : P01654821 P01654822



STRENGTHS

- J, K, T, N, E, R or S thermocouples
- Recording of up to 1 million points
- Magnetized product compatible with MultiFix
- USB and Bluetooth communication
- Backlit digital display

ADDITIONAL INFO

- Shockproof protective sheath available as an accessory
- Compatible with the Data Logger Transfer module of the Dataview® software for:
  - data display
  - programming of recordings
  - automatic report export

CONTENTS

C.A 1821 and C.A 1822 delivered with:

- 1 carrying bag
- 3 x 1.5V LR6 batteries
- 1 USB cable
- 1 measurement report

SPECIFICATION

	C.A 1821	C.A 1822
Sensor	J, K, T, N, E, R or S thermocouple	
No. of inputs	1	2
Range	J: -210 to +1200 °C / -346 to +2192 °F K: -200 to +1372 °C / -328 to +2501 °F T: -250 to +400 °C / -418 to +752 °F N: -200 to +1300 °C / -328 to +2372 °F E: -150 to +950 °C / -238 to +1742 °F R: 0 to +1767 °C / 32 to +3212 °F S: 0 to +1767 °C / 32 to +3212 °F	
Resolution	Display in °C: θ < 1000 °C: 0.1°C and θ ≥ 1000 °C: 1°C Display in °F: θ < 1000 °F: 0.1°F and θ ≥ 1000 °F: 1°F	
Accuracy	(J, K, T, N, E) θ ≤ -100 °C ± (0.2 % R* +0.6 °C) - 100 °C < θ ≤ +100 °C ± (0.15 % R+0.6 °C) + 100 °C < θ ± (0.1 % R + 0.6 °C) (R, S) θ ≤ +100°C ± (0.15 % R +1.0 °C) +100°C < θ ± (0.1 % R +1.0 °C)	
Functions	Min., Max., HOLD, Alarms, Temperature Differential (C.A 1822)	
Recording	Manual start and stop on the product Programmed recording	
Alarms	Visual alert on threshold overrun settable via Data Logger Transfer Possibility of triggering recording on alarm threshold	
Data storage	More than 1 million points	
Power supply	- Alkaline batteries: 3 x 1.5V LR6 or rechargeable NiMH battery - Mains connection via mains adapter / micro USB (option)	
Battery life	1,000 hrs (portable mode) / 3 years of recording (one measurement every 15 minutes)	
Dimensions/ weight	150 x 72 x 32 mm / 260 g with batteries	
Protection	IP54 casing	
Operating temperature/ humidity	-10 to +60 ° C - 10 to 90 % RH	
Standards	IEC 61010-1 - IEC 61326-1	

CONTACT THERMOMETERS TEMPERATURE SENSORS

C.A 1823

Ref. : P01654823



STRENGTHS

- Pt100 and Pt1000 resistive sensors
- Recording of up to 1 million points
- Magnetized product compatible with MultiFix
- USB and Bluetooth communication
- Backlit digital display

SPECIFICATIONS

	C.A 1823
Sensor	Pt100 or Pt1000 sensor
No. of inputs	1
Range	-100 to +400 °C -148 to +752 °F
Resolution	Display in °C: 0.1°C Display in °F: 0.1°F
Accuracy	± (0.4 % R +0.3 °C)
Functions	Min., Max., HOLD, Alarms
Recording	Manual start and stop on the product Programmed recording
Alarms	Visual alert on threshold overrun settable via Data Logger Transfer Possibility of triggering recording on alarm threshold
Data storage	More than 1 million points
Power supply	- Alkaline batteries: 3 x 1.5V LR6 or rechargeable NiMH battery - Mains connection via mains adapter / micro USB (option)
Battery life	800 hrs (portable mode) / 3 years for recording (one measurement every 15 minutes)
Dimensions / weight	150 x 72 x 32 mm / 260 g with batteries
Ingress protection	IP54 casing
Operating temperature / humidity	-10 to +60 ° C - 10 to 90 % RH
Standards	IEC 61010-1 for 50 V voltages in category II - IEC 61326-1

