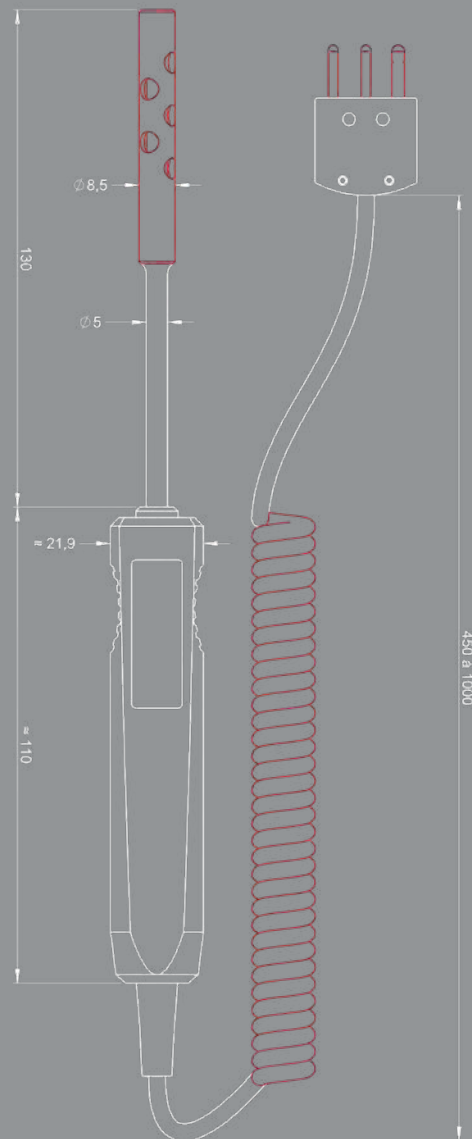
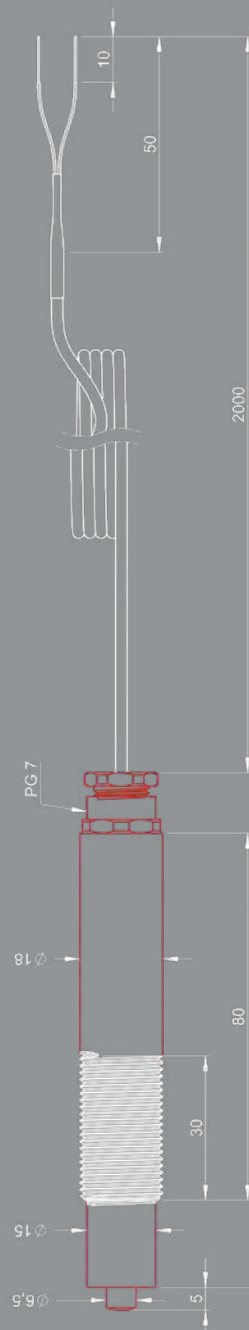
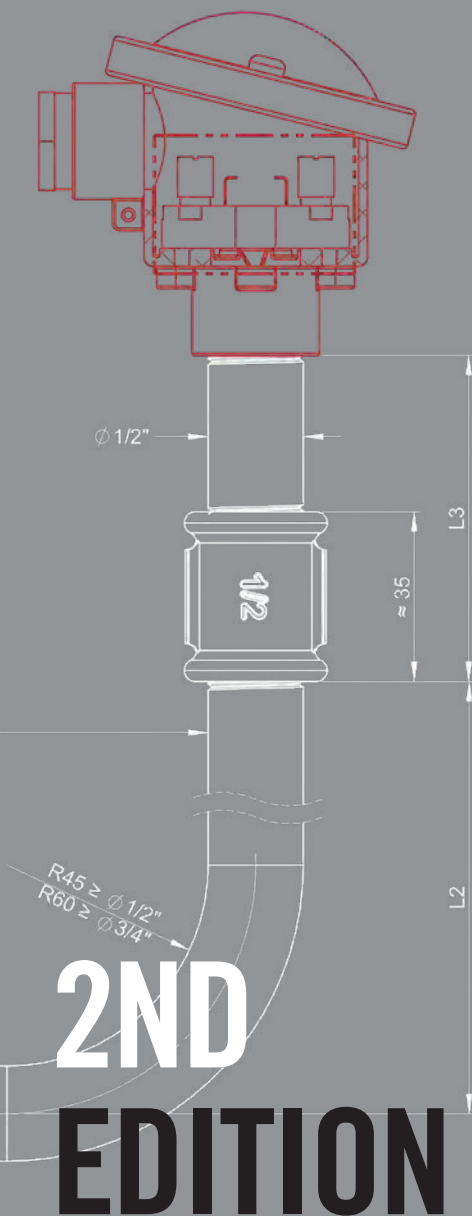


SENSORS CATALOGUE

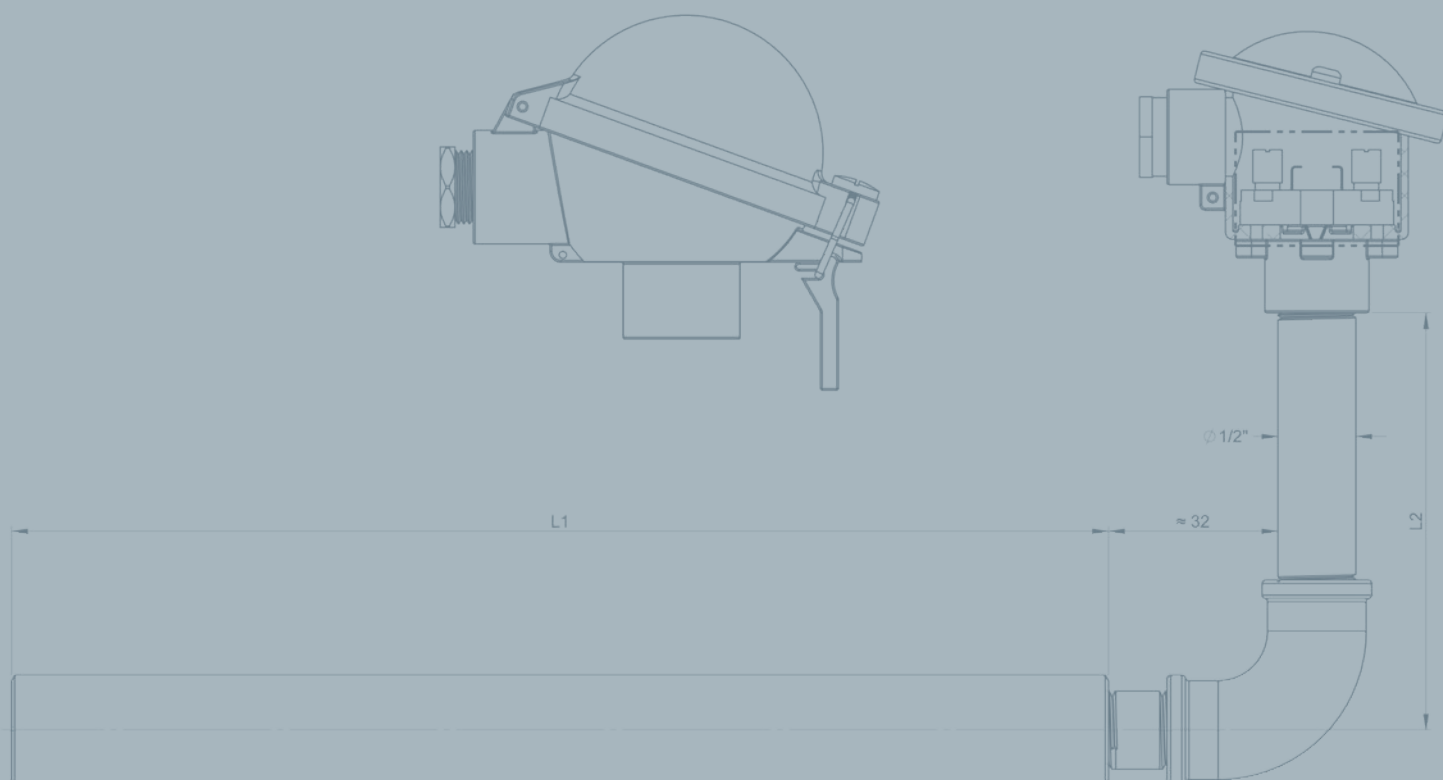
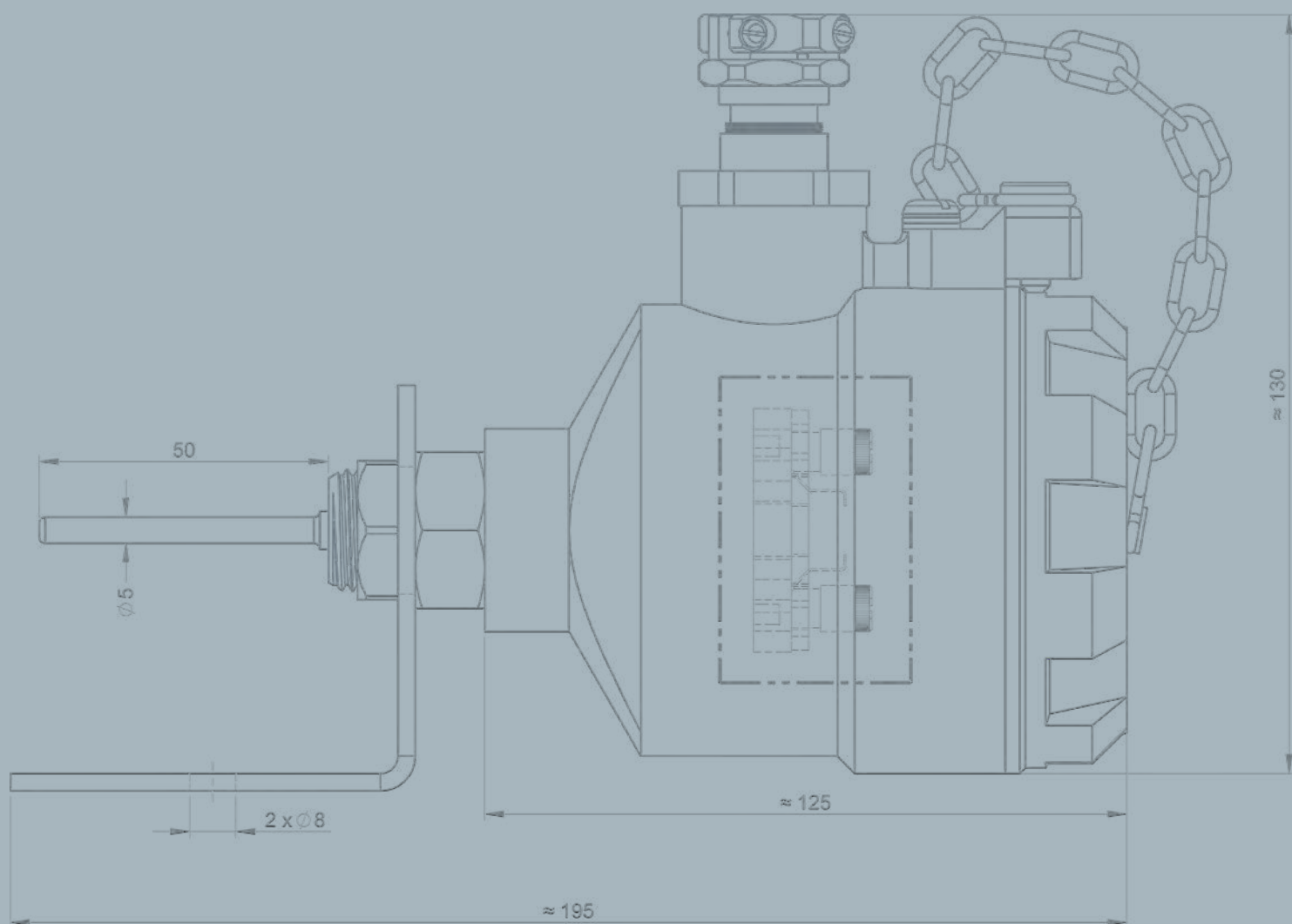
TEMPERATURE MEASUREMENT IN INDUSTRIAL ENVIRONNEMENTS



**2ND
EDITION**

Measure up





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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**
- **1,000 staff**
- **8 production sites**
- **10 subsidiaries all over the world**
- **6 R&D teams worldwide**
- **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.



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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.



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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...



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®



**COMPLETE
MASTERY
OF THE THERMAL
PROCESS CHAIN**

1

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5

SOLUTION FOR EACH REQUIREMENT

SIGNAL PROCESSING

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



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.



POWER CONTROL

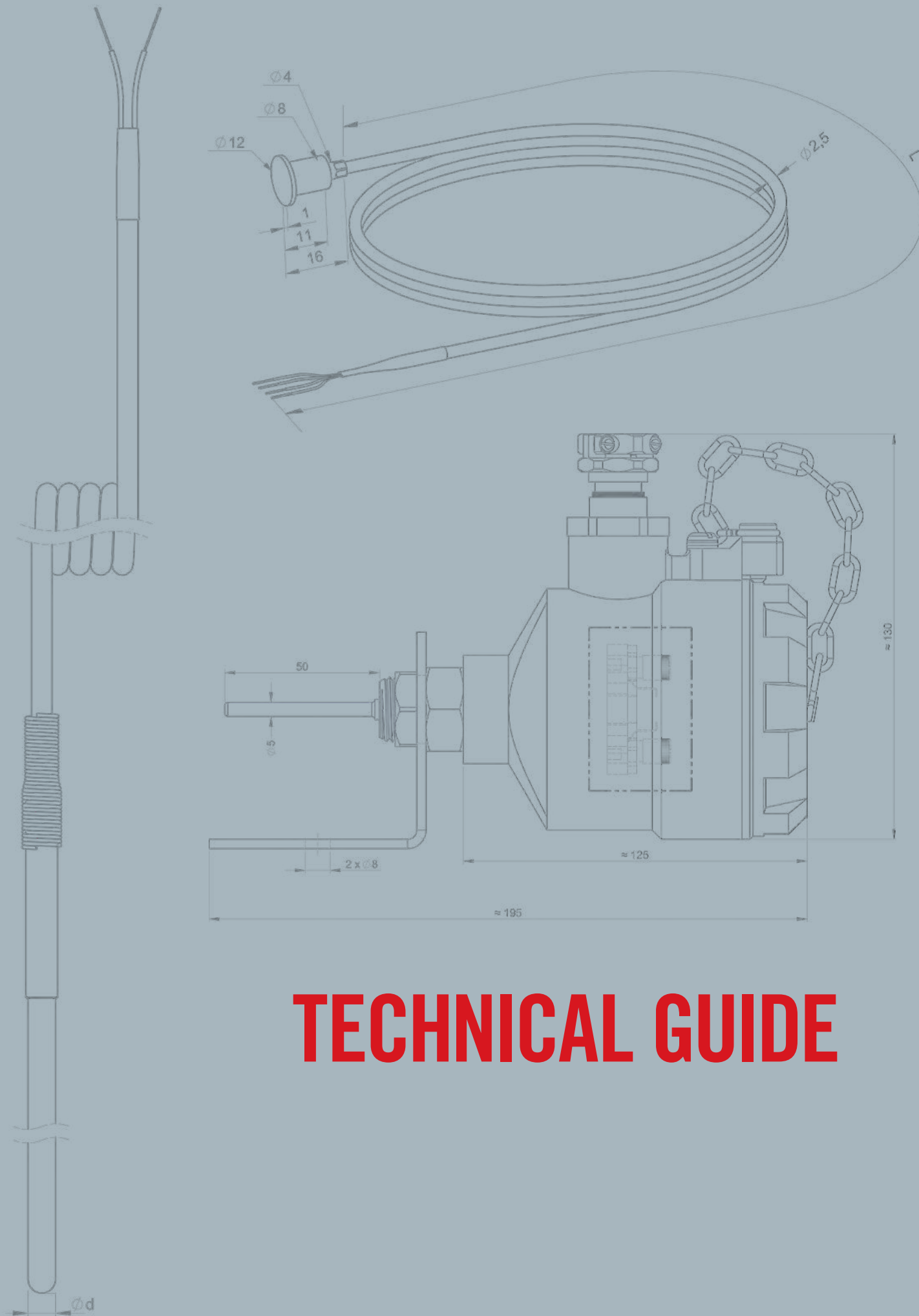
- Thyritop range of single-phase, bi-phase or three-phase thyristor power controllers from 15 A to 600 A for resistive and inductive loads.
- Training and commissioning services: "Control process".



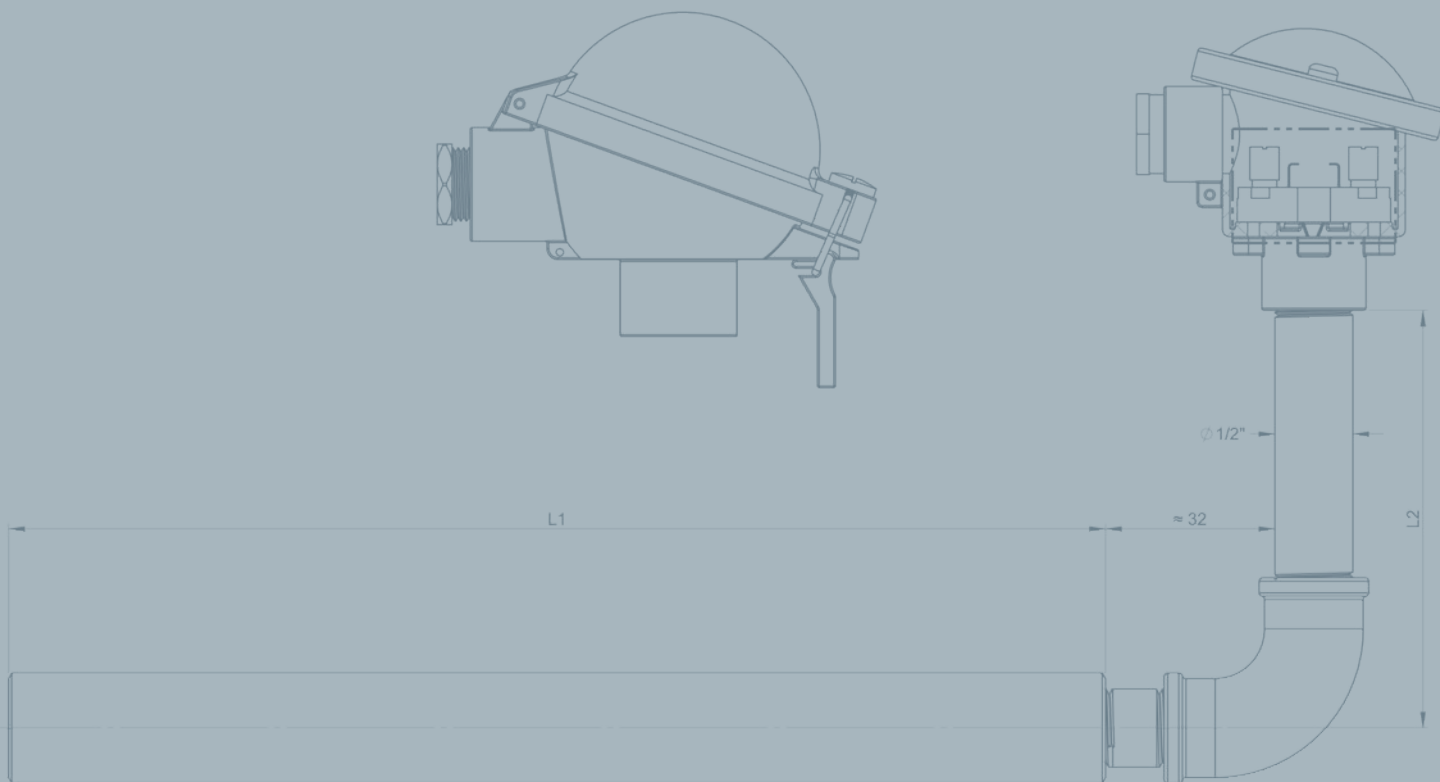
SUPERVISION

- 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.
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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.

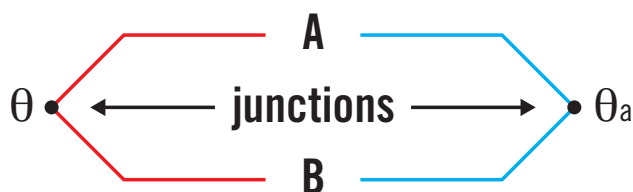
B - THERMOCOUPLES

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:

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

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

T_{ref} : temperature of the cold junction

S_{ab} : 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

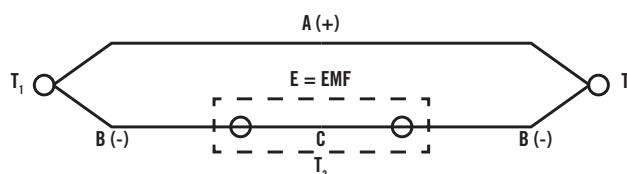
The following 3 laws are derived from these 3 principles

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

Law of intermediate metals:

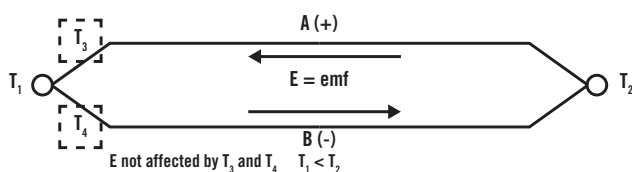
This law stipulates that a metal (a conductor of a different type) added to the thermocouple circuit has no effect on the emf produced, as long as the junctions of the metal added to the other metals are at the same temperature.

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 T_1 , while the other is kept at T_2 , the emf effect produced is independent and not affected by the temperature distribution along the wires T_3 and T_4 .



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 $2,000^{\circ}\text{C}$) 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. The most widespread are:

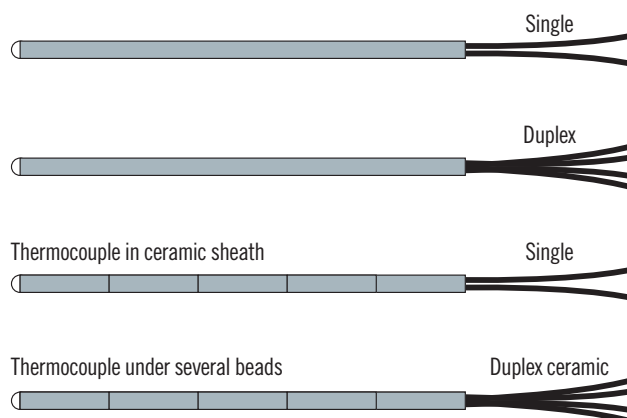
- Bare-wire thermocouples
- Thermocouples with mineral insulation

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.

| INSULATION | FORMULA | MELTING POINT | MAX. TEMP. IN OXIDIZING ENVIRONMENT | RES. TO THERMAL SHOCKS | STABILITY | | | | |
|-------------------|--------------------------------|---------------|-------------------------------------|------------------------|---------------|--------------|-------------|------------|--------------|
| | | | | | 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:

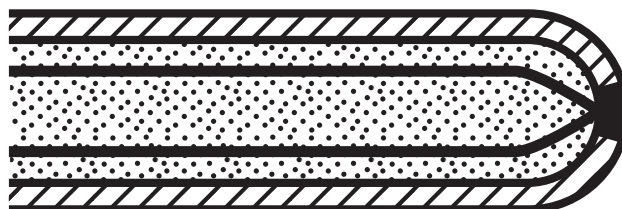
- Exposed hot junction
- Earthed hot junction
- Insulated hot junction

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).

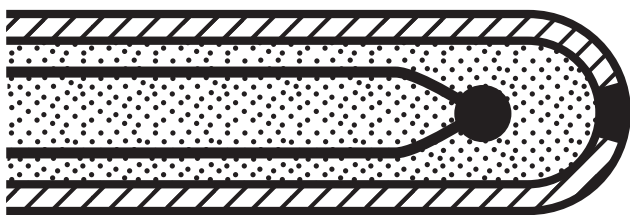
Earthed hot junction:

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:

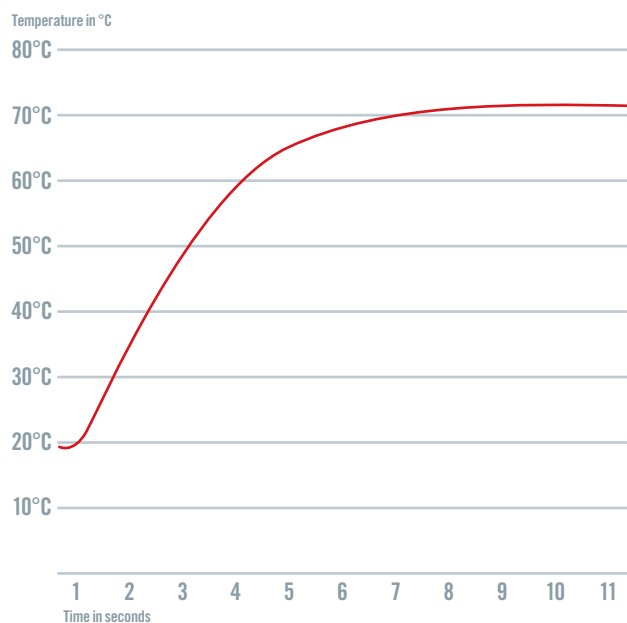
In this assembly, the hot junction and the sheath of the sheathed thermocouple are insulated by mineral insulation. This type of junction will be chosen if the thermocouple is used in an industrial environment. Indeed, without insulation, there may be electrical disturbances which interfere with the 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 Part 1: Specifications and tolerances regarding emf
thermo-electric couples 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 | | | | | | | ASTM E988 |
|--------|----------------------|--------|--------|--------|--------|--------|--------|---------------|
| | IEC 584 | | | | | | | |
| | 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 (\pm °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 |
| N | 6 | Inconel 600 | 1000 |
| | 8 | | 1050 |
| | 1.5 | | 650 |
| | 2 | | 700 |
| | 3 | | 750 |
| | 4.5 | | 800 |
| | 6 | Pyrosil | 1000 |
| | 3 | | 1070 |
| | 4.5 | | 1150 |
| | 6 | | 1150 |
| S | 8 | | 1150 |
| | 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):

$$R(t) = R_0 (1 + At + Bt^2) \quad \text{from } 0^\circ\text{C to } 850^\circ\text{C}$$

$$R(t) = R_0 [1 + At + Bt^2 + Ct^3 (t-100)] \quad \text{from } -200^\circ\text{C to } 0^\circ\text{C}$$

$$A = 3.9083 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$$

$$B = -5.775 \times 10^{-7} \text{ } ^\circ\text{C}^{-2}$$

$$C = -4.183 \times 10^{-12} \text{ } ^\circ\text{C}^{-3}$$

Two different technologies are used:

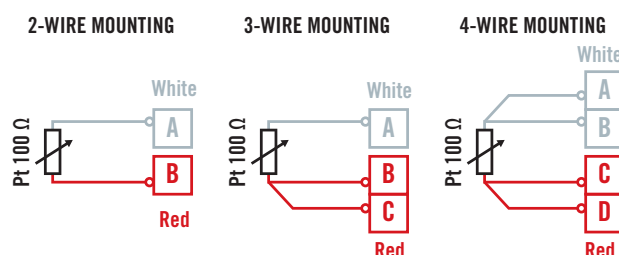
- **resistors made of platinum wire wound on an insulating support.** In most cases, this support is ceramic, but glass supports are also used. The operating ranges extend up to 450 °C, and exceptionally up to 850 °C.

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:

$$R = R_0 \times L / S$$

where R_0 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 17×10^{-9} ohms/metre.

If you use a copper cable with two conductors whose cross-section is 0.25 mm^2 and whose length is 1 metre to hook up the Pt100, the resistance will be:

$$R = 17 \times 10^{-9} \times 1 / 0.25 \times 10^{-6} = 0.068 \text{ ohm per conductor.}$$

The total resistance will be 0.136 ohm.

As it is known that the resistance of a Pt100 varies by $0.3851 \text{ ohm}/^\circ\text{C}$, 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

| $^\circ\text{C ITS 90}$ | Ω | $^\circ\text{C ITS 90}$ | Ω | $^\circ\text{C ITS 90}$ | Ω | $^\circ\text{C ITS 90}$ | Ω | $^\circ\text{C ITS 90}$ | 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 | $0.15 + 0.002 \times [t]$ |
| B | $0.3 + 0.005 \times [t]$ |

[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: $0.1 + 0.0017 \times t$

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 °C. 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 °C. 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 °C. The maximum air temperature which SS 310 steel can withstand in continuous operation is 1,150 °C. 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 °C. The maximum air temperature which it can withstand is 900°C. 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 it 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 | TRANSMITTER SCALE | OPTIONS |
| TCG | 5 | 2 | 1J | CM | 6 | 500 | I | A | 0-600° | 2 |
| <div>Reference in table and diagram</div> <div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div> </div> | | | | | | | | | | |
| <div>Possible choice</div> <div> <div>None: 5</div> <div>DAN : 2</div> <div>1T</div> <div>316L : AC</div> <div>4,5</div> <div>100 à 30000</div> <div>Insulated: I (standard)</div> <div>LC5334A-100 : A</div> <div>IP65 : 1</div> </div> <div> <div>With extension and G1/2" connector: 6</div> <div>With G1/2" connector under head: 9</div> <div>1J</div> <div>INCONEL600 : CM</div> <div>6</div> <div></div> <div>Earthed: M</div> <div>LC5331A-321 : B</div> <div>Epoxy : 2</div> </div> <div> <div></div> <div></div> <div>1K</div> <div>PYROSIL : DB</div> <div>8</div> <div></div> <div></div> <div>LC5335A-100 : C</div> <div>IP65 + epoxy : 3</div> </div> <div> <div></div> <div></div> <div>1N</div> <div></div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div></div> <div></div> <div>2K</div> <div></div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div></div> <div></div> <div>2J</div> <div></div> <div></div> <div></div> <div></div> <div></div> </div> | | | | | | | | | | |