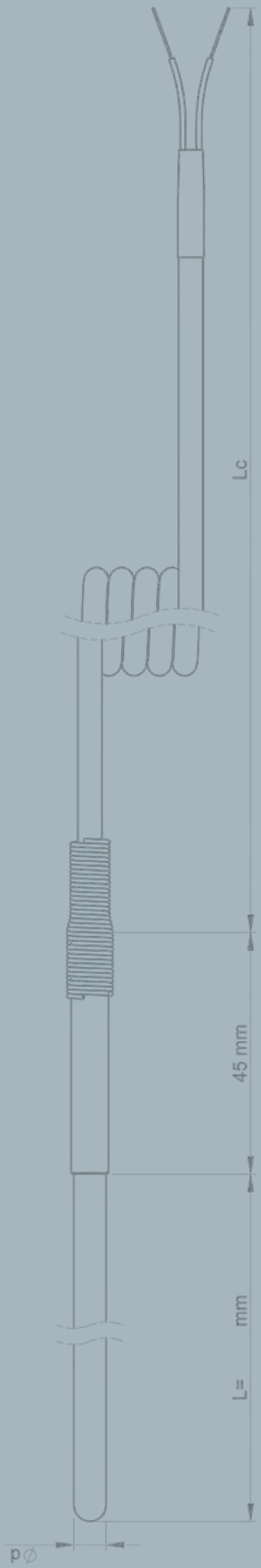
ADDITIONAL INFO

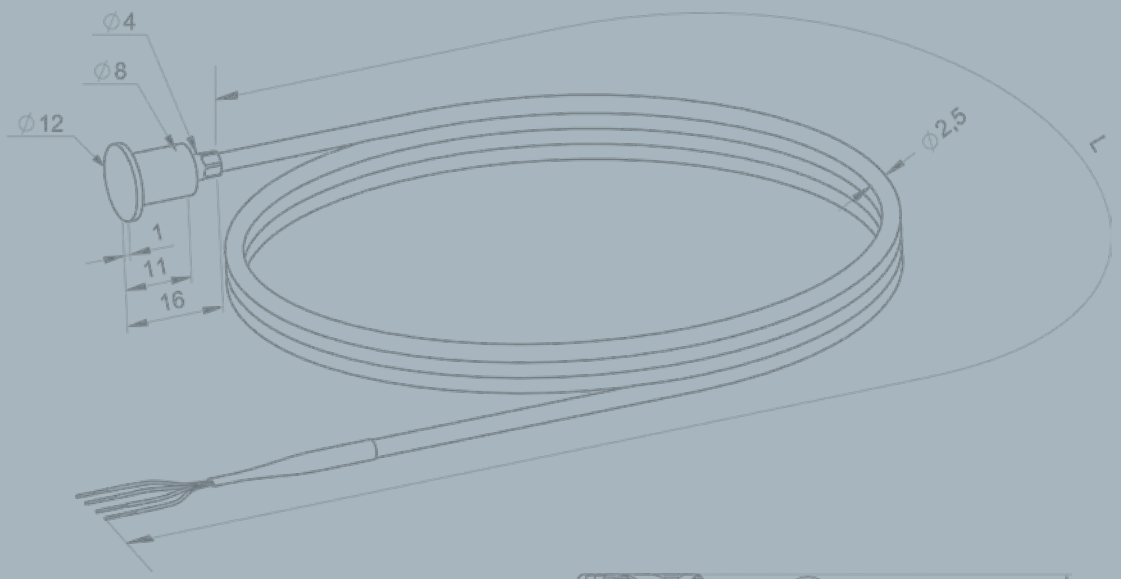
- Protective shockproof sheath available as an accessory
- Compatible with the Data Logger Transfer module of the Dataview® software for:
  - data display
  - programming of recordings
  - automatic report export