DIAGRAM

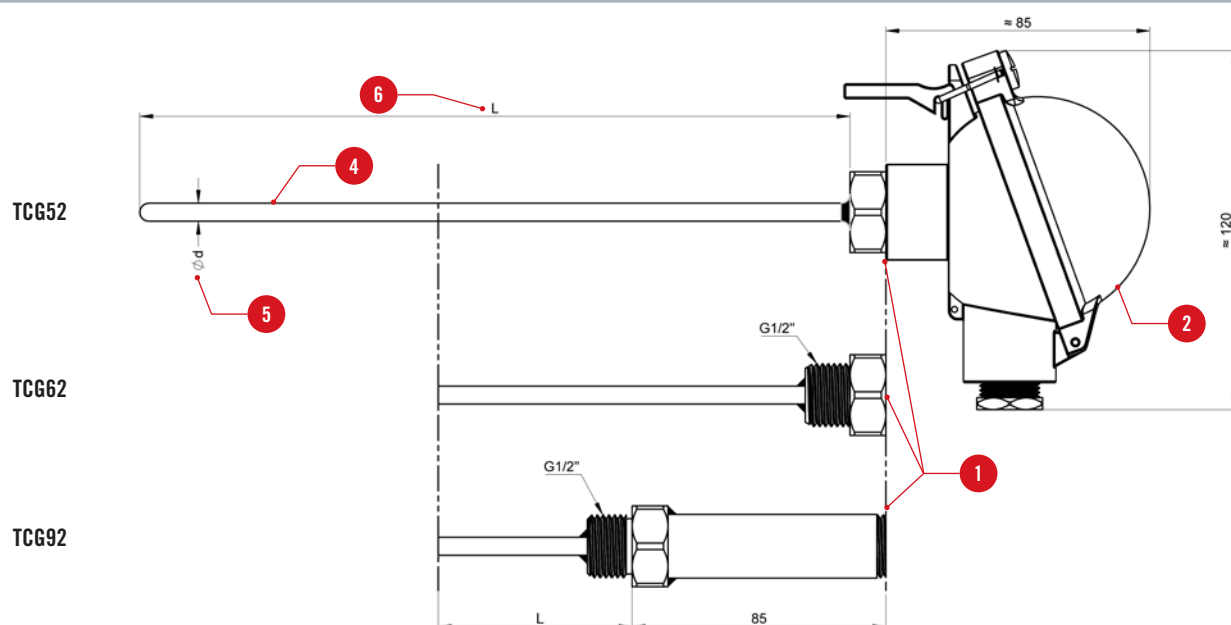


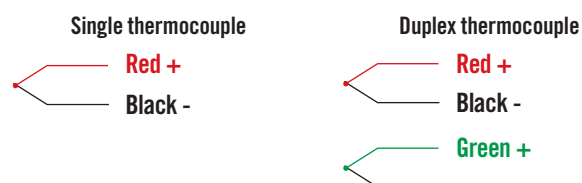
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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 |

TRANSMITTER (NOT COMPATIBLE FOR DUPLEX)

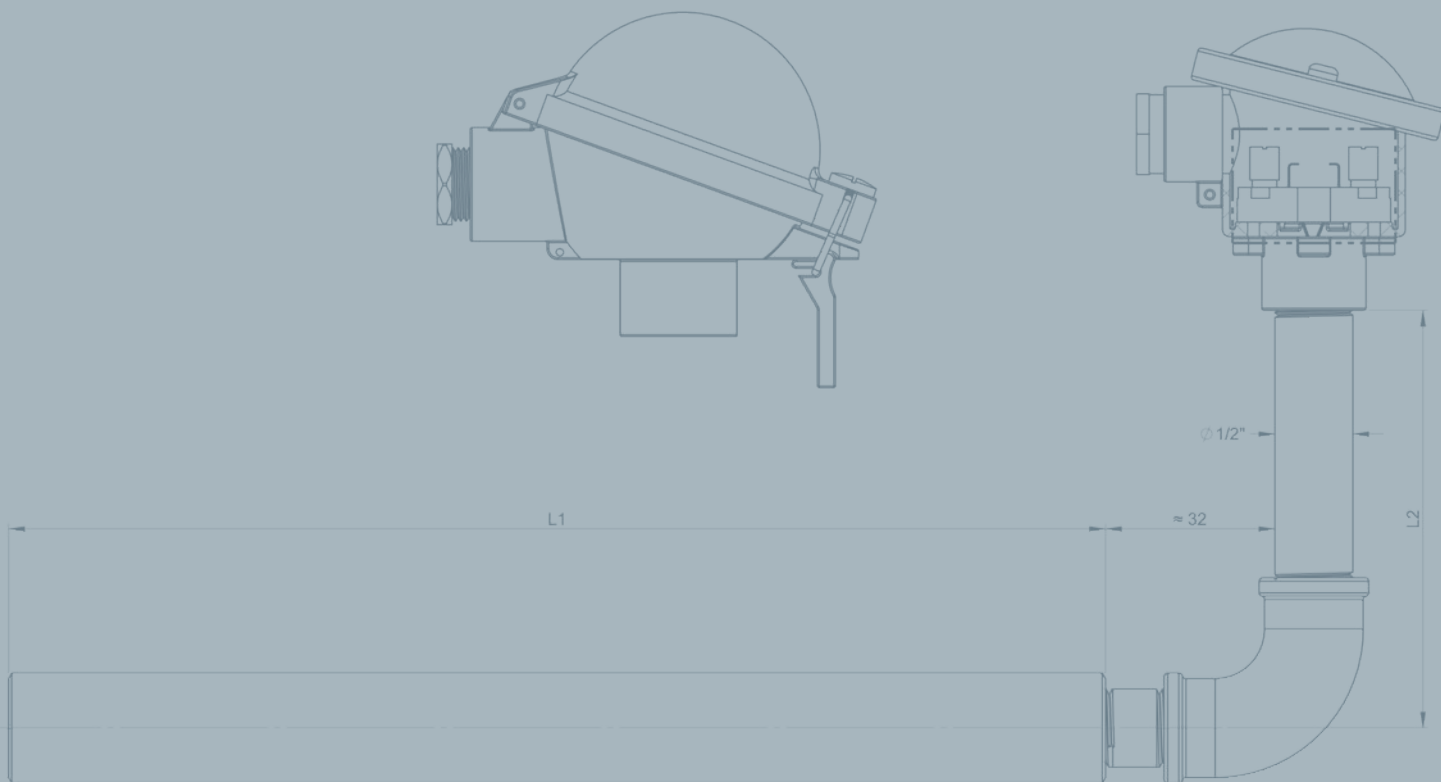
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1,5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1,5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1,5kV | LC5335A-100 |

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 $+450\text{ °C}$ for resistance sensors and -40 °C to $+1,500\text{ °C}$ 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-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 | -40 to 90°C | 0.07 | Comparison with a standard reference platinum resistance thermometer. |
| Measurement line (resistance probe) | 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 | $\varnothing \leq 10\text{mm}$ | $L \geq 150\text{mm}$ |
| Thermostatted bath | 90 to 300°C | $\varnothing \leq 14\text{mm}$ | $L \geq 150\text{mm}$ |
| Fluidized bath | 300 to 450°C | $\varnothing \leq 11\text{mm}$ | $L \geq 350\text{mm}$ |
| Oven | 450 to 1200°C | $\varnothing \leq 8\text{mm}$ | $L \geq 350\text{mm}$ |
| Oven | 500°C to 800°C | $\varnothing \leq 8\text{mm}$ | $L \geq 400\text{mm}$ |
| Oven | 800 to 1500°C | $\varnothing \leq 8\text{mm}$ | $L \geq 650\text{mm}$ |

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 $\geq 90^\circ$.

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)



UNCERTAINTY OF THE LABORATORY

| Item calibrated | Measurement range | Calibration uncertainty | Method and means |
|-------------------------------------|-------------------|-------------------------|---|
| Platinum resistance probe | -40 to 90°C | 0.07 | Comparison with a standard reference platinum resistance thermometer. |
| Measurement line (resistance probe) | 90 to 450°C | 0.12 | |
| | -40 to 290°C | 0.30 | |
| Thermocouple | 290 to 450°C | 0.56 | Comparison with a standard reference S thermocouple. |
| Measurement line (thermocouple) | 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 | $\varnothing \leq 10\text{mm}$ | $L \geq 150\text{mm}$ |
| Thermostatted bath | 90 to 300°C | $\varnothing \leq 14\text{mm}$ | $L \geq 150\text{mm}$ |
| Fluidized bath | 300 to 450°C | $\varnothing \leq 11\text{mm}$ | $L \geq 350\text{mm}$ |
| Oven | 450 to 1200°C | $\varnothing \leq 8\text{mm}$ | $L \geq 350\text{mm}$ |
| Oven | 500°C to 800°C | $\varnothing \leq 8\text{mm}$ | $L \geq 400\text{mm}$ |
| Oven | 800 to 1500°C | $\varnothing \leq 8\text{mm}$ | $L \geq 650\text{mm}$ |

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 $\geq 90^\circ$.



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!

Pyrocontrol'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.

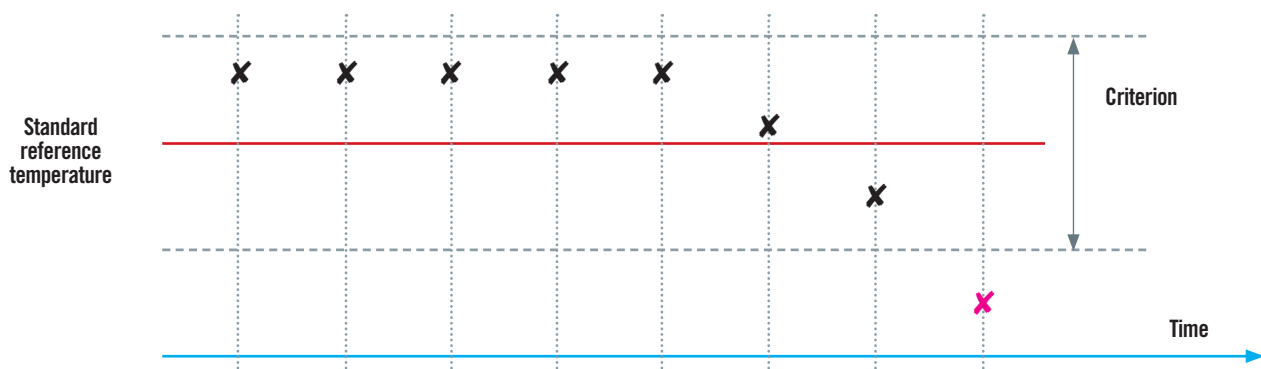


* Patent filed: no. 0213616

- 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

Pyrocontrol 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.





ETR

PT100 & THERMOCOUPLE

CLASS
A

IEC
60751

NF EN
60584-1



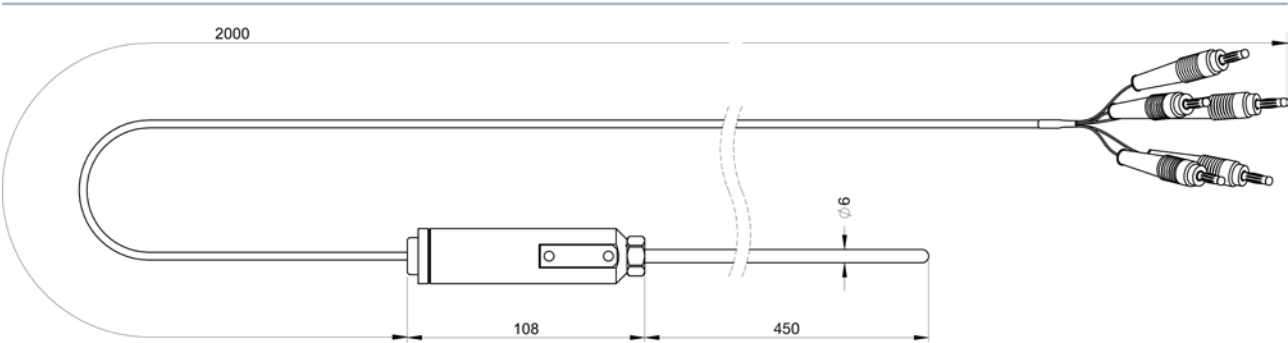
DESCRIPTION

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

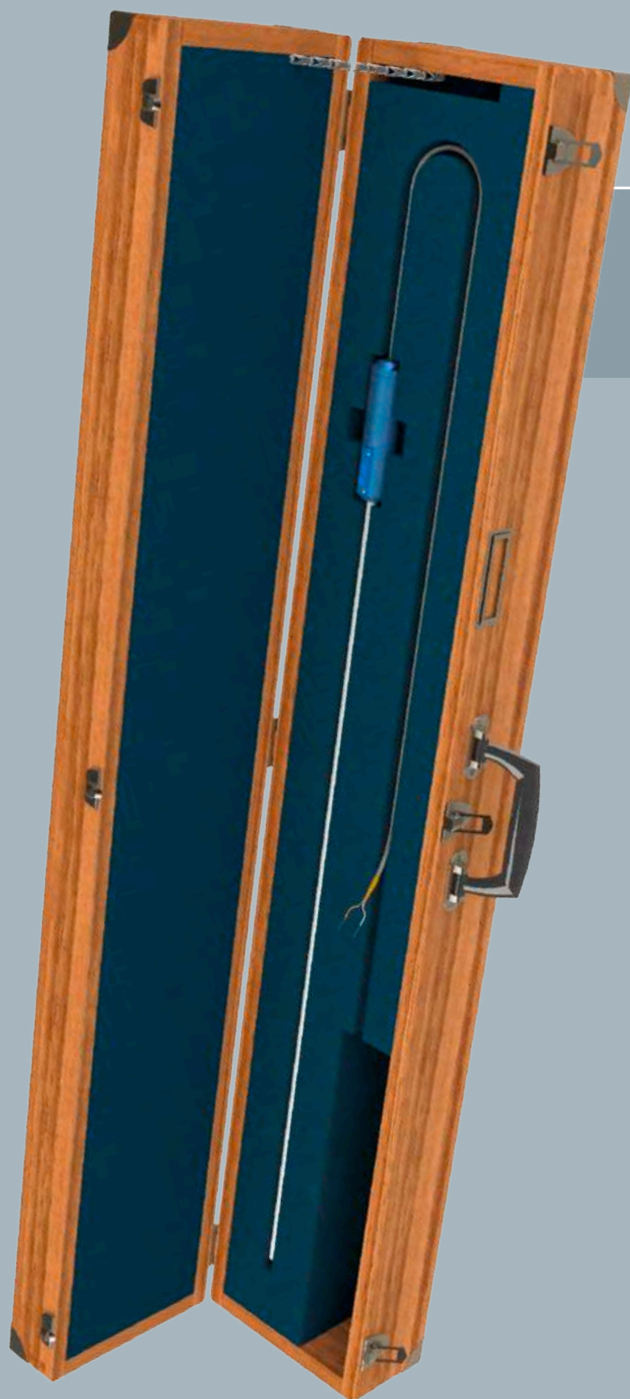
Reference standard

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

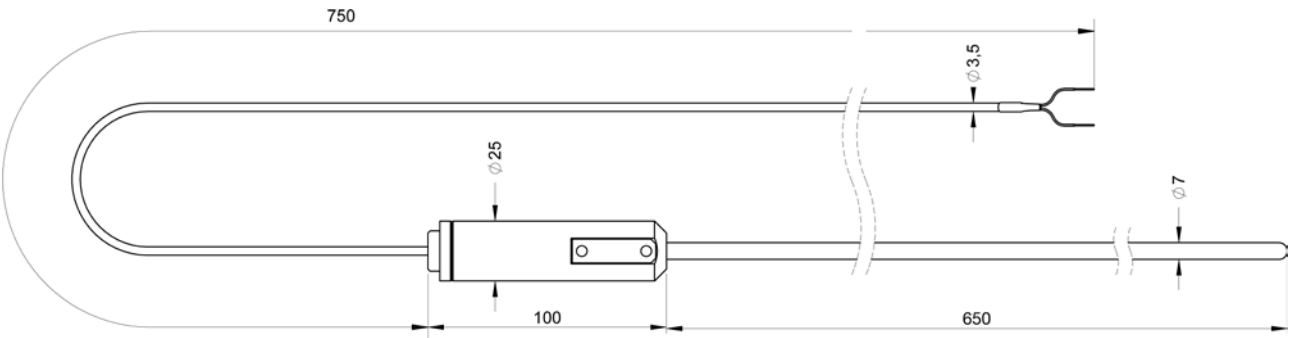
These secondary reference sensors are used in workshops or laboratories, used for calibration. They must also be calibrated periodically against a reference standard.

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

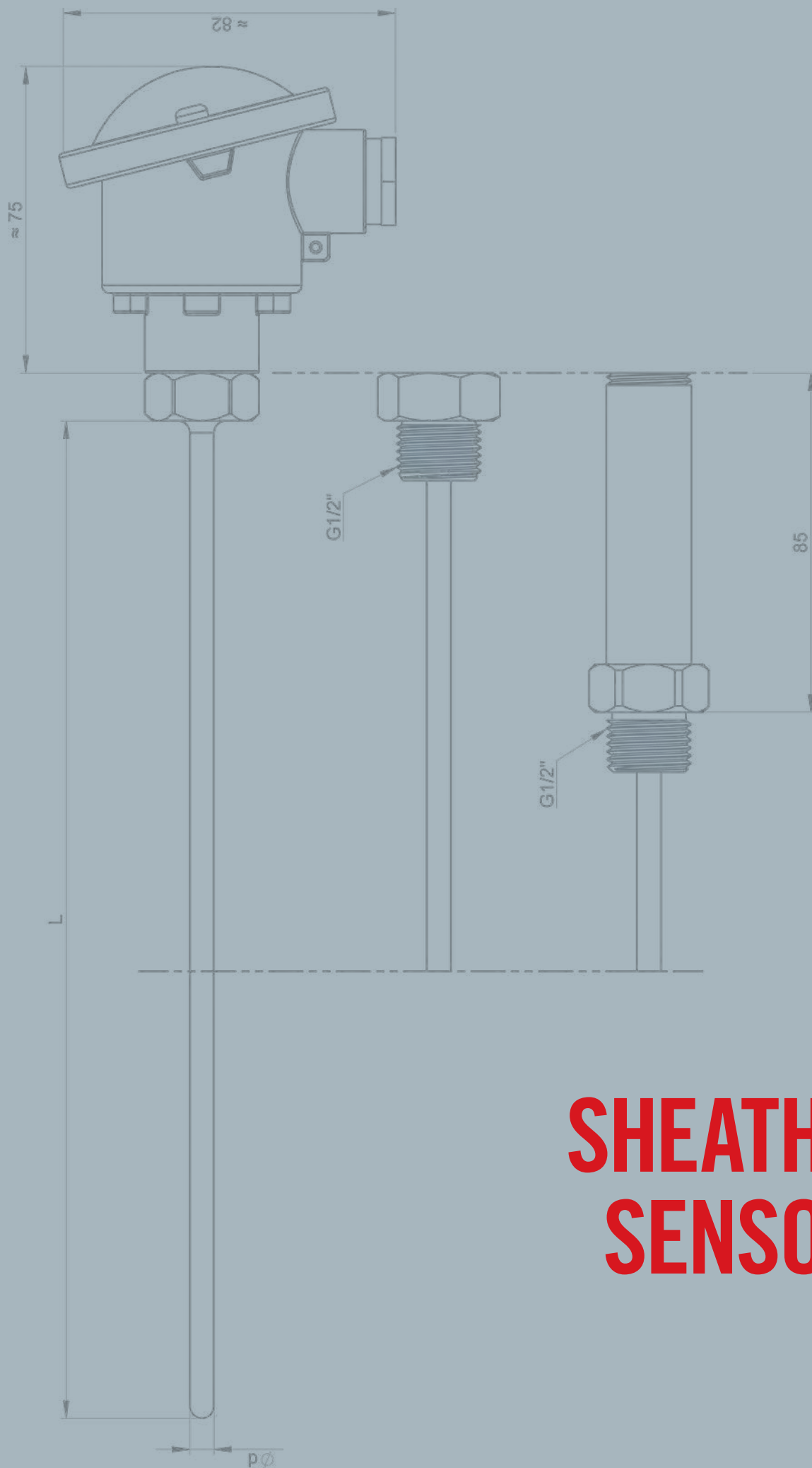
Secondary reference

Model S90-03: 0 °C to 1,554 °C

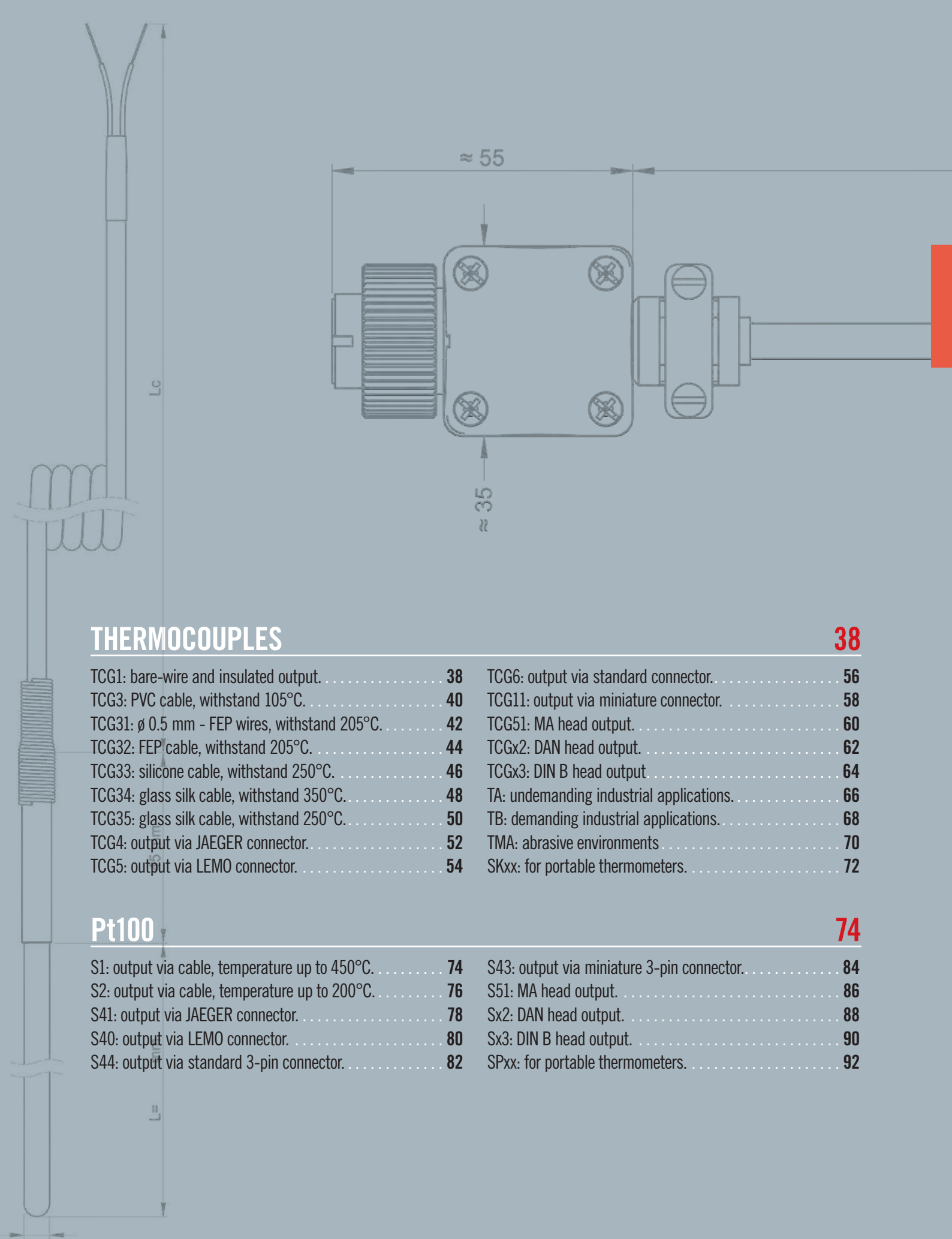
Delivered in a case with a certificate of calibration by comparison.

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

Pt100 **74**

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

TCG1

THERMOCOUPLE

CLASS
1
IEC
584-1


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)

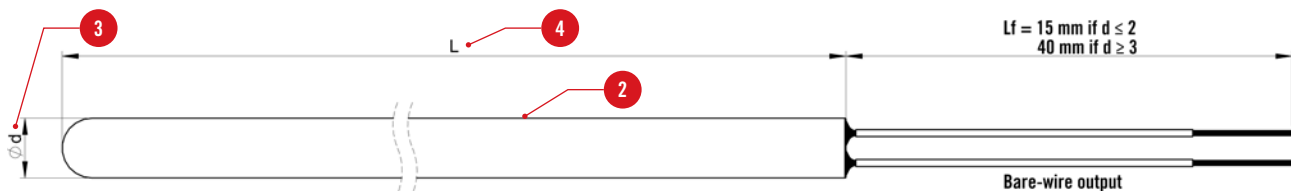
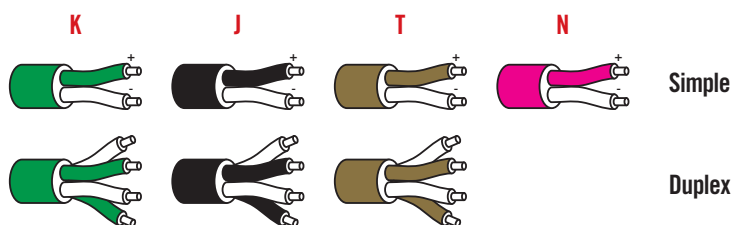


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| TC Class 1 | Sheath diameter (mm) | | | | | | | |
|---------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|
| | 0.5 | 1 | 1.5 | 2 | 3 | 4.5 | 6 | 8 |
| 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 |
| 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


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)

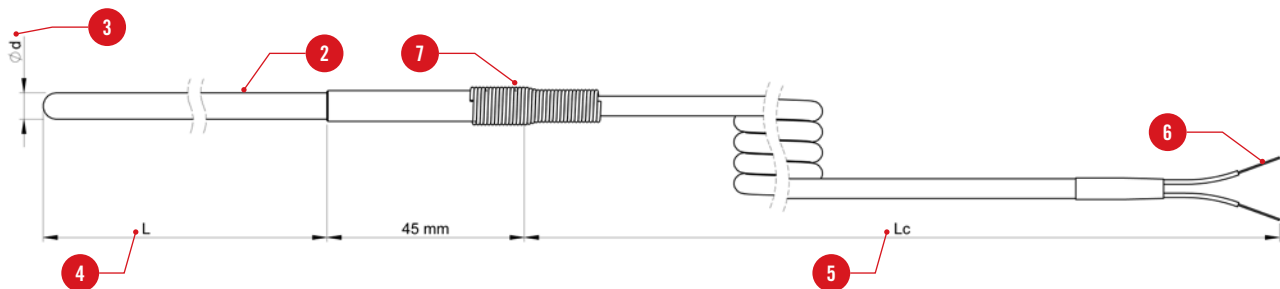
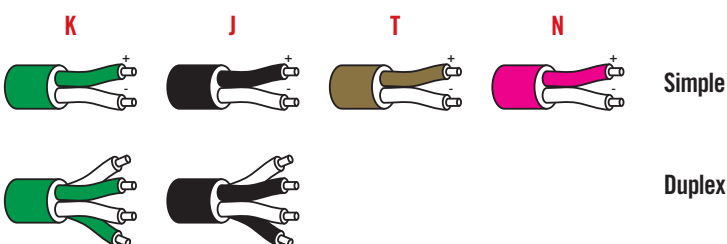


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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

CONNECTIONS



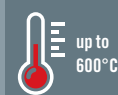
TO ORDER

Order our standard references on p. 95

For any other configuration, please contact us.

TCG31

THERMOCOUPLE

CLASS
1IEC
584-1DIAMETER
0,5 MMFEP
SHEATHED
WIRES

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 mm ² , 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)

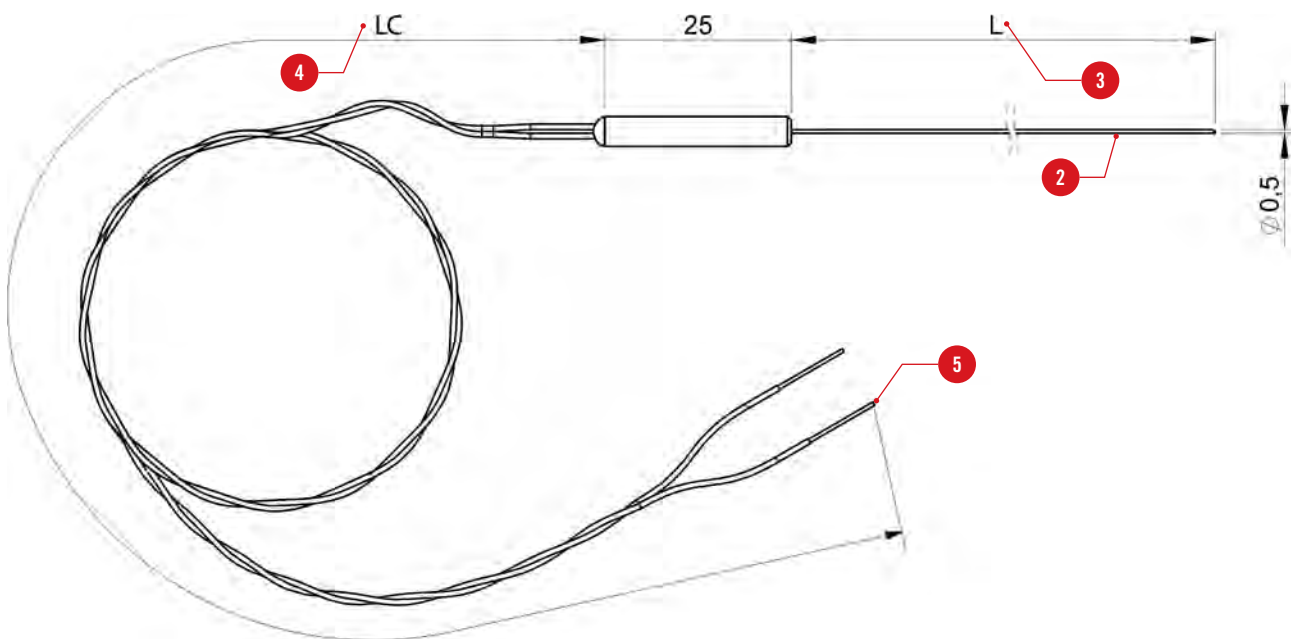


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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

CONNECTIONS



For any other configuration, please contact us.