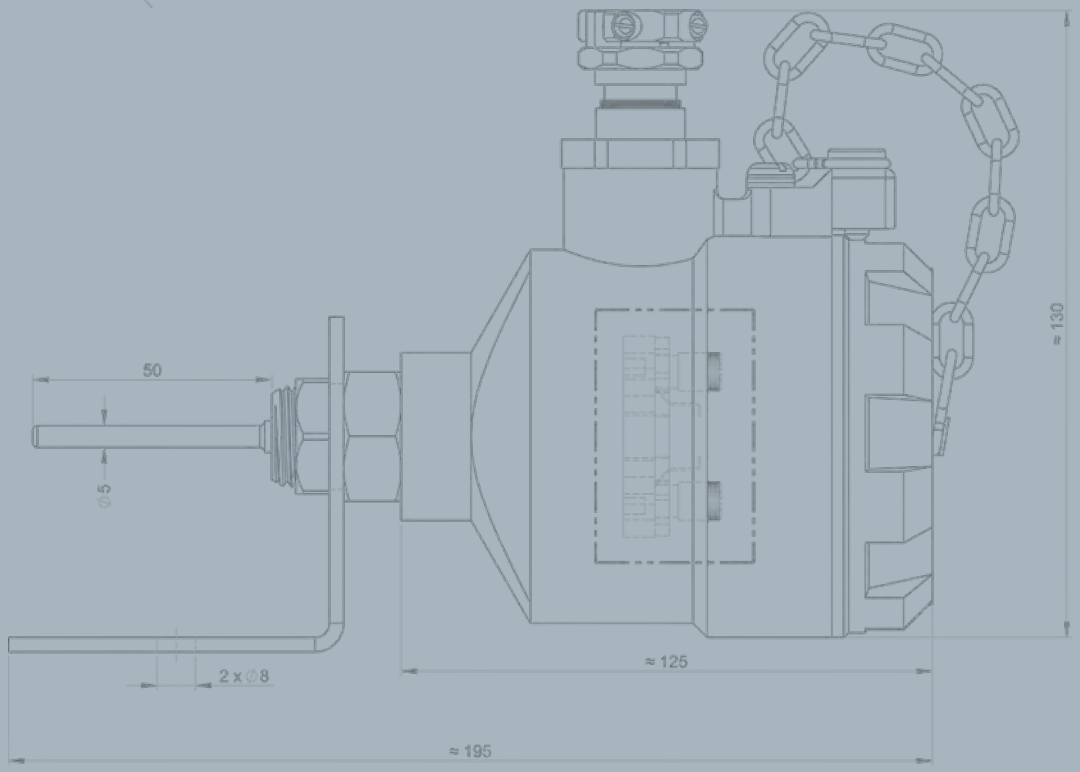
CONTENTS

C.A 1823 delivered with:

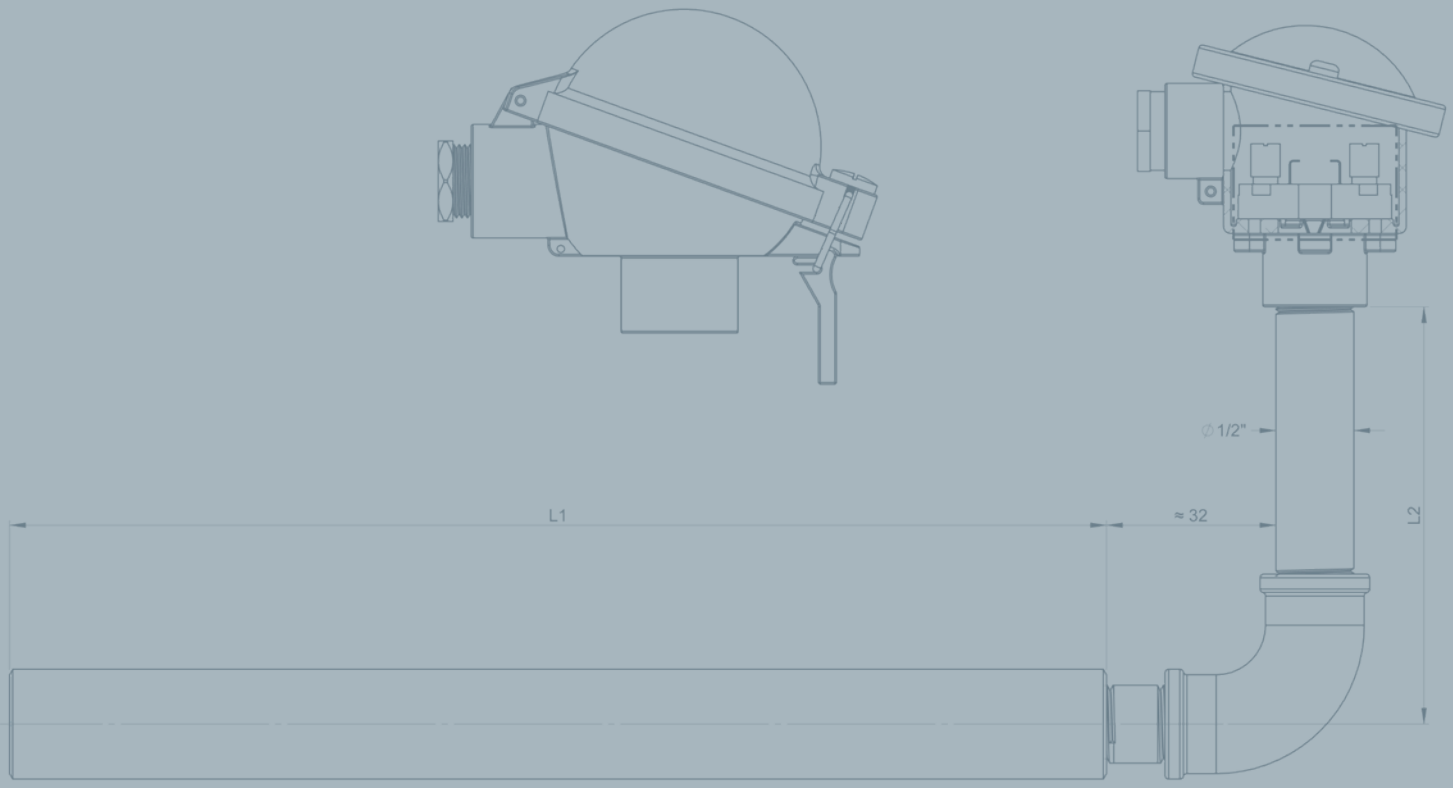
- 1 carrying bag
- 3 x 1.5V LR6 batteries
- 1 USB cable
- 1 measurement report







GLOSSARY


Ø 1/2"
L1
≈ 32
L2

GLOSSARY

Austenitic: Refers to the crystalline structure of the Series 300 stainless steels.