TCG32

THERMOCOUPLE

CLASS
1

IEC
584-1

FEP
CABLE


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)

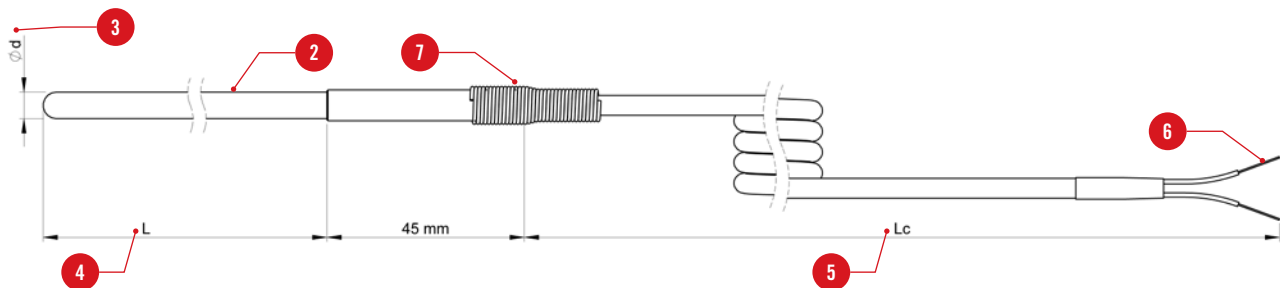
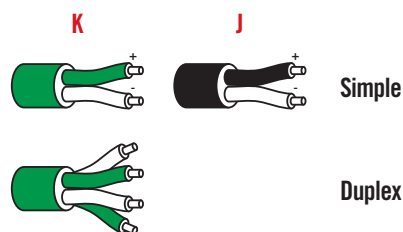


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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


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 mm ² , 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)

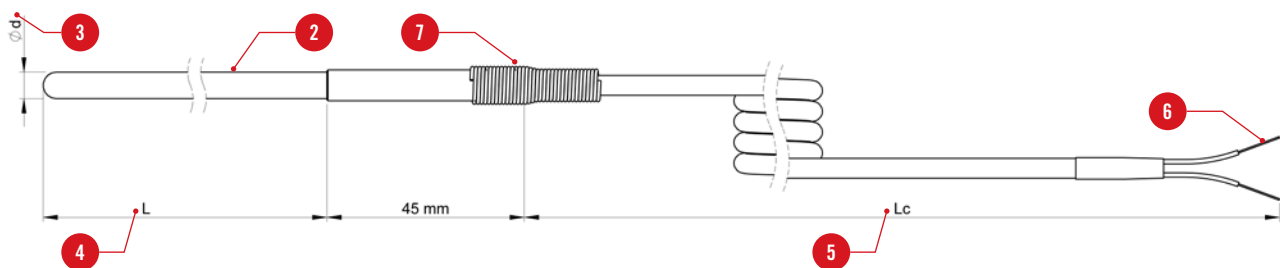
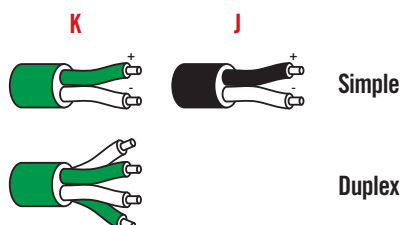


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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


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 mm ² , 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)

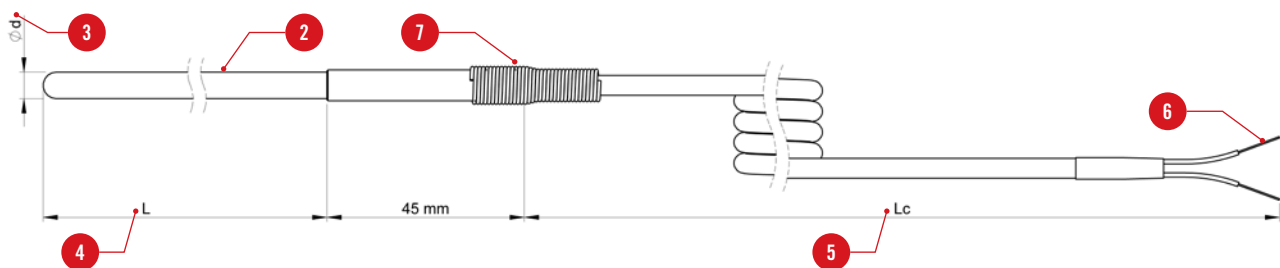
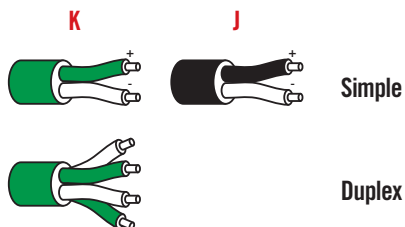


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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


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 mm ² , 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)

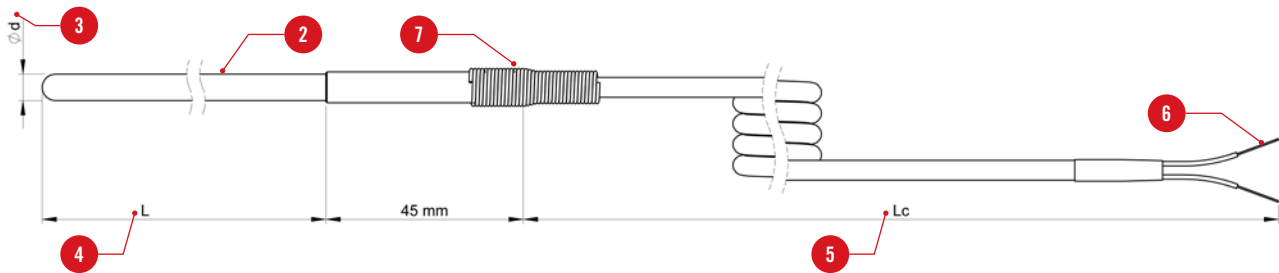
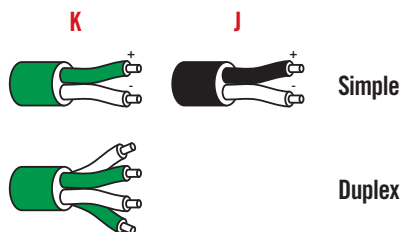


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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


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)

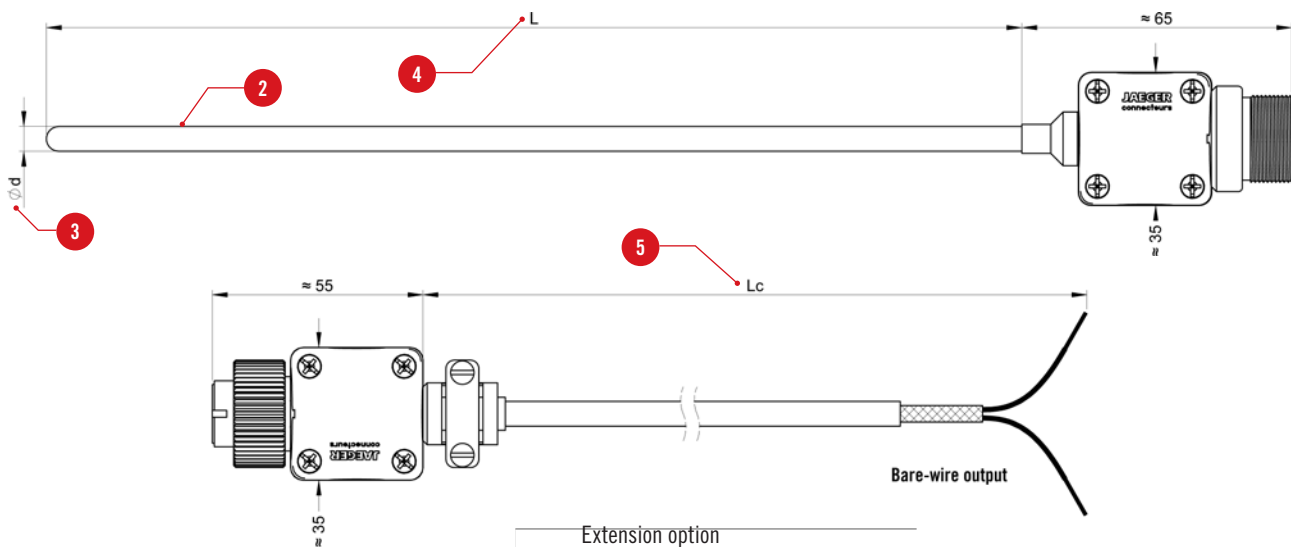
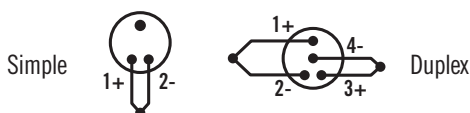


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| TC | Sheath diameter (mm) | | | | |
|----|----------------------|------------|------------|------------|------------|
| | 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 |

CONNECTIONS

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)

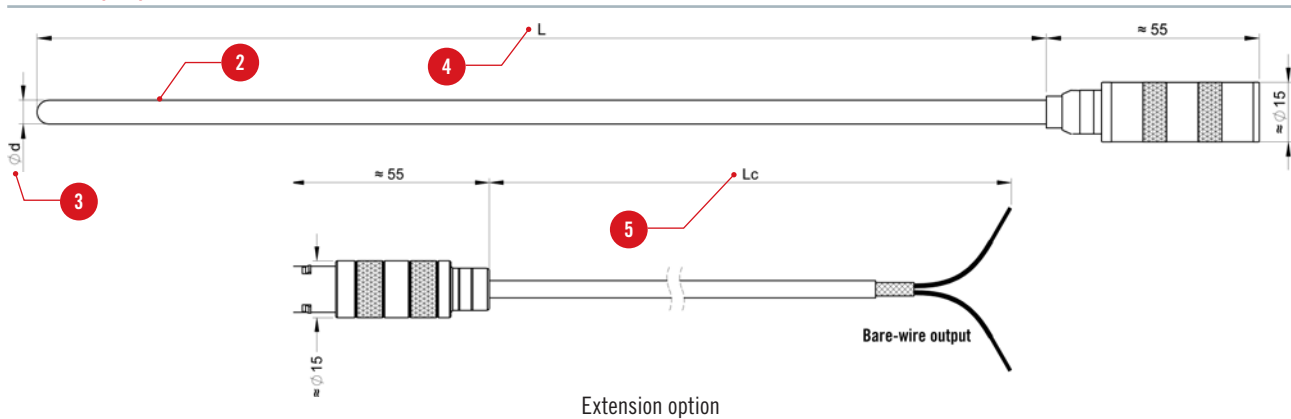
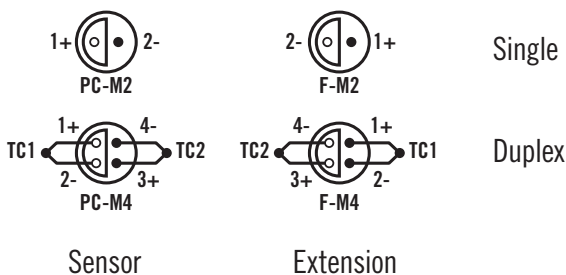


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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

CONNECTIONS

For any other configuration, please contact us.



TCG6

THERMOCOUPLE

CLASS
1

IEC
584-1

STANDARD
CONNECTOR


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 |
| | | Standard plug-in male connector with compensated contacts | | | | |
| Output | 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:

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)

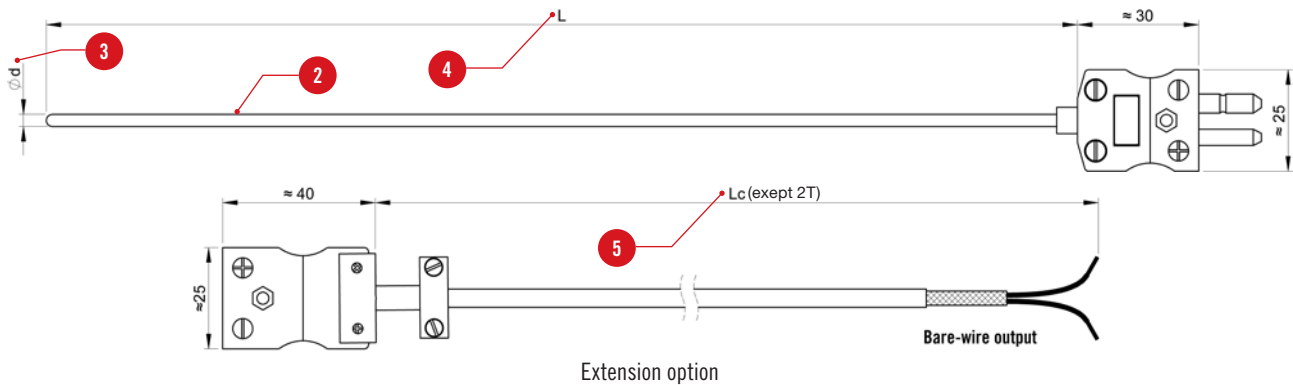
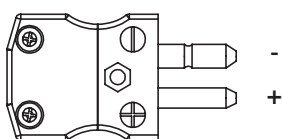


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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



TO ORDER

Order our standard references on
p. 96

For any other configuration, please contact us.

TCG11

THERMOCOUPLE

CLASS
1

IEC
584-1

MINIATURE
CONNECTOR


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)

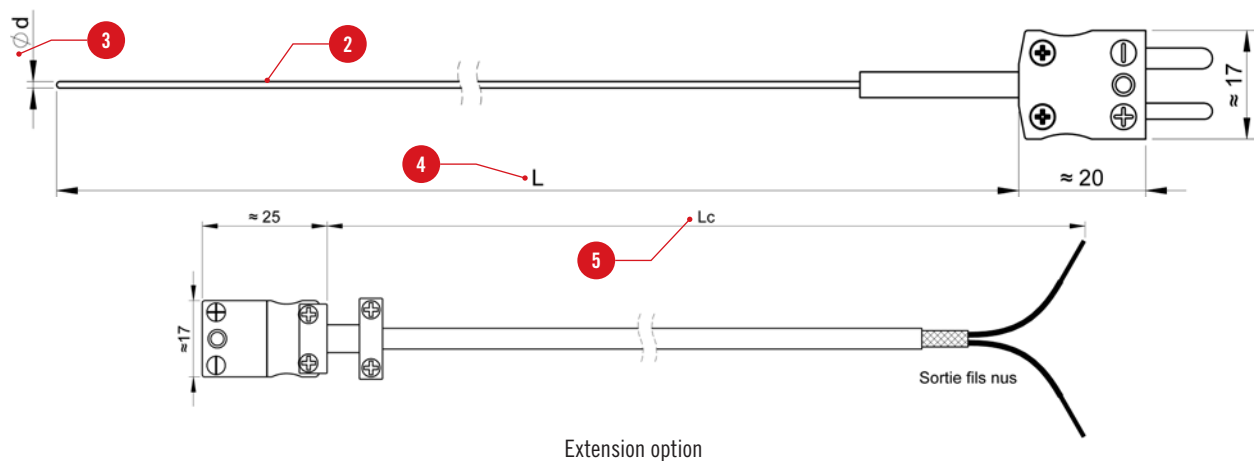
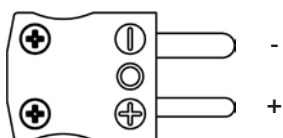


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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

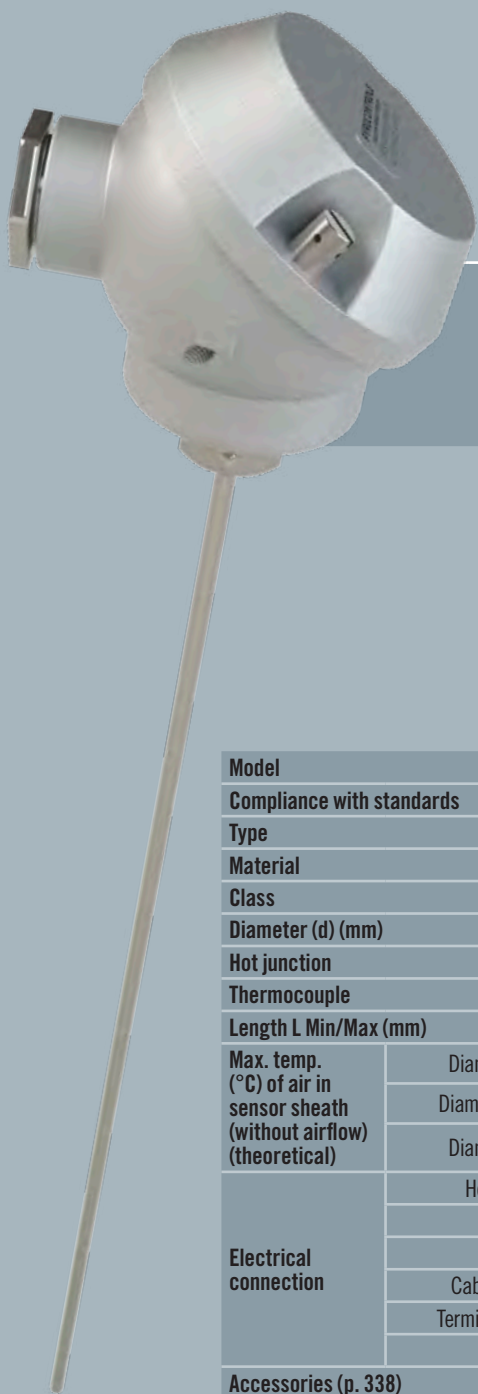
CONNECTIONS



TO ORDER

Order our standard references on
p. 97

For any other configuration, please contact us.



TCG51

THERMOCOUPLE

IP
54CLASS
1IEC
584-1up 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)

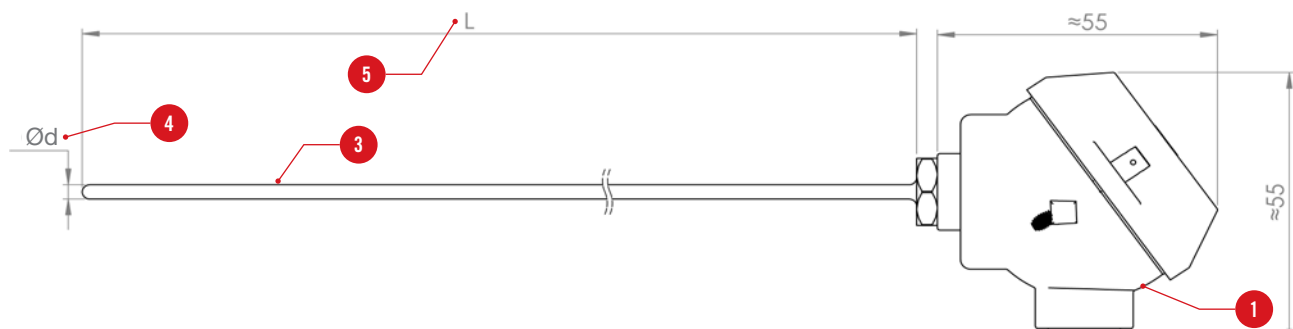
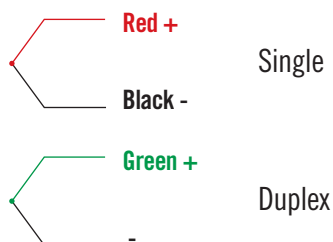


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

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

CONNECTION

For any other configuration, please contact us.





TCGx2

THERMOCOUPLE

IP
65CLASS
1IEC
584-1

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 | TRANSMITTER | 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)

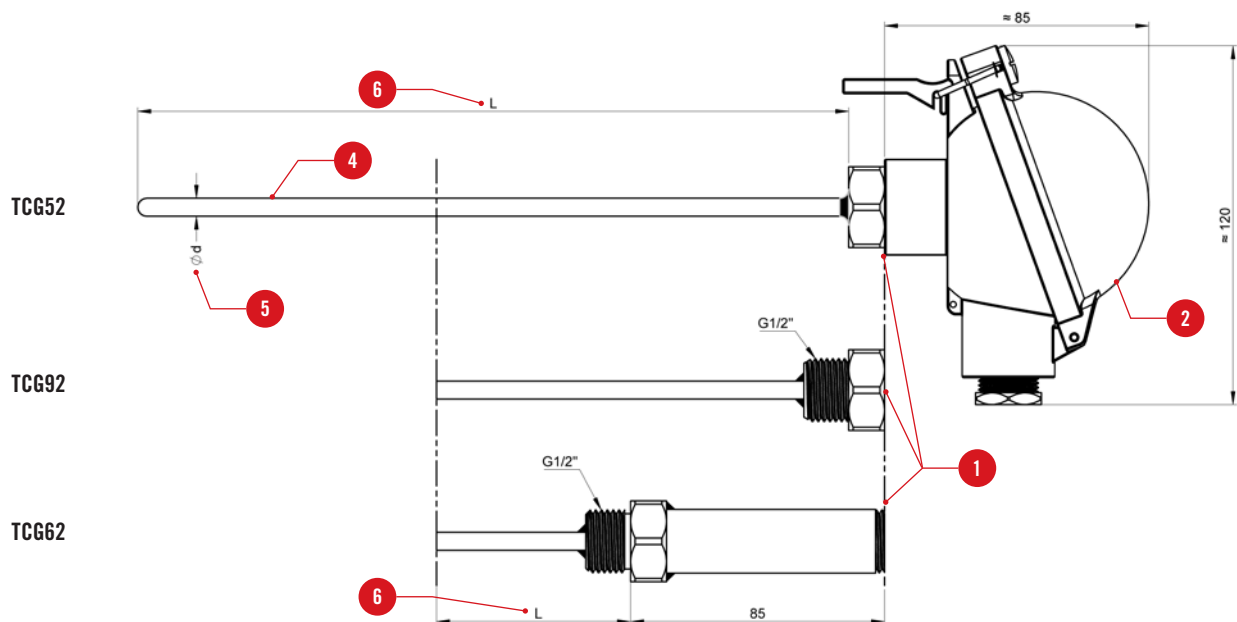


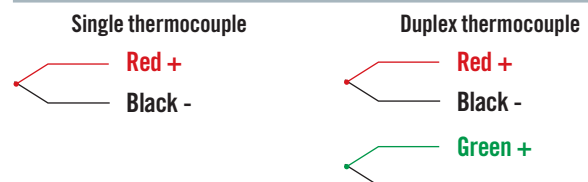
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

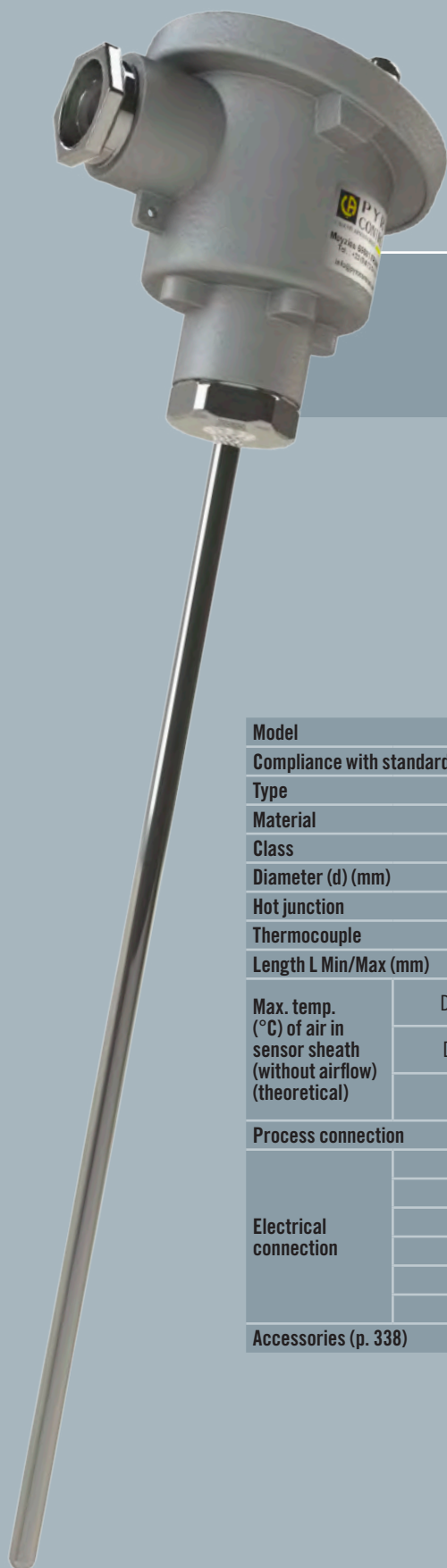
| TC Class | Sheath diameter (mm) | | |
|-------------|----------------------|------------|------------|
| | 4.5 | 6 | 8 |
| T (class 2) | 316L | 316L | 316L |
| J | 316L | 316L | 316L |
| K | INCONEL600 | INCONEL600 | INCONEL600 |
| N | INCONEL600 | INCONEL600 | - |
| | PYROSIL | PYROSIL | PYROSIL |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

TRANSMITTER (NOT COMPATIBLE WITH DUPLEX)

| 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





TCGx3

THERMOCOUPLE

IP
54CLASS
1IEC
584-1

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 | |
|-------------------------------------|---|-----------|----------------------------------|--|---------------|---------------|---------------------------------------|---|-------------------|
| TCG | 5 | 3 | 1J | AC | 6 | 2,500 | I | TRANSMITTER | TRANSMITTER SCALE |
| 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)

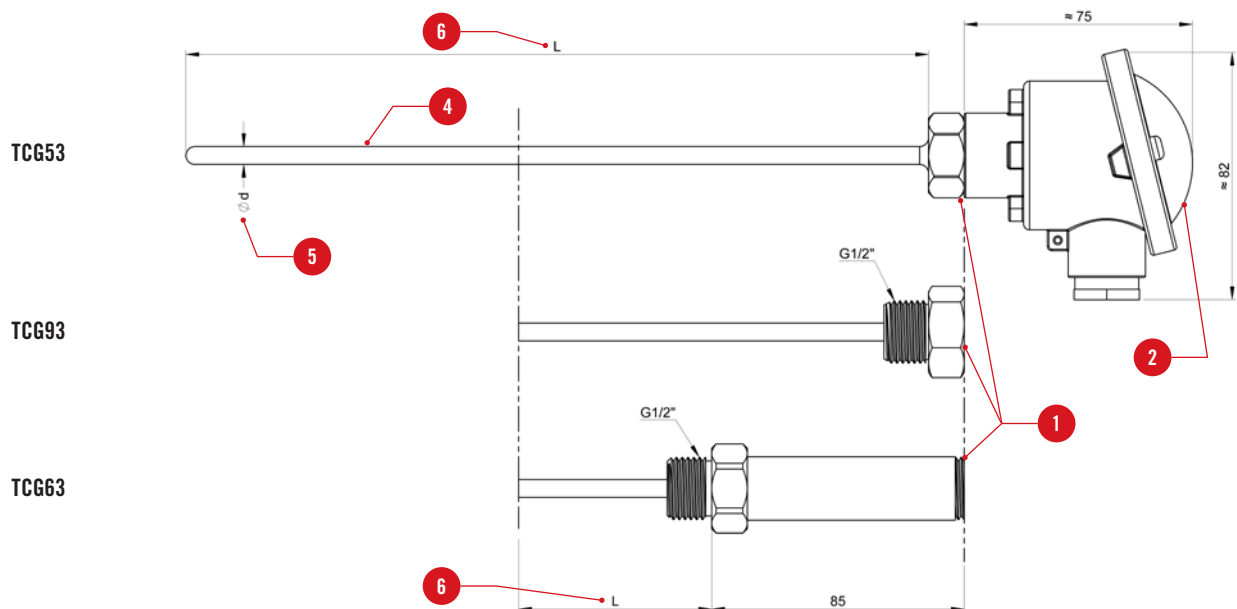


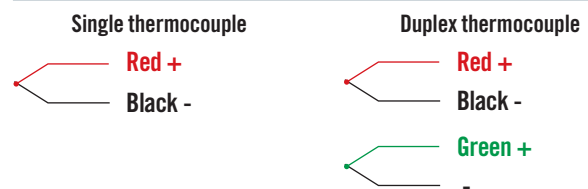
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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 |

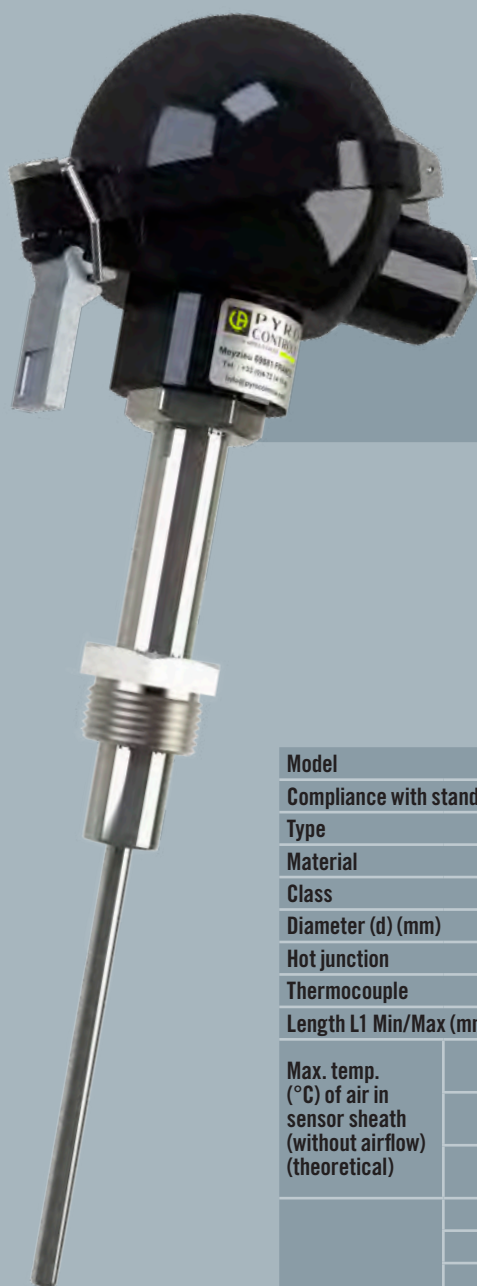
TRANSMITTER (NOT COMPATIBLE WITH DUPLEX)

| 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.