Carbide precipitation: The process by which chrome carbide forms by precipitation to transform into steel. The carbon atoms combine with the chrome atoms until the chrome is locally exhausted, thus reducing the chrome available to form a protective film of chrome oxide. This process allows localized intergranular corrosion by salts and acids. Carbide precipitation occurs when a stainless steel from the 300 Series is maintained at a temperature of approximately 800 ºF.

Carburizing environment: Contains carbon vapour (e.g. hydrocarbons). At high temperatures, carbon may react with the alloys to produce metal carbides. This reaction may lead to fragilization. Usually, an alloy's high nickel content enables it to withstand carburization, but without totally preventing it.

Cold junction (reference junction): Junction whose known temperature is used as a reference for the measurement (in theory: 0 °C, in practice: measured).

Compensation cable: Cable comprising conductors different from those in the thermocouple, but with thermoelectric characteristics such that the error resulting from their use is low in a given temperature range. Conventionally, the temperature to which the junctions between the thermocouple elements/compensation conductors will be exposed is limited to 200 °C, so that the electromotive force developed in the two compensation conductors is equal to that developed by the thermocouple at the same temperature.

Correspondence table: Table establishing the link between the sensor output indication and the value of the quantity to be measured. When the reference junction of a thermocouple is maintained at 0 °C, the electromotive force which it delivers when its measurement junction is raised to a temperature t is characteristic of the thermocouple and the temperature. For each type of thermocouple, emf/temperature correspondence tables are drawn up which enable users to deduce the temperature t of the emf measured or vice versa.

Corrosive environment: An environment containing oxygen which will react with metals at high temperature, causing the formation of oxides on the surface. For the alloys to withstand high temperatures, a stable protective oxide film must have formed on the surface. The presence of chrome and aluminium in an alloy helps to create an excellent protective film of chromium oxide and aluminium oxide.

Creep: At high temperatures, the mechanical resistance of metals may be reduced. Over time and if they are subjected to high temperatures, metals slowly expand when they are subjected to the constant pressure of the volume of a body and they break more easily than usual.

Dysfunction: Situation which exists when the equipment, protective systems and components do not fulfil their planned function and may generate an ignition source. A foreseeable dysfunction is one which we know through experience may occur during the product's life span. A rare dysfunction only occurs exceptionally.

Explosible atmosphere: Atmosphere which may become explosive.

Explosive atmosphere: Defined as a mixture of inflammable substances in the form of gas, vapour, mist or dust, etc.

- With air;
- In normal atmospheric conditions;
- In which, after ignition, combustion spreads to the whole of the unburned mixture.

Extension cable: Cable comprising conductors of the same type as the elements in the thermocouple and extending the thermocouple to the junction of reference.

Ferritic: Refers to the crystalline structure of the stainless steels in the 400 Series.

Hot junction (measurement junction): Junction located at the point where the temperature is measured.

Ignition source: Inherent to the instrument concerned, a specific feature whose activation represents a risk of ignition. A distinction must be made between the two concepts during the risk analysis. The possible ignition sources are listed in EN 1127-1. On a site transforming combustible materials, and in the presence of oxygen in the ambient air, the ignition source is the only element which can easily be eliminated to prevent an explosion. 13 ignition sources are identified in EN 1127-1.

Inert environments: An inert gas such as argon. The alloys are not a problem in this type of environment. Another variant of inert environments is the absence of any atmosphere at all, i.e. a vacuum. This type of environment is increasingly widely used for heat treatments.

Insulation resistance: Electrical resistance between the sensing element and the neighbouring conductive parts belonging either to the sensor itself or to its environment. Its value depends on the operating conditions, particularly the temperature.

Insulated thermocouple: Thermocouple in which the two elements are electrical isolated from one another outside the junction.

Interchangeability: Quality characterizing a sensor's ability to be replaced with another sensor without altering the performance of a measuring system.

International Temperature Scale (ITS): a is made between:

- the practical international Kelvin temperature: T90. Unit: the Kelvin, symbol: K
- the practical international Celsius temperature: t90.

Unit: degree Celsius, symbol: °C

These two temperatures are linked by the equation:

t90 = T90 – 273.16 K

The Kelvin is also equal to 1/273.16 of the thermodynamic temperature of water's triple point.

ITS 90 is based on the temperature values assigned to a certain number of reproducible equilibrium states (fixed points) and on the specified instruments calibrated at these temperatures. Interpolation between the fixed-point temperatures is performed by means of formulae used to establish the relation between the indications on these instruments and the International Temperature Scale values.

Joule effect: Any conductor in which an electric current flows is subject to heating via what is called the Joule effect.

Law of resistance/temperature variation: The fundamental values of the platinum measurement resistors in the 0 to 850°C and –200 to 0°C operating ranges are determined on the basis of the following interpolation functions (values based on ITS 90):

R(t)-R0 (1 + At + Bt2) from 0 °C to 850 °C

R(t) = R0 [1 + At + Bt2 + Ct3 (t-100)] from -200 °C to 0 °C

A = 3.9083 x 10-3 °C-1

B = - 5.775 x 10-7 °C-2

C = - 4.183 x 10-12 °C-3

Measurement chain: The measurement of a physical quantity implies not only the use of a sensor, but also the use of a measuring instrument. The measurement chain is a series of transducers and measuring instrument connection systems placed between the sensor - the first element in the chain - and the indicator system which is the last element (or the measurement transducer).

Measurement range: Algebraic difference between the extreme values of the quantity to be measured for which the rated metrological characteristics of the sensor remain guaranteed. The units are those of the quantity to be measured.

Normal operation: Situation which exists when the equipment, protective systems and components fulfil their planned function in the context of their design parameters. Small leaks may be part of normal operation. Failures requiring repairs or shutdown are not considered to be part of normal operation.

Passivation: This involves plunging 300 Series stainless steel into 10 % citric acid for 10 to 30 minutes. The acid removes the iron particles which may have been incorporated into the surface during treatment, but does not attack the stainless steel. Indeed, as this acid is highly oxidizing, the chrome oxide film is reinforced, thus increasing the steel's corrosion withstand.

Reducing environment: Contains hydrogen in carbon compounds and does not form a protective oxide film on alloys. In the presence of hydrogen, it may spread to the thermowells and thermocouples. This propagation causes the formation of "green rot", which takes its name from the dark green colour of its surface. This type of attack is not always simple to detect, however. In the case of chrome-alumel thermocouples, green rot magnetizes the chrome-plated wire, making the measurements false. This effect is easy to check on with a magnet: if the two wires are magnetic, green rot has formed (in reality, this phenomenon is not found only in totally "reducing" environments. It only occurs in the presence of a small amount of hydrogen in a mainly reducing environment. When these conditions are present, there is preferential oxidation of the chrome contained in the alloy).

Repeatability error: For each value of the quantity to be measured, there are two values of the sensor indication, depending on whether this value was reached by increasing or decreasing variation. The repeatability error is equal to the maximum deviation observed on these two values in the measurement range.

Reproducibility: Quality characterizing the ability of a sensor to provide indications which agree for a given value of the quantity measured, without taking the systematic errors into consideration.

Resistivity: At a constant temperature, the resistivity of a metal conductor of given length and cross-section is a specific characteristics of the material and depends on its type. It is expressed in ohm-metre.

$\rho = R \times S / L$

ρ = resistivity of the material (Ω.m)

R = resistance measured (Ω)

S = conductor cross-section (m2)

L = conductor length (m)

Resolution: Smallest perceptible variation of the information provided by a measuring instrument in the conditions of reference. For a resistance thermometer, the resolution is the limit towards which the ratio ΔR tends when Δt tends towards 0.

Response deviation: For a given value of the quantity to be measured, the response deviation is the difference between the sensor output indication and the conventionally true value provided by the correspondence table, a standard or a theoretical law.

Seebeck effect (or thermoelectric effect): The term "Seebeck effect" is used to refer to the phenomenon by means of which an electric current is generated in a circuit comprising two conductors of different types whose junctions are placed at two different temperatures.

Self-heating: Specific heating of the temperature sensor under the effect of the current flowing in it. This quantity, which depends on the conditions of use and, more particularly, the features of the surrounding environment. Expressed in degrees per Watt: °C.W-1

Self-heating coefficient: If a current of known intensity flows through a sensing element whose resistance is R, the power ($P = R.I2$) produced by the Joule effect raises the temperature by Δt; the self-heating coefficient is then defined as $K = \Delta t / P$

K is expressed in degrees per Watt: °C.W-1

Sensitivity: For a given value of the quantity measured, the sensitivity is expressed by the quotient of the increase in the variable observed divided by the corresponding increase of the value measured: $\Delta R / \Delta t$ For a thermocouple: $\Delta E / \Delta t$

Sensor: Part of a measuring instrument used to acquire information concerning the quantity to be measured, comprising the proof body (if there is one) and the sensing element which translates the value measured.