TA

THERMOCOUPLE

IP
54IP
65

Option

CLASS
1IEC
584-1up 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
fasteningThreaded
fitting under
headWelded
threaded
fittingCompression
fittingSleeve
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 | | | |
| A | 500 | 1 | 200 | TRANSMITTER | TRANSMITTER SCALE | OPTIONS* | |
| | 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)

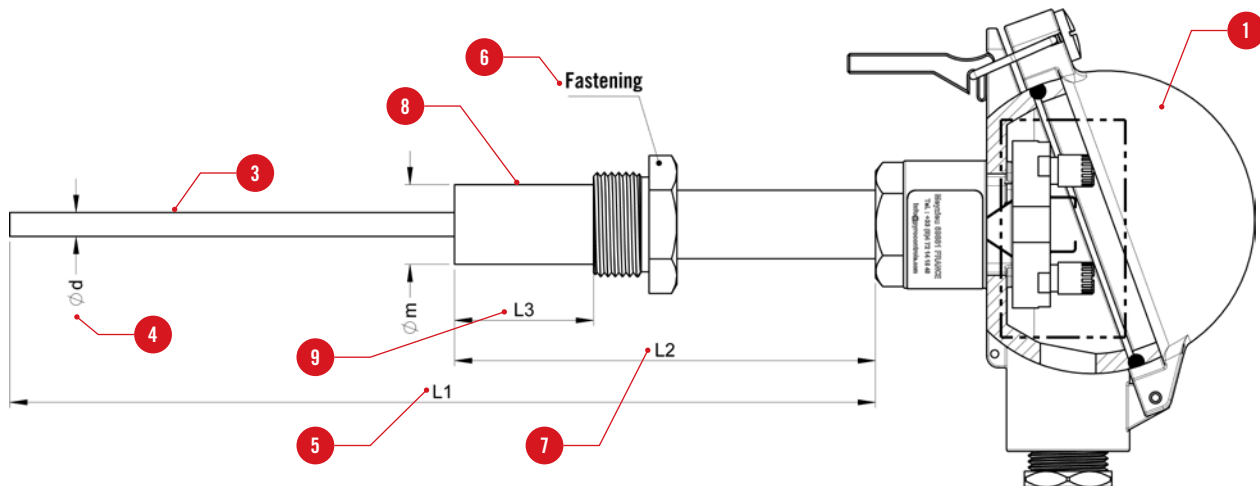


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| TC Class 1 | 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 |

For any other configuration, please contact us.

TRANSMITTER (NOT COMPATIBLE WITH DUPLEX)

| 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
54CLASS
1IEC
584-1

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 |

| 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)

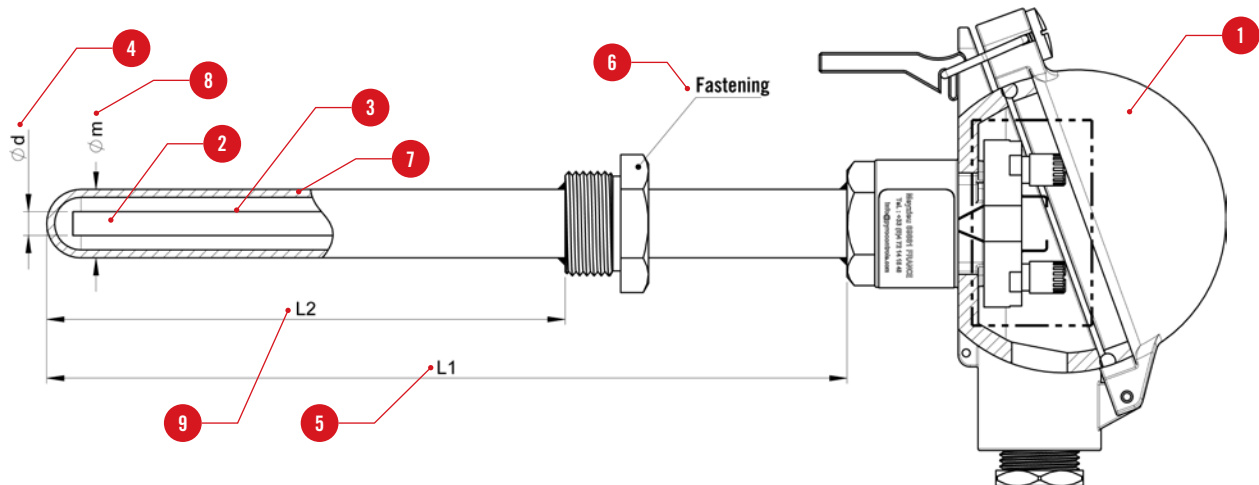


TABLE OF CONDUCTOR TYPE - SHEATH DIAMETER

| 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 |

TRANSMITTER (NOT COMPATIBLE WITH DUPLEX)

| 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



For any other configuration, please contact us.



TMA

THERMOCOUPLE

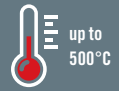
IP
54

IP 65

Option

CLASSE 1

**IEC
584-1**



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 | |

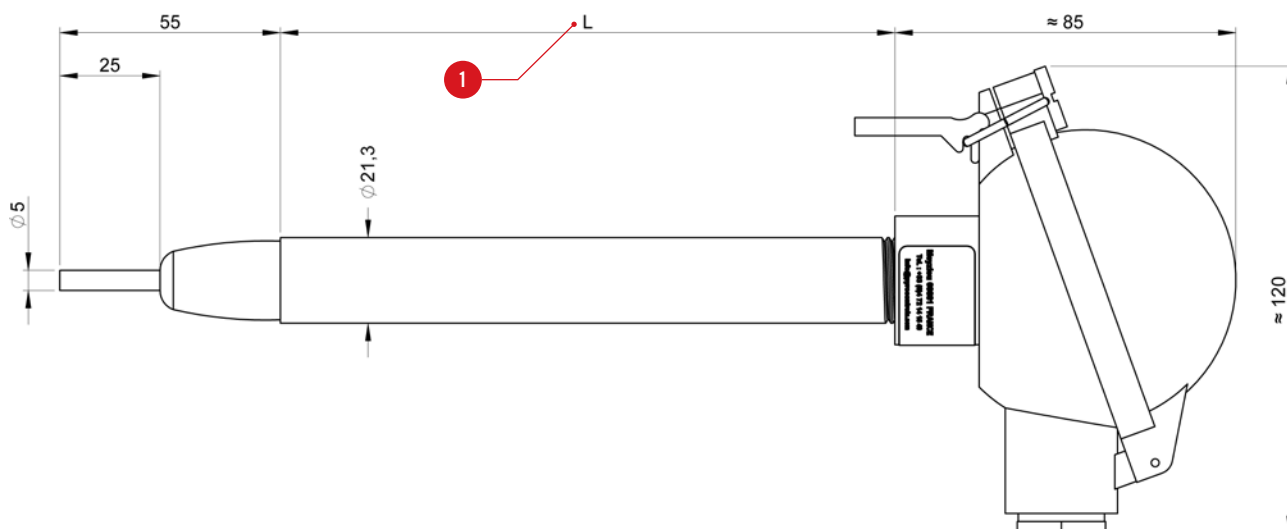
DESIGN YOUR SENSOR

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 | | |
| <div>Reference in table and DIAGRAM (MM)</div> <div> <div>1</div> <div>2</div> </div> | | | | | |
| 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

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

CONNECTION



For any other configuration, please contact us.

SKxx

THERMOCOUPLE

IEC
584-1

IP
54

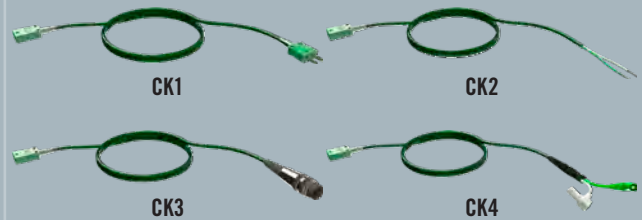
CLASS
1



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



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

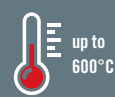
- PP1 handle for CK extension P03652912
- Miniature 2-pole male compensated connector P03652925

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

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)

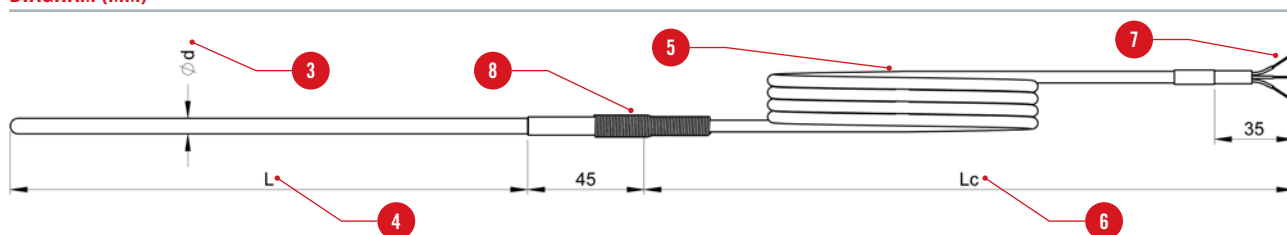
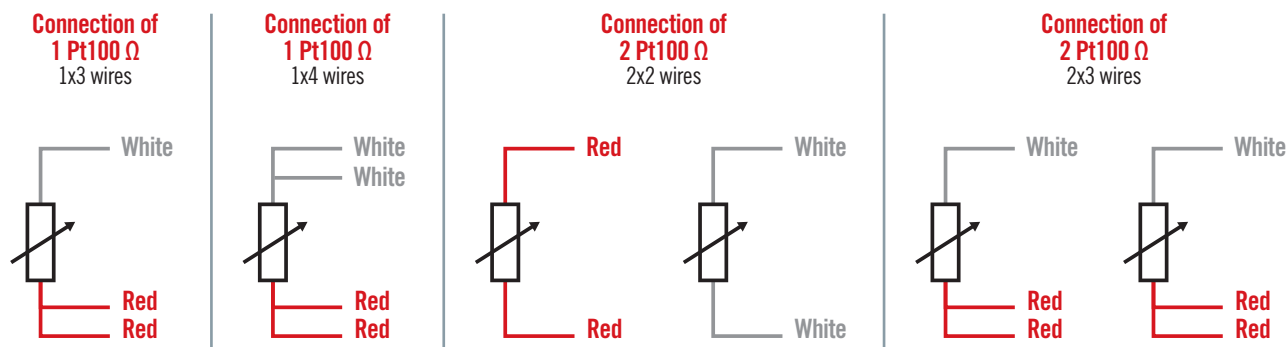


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| Number of Pt100 | 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



TO ORDER

For any other configuration, please contact us.

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)

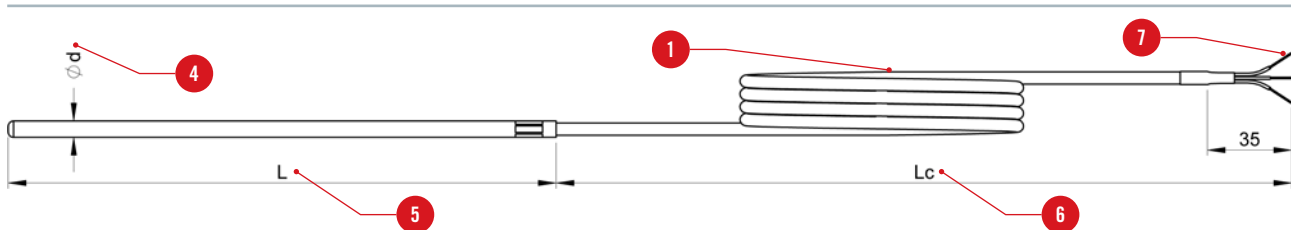
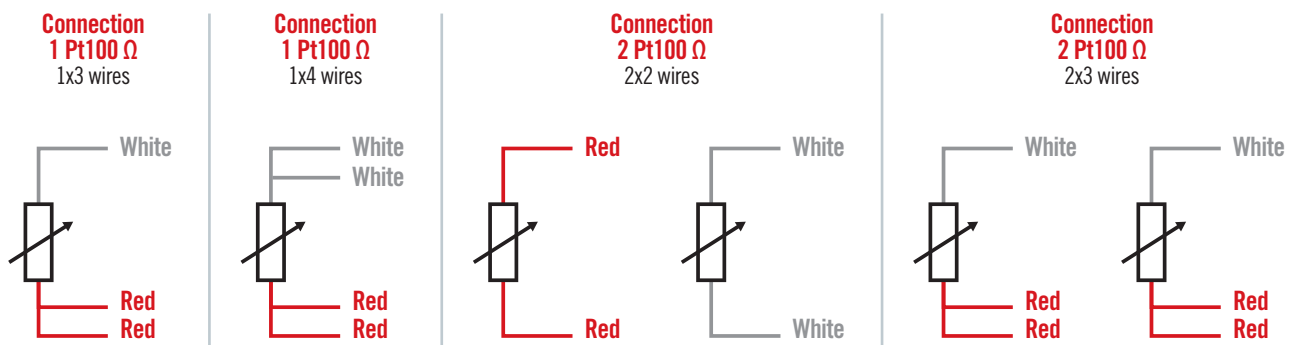


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| Number of Pt100 | Mounting | Min./max. length (mm) | | | |
|-----------------|-----------|-----------------------|-----------|-----------|----------|
| | | Sheath diameter (mm) | | | |
| | | 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 | 2x2 wires | - | 50 / 250 | 50 / 250 | 50 / 250 |
| | 2x3 wires | - | - | 50 / 1500 | 50 / 500 |

CONNECTIONS



TO ORDER

For any other configuration, please contact us.

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 | | |

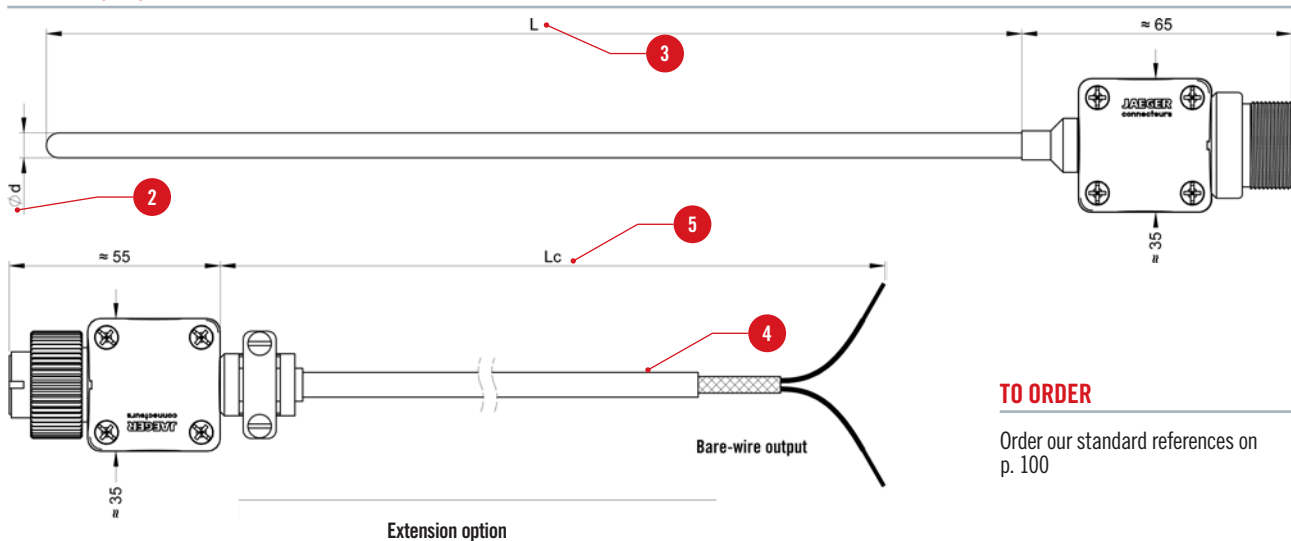
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | OPERATING TEMP. (°C) | MOUNTING | Ø (mm) | LENGTH L (mm) | OPTION | |
|-------------------------------------|----------------------|--|---------------|---------------|---------------------------------------|------------------|
| S41 | 200 | B | 3 | 750 | FEP | 9,000 |
| Reference in table and DIAGRAM (MM) | | 1 | 2 | 3 | 4 | 5 |
| | 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 |
| Possible choice | | | | | | |