Sheathed thermocouple: Thermocouple bedded in a mineral insulant compressed inside a leak-tight, bendable metal sheath.

Stabilized carbide: To reduce the probability of carbon precipitation, some stainless steels in the 300 Series are stabilized with a small amount of titanium, tantalum or niobium which combines preferentially with the carbon, thus separating the chrome. This result can also be obtained with low-carbon stainless steels which contain less carbon for combination with the chrome.

Stress corrosion: When a metal is subjected to the joint action of a mechanical stress through tension and an aggressive environment, the metal may fissure. Stress corrosion fissures are frequent in the presence of chlorides.

Stress-relieving annealing: A type of heat treatment used to reduce the internal stresses in order to prevent the appearance of fissures due to stress corrosion.

Sulphurizing environment: Contains sulphide compounds which are often produced when burning coal or fuel oil. The sulphide may be present as sulphur dioxide, as is the case in oxidizing environments, or as hydrogen sulphide (H2S), in reducing atmospheres. The latter is less suited because the environment does not help with the formation of a protective film of oxide. Alloys which contain nickel (nearly all the alloys

currently used at high temperatures) are subject to attack by sulphides because the melting point of sulphur is low when the alloy contains nickel. Alloys with a high chrome content (more than 18 %) which contain aluminium form a sulphur-resistant oxide film in oxidizing environments.

Temperature: By uniting two identical bodies at the same temperature, we obtain a new body whose mass and volume have doubled, but whose temperature remains unchanged. Although it is possible to define the equality of two temperatures, it is not possible to define their addition. Temperature is not therefore a measurable quantity in the strict sense of the term, but is only identifiable. In terms of thermodynamics, it is possible to specify what the "temperature" quantity, which can be defined by means of Carnot's principle, represents. In these conditions, the "thermodynamic temperature" is expressed according to a unit of the property considered, rather than according to a scale.

Temperature coefficient: Mean value of the resistance variation between 0 and 100°C, given by the following equation: α 100 = (R100 – R0) / 100 x R0, where R0 and R100 are the resistance values at 0 and 100 °C, respectively; α is expressed in °C-1

Temperature measurement assembly (or pyrometer assembly): Assembly comprising the sensing element (thermometric resistor or thermocouple), its electrical insulation and, if relevant, its shielding and protection. A temperature measurement assembly is equipped with electrical connection systems (connectors, junctions, terminals, etc.) and mechanical fastening elements.

Thermal insulation: Heat is transmitted from one material to another by conduction, convection and/or radiation. Insulators are used to minimize these heat transfers.

Thermocouple: Assembly comprising two homogeneous conductors of different types, connected at their tips and developing an electromotive force due to the Seebeck effect which depends on the temperatures of their junctions. In practice, a thermocouple comprises two conductor elements connected at one of their ends, with the two other ends connected to a measuring instrument.

Time constant: The sensor's response at a given temperature level can usually be assimilated to an exponential law with the form:

$S(t) = S1 + (S2 - S1)(1 - \exp(-t/\tau))$

S (t): sensor output indication

S1 sensor output indication corresponding to the initial temperature value

S2 sensor output indication corresponding to the final temperature value

τ time constant

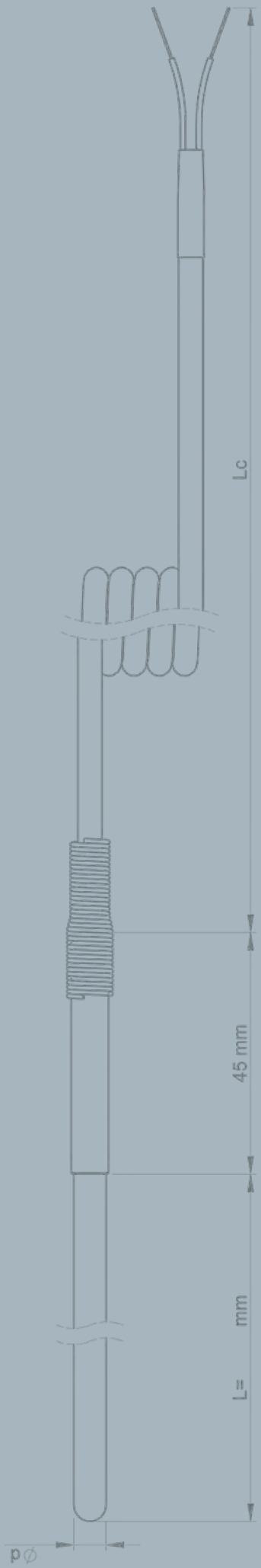
The time constant is the 63% measurement response time where the sensor reaction time is negligible.