DIAGRAM (MM)



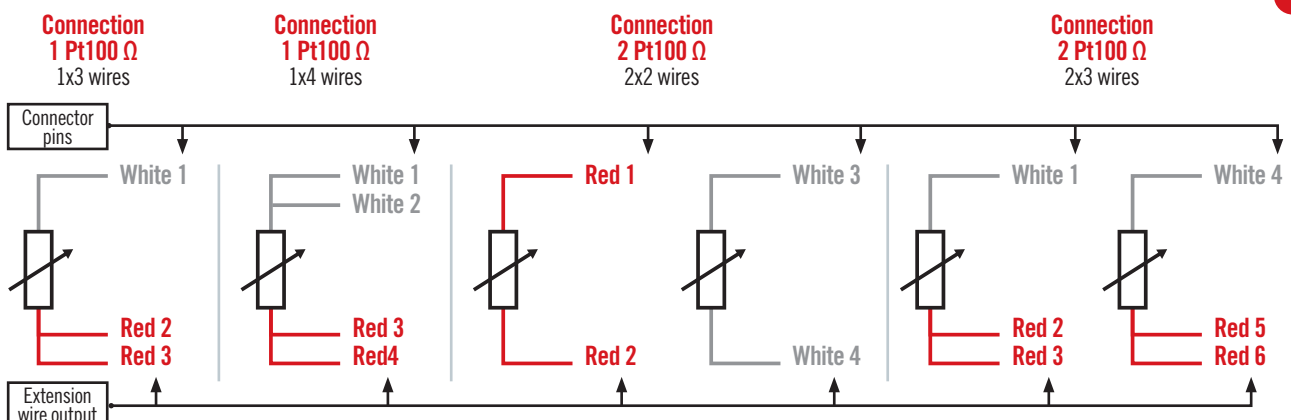
TO ORDER

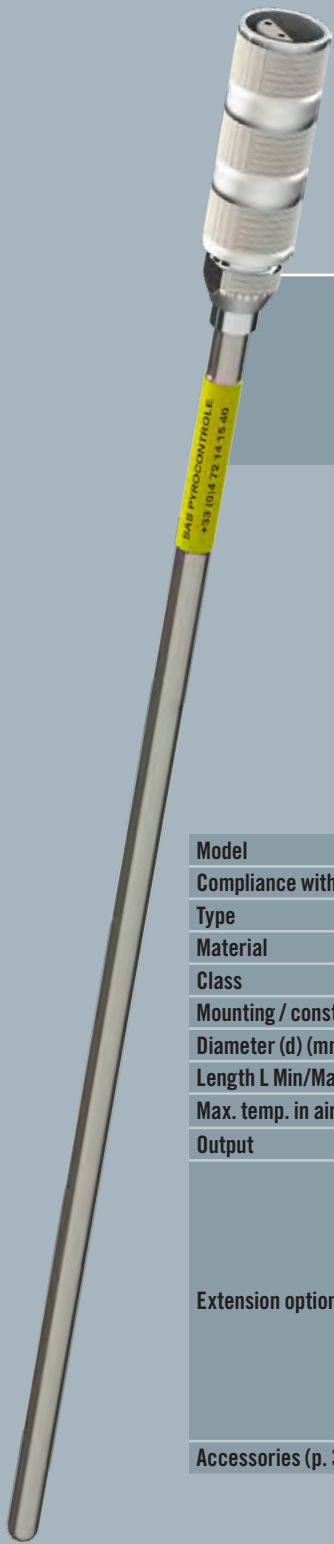
Order our standard references on p. 100

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 | - | - |
| 4.5 | 50/1500 | 50/1500 | 50/250 | 50/1500 |
| 6 | 50/1500 | 50/1500 | 50/250 | 50/1500 |

CONNECTIONS





S40

Pt100

CLASS
A

IEC
60751

LEMO
CONNECTOR



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 | |
|-------------------------------------|----------------------|--|---------------|---------------|---------------------------------------|------------------|
| S40 | 200 | C | 4.5 | 75 | PVC | 5,200 |
| Reference in table and DIAGRAM (MM) | | 1 | 2 | 3 | 4 | 5 |
| | 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 |
| Possible choice | | | | | | |

DIAGRAM (MM)

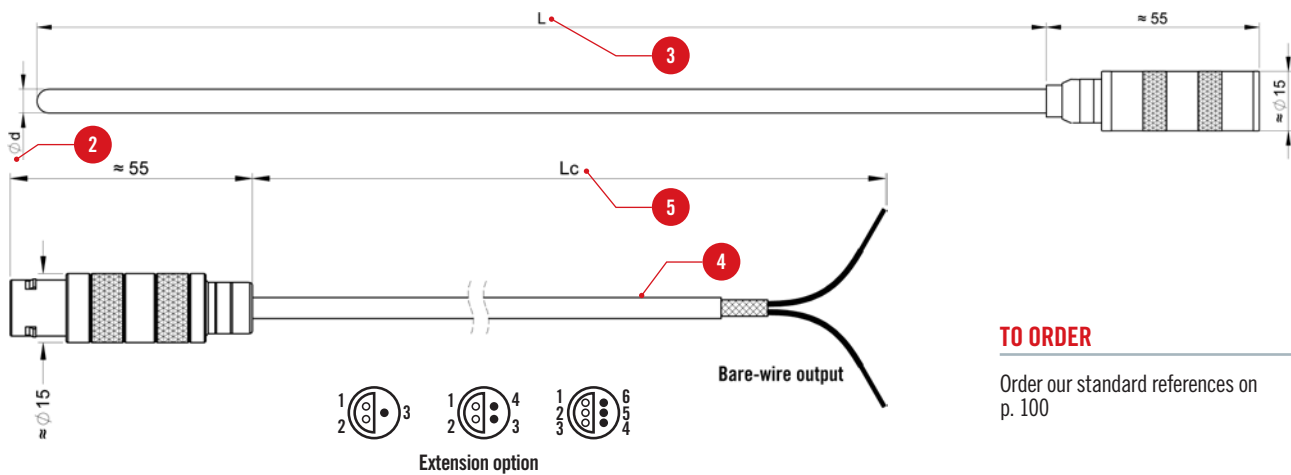
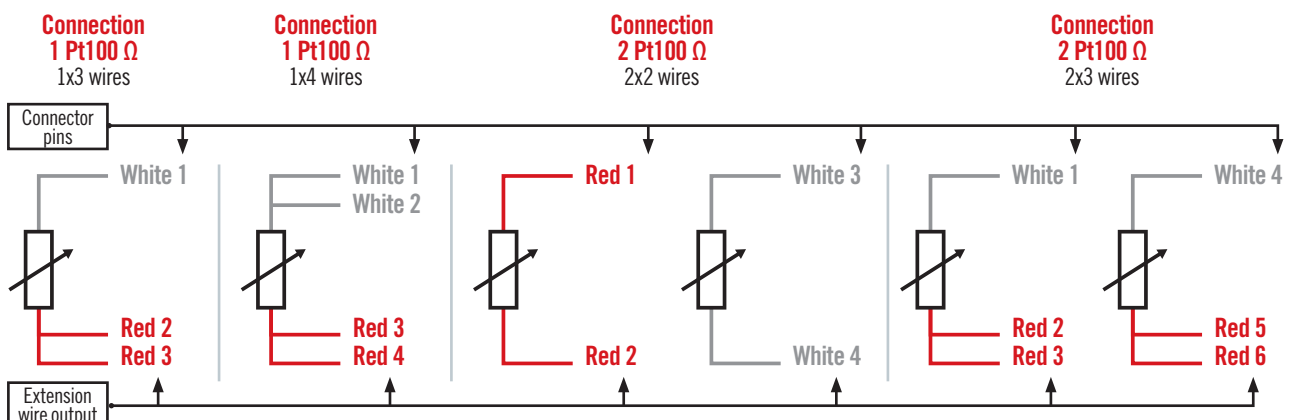


TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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



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 | | |

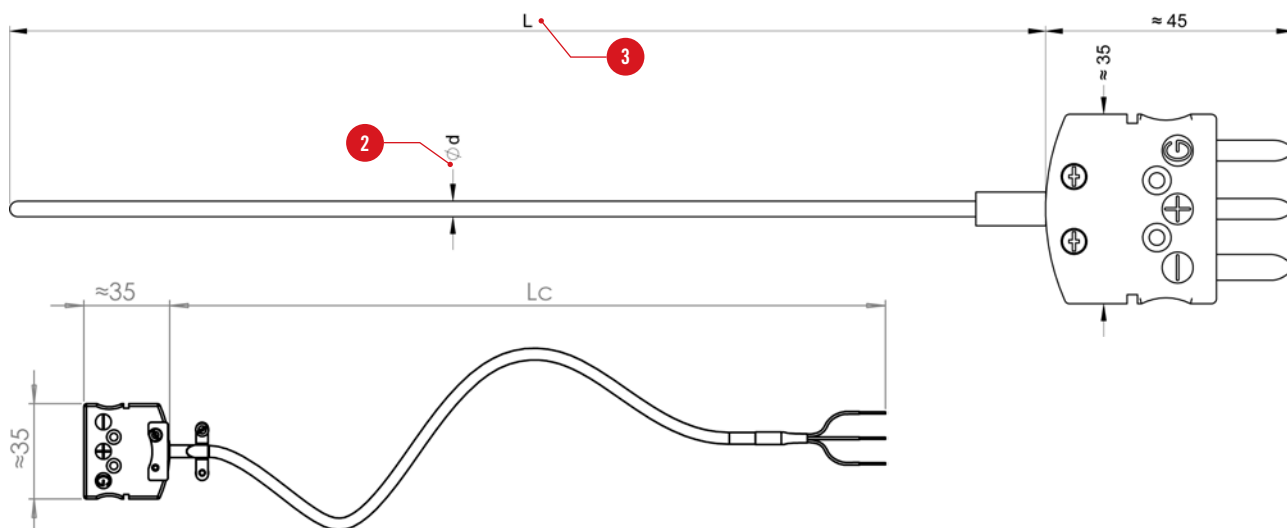
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | OPERATING TEMP. (°C) | Ø (mm) | LENGTH L (mm) | OPTION | |
|-------------------------------------|----------------------|---------------|---------------|--|------------------|
| 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)

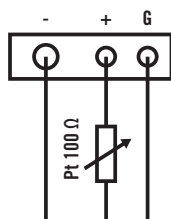


OPERATING TEMPERATURE LIMIT ACCORDING TO DIAMETER

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

CONNECTIONS

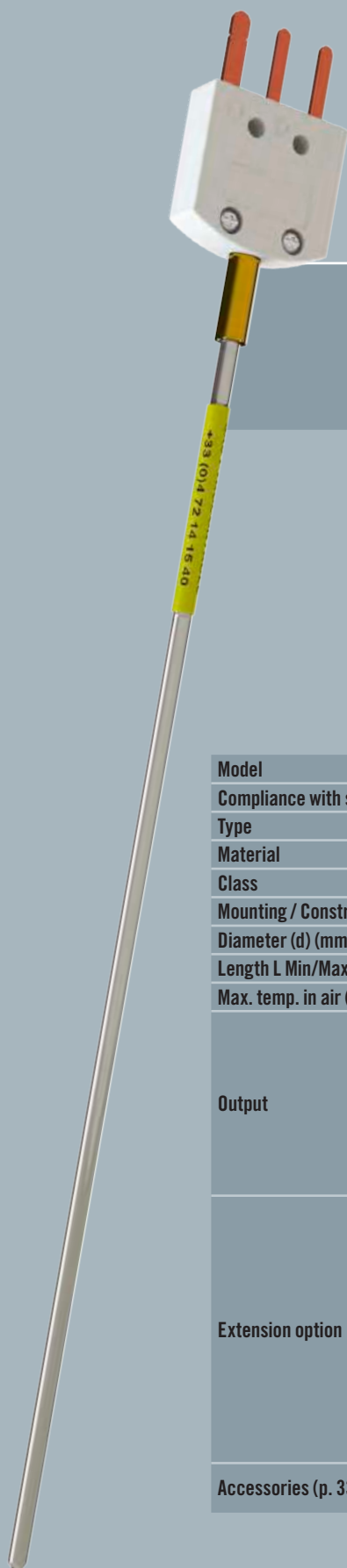
Standard 3-pin connector



TO ORDER

Order our standard references on p. 101

For any other configuration, please contact us.



S43

Pt100

CLASS
A
IEC
60751
MINIATURE
CONNECTOR


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 | | |

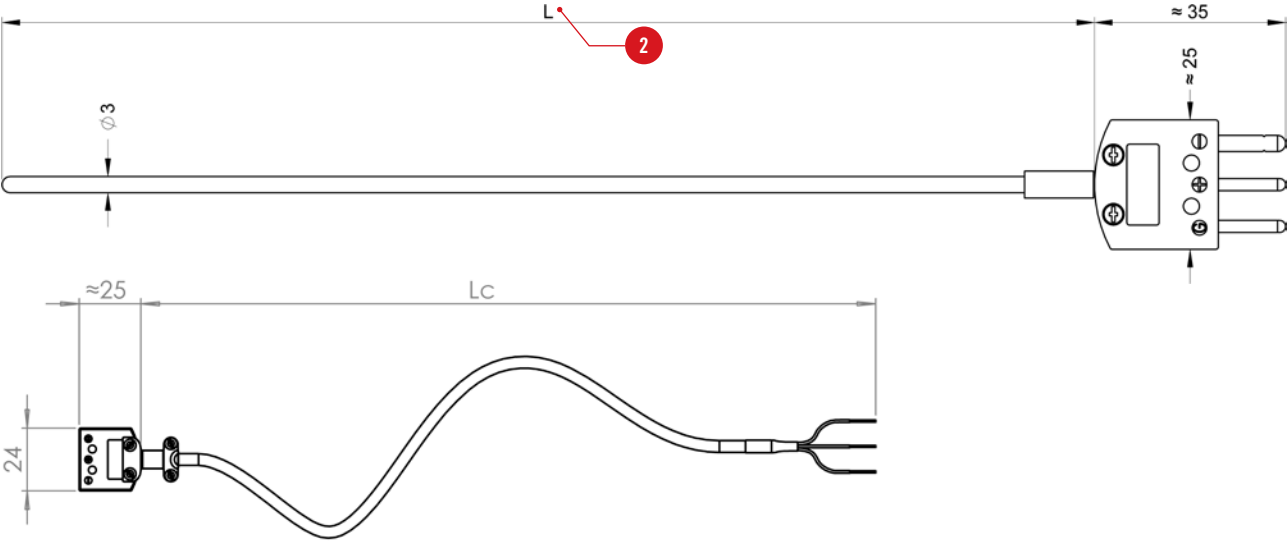
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| EN OPTION | | | | |
|-------------------------------------|----------------------|---------------|--|------------------|
| MODEL | OPERATING TEMP. (°C) | LENGTH L (mm) | EXTENSION CABLE | 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)

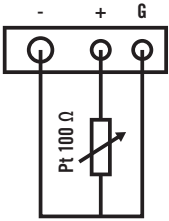