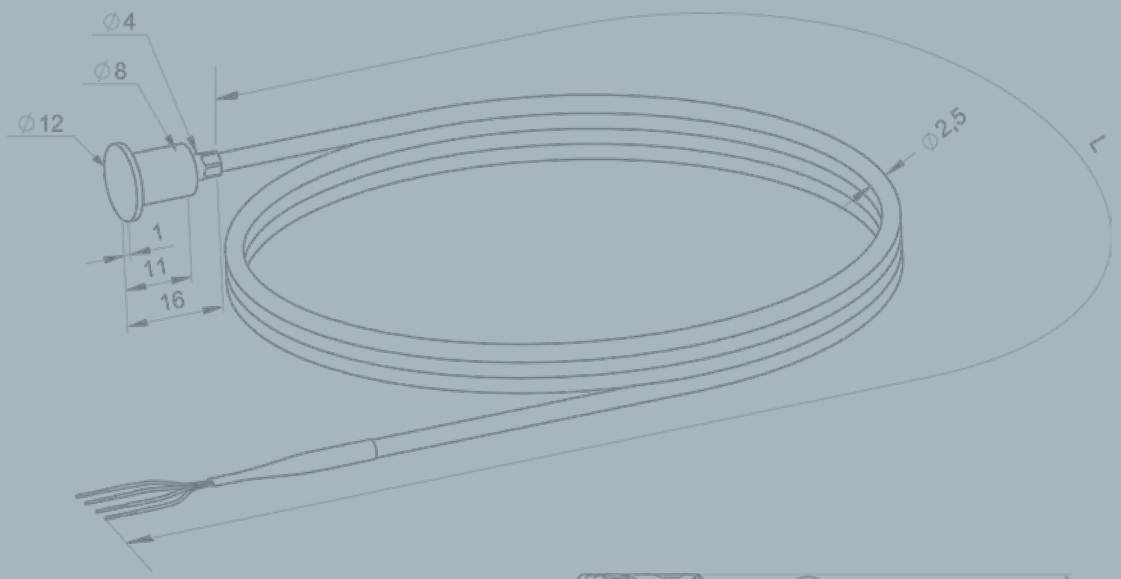
Transfer by conduction: Conduction occurs when materials, particularly solids, are directly in contact. Conduction is an energy transfer (heat transfer) from the hottest particles to the coldest.

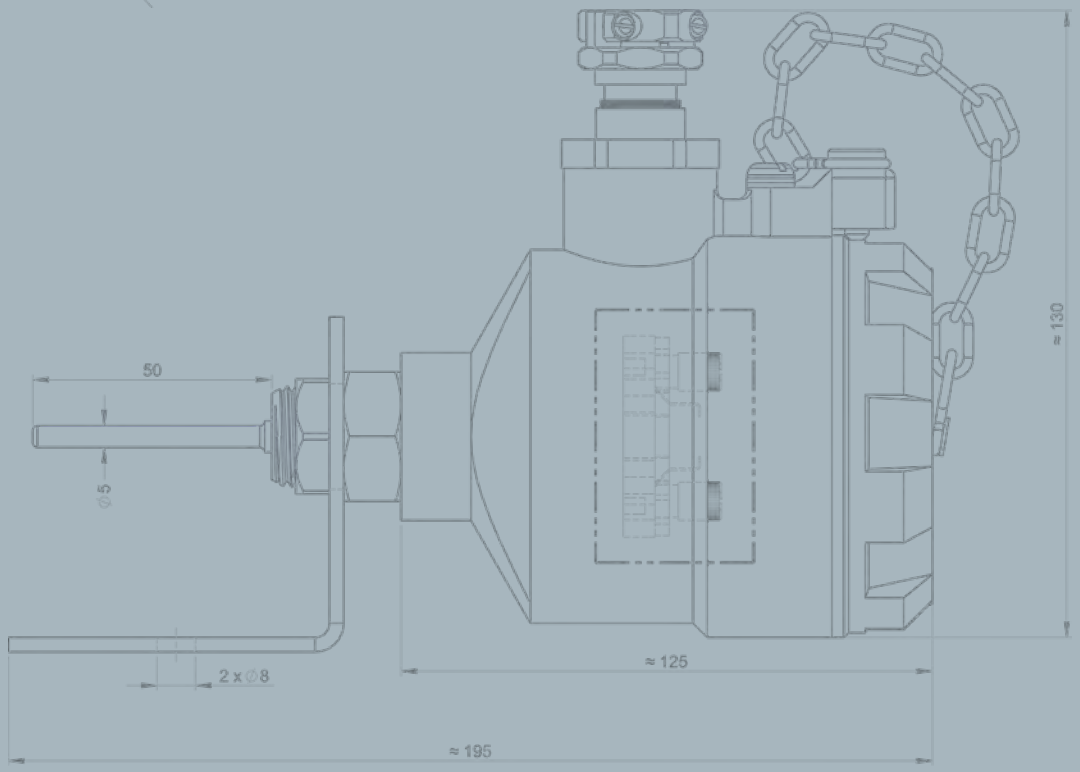
Transfer by convection: Convection is a heat transfer which occurs in fluids (and gases) in movement. Convection concerns the energy transfer due to particle-to-particle interaction in the moving fluid.

Transfer by radiation: Hot and even lukewarm objects emit infrared electromagnetic radiation which may heat other remote objects, while losing their own energy. The use of reflective materials usually provides insulation against heat transfer by radiation.

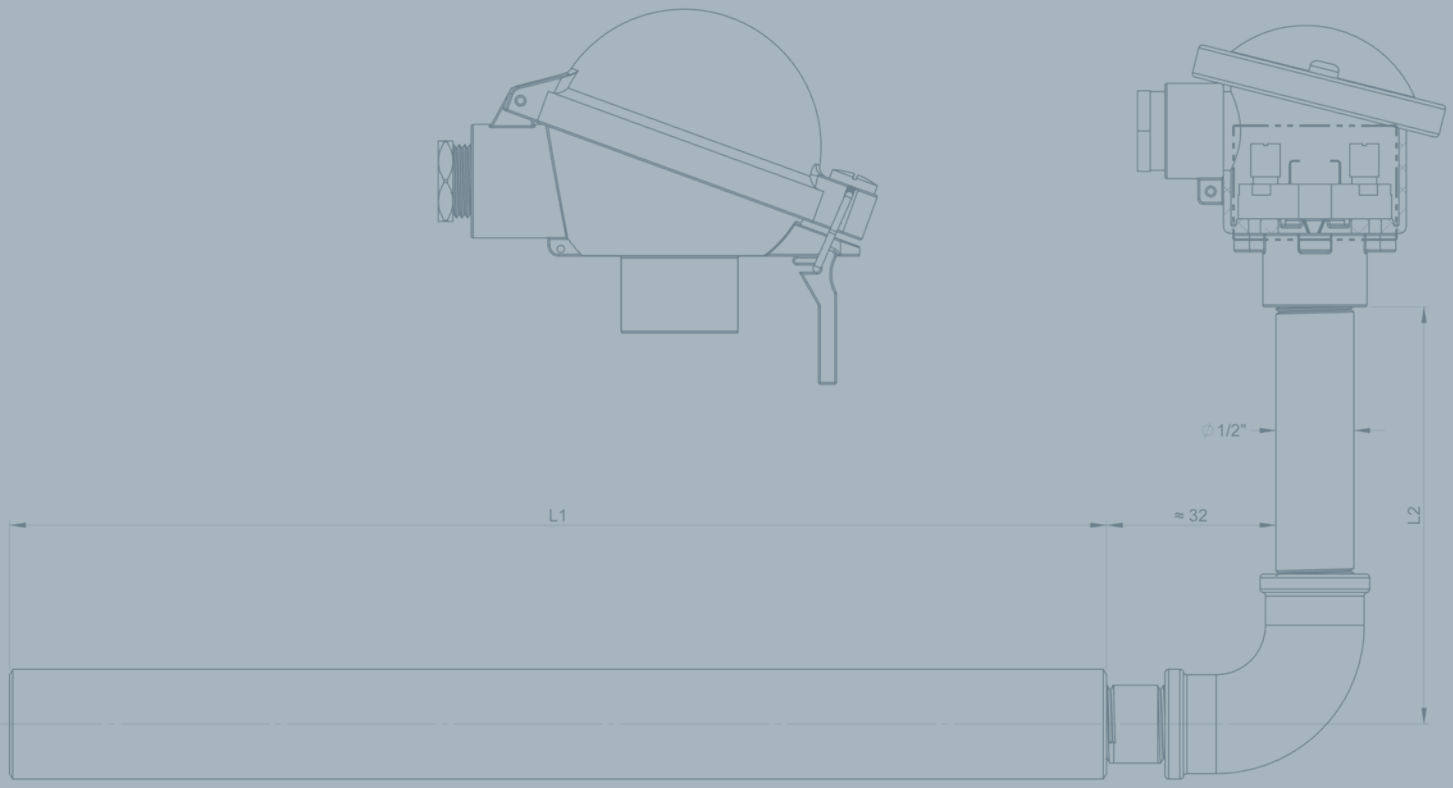
Weld disintegration: Corrosion caused by localized carbide precipitation on either side of the weld.







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≈ 32
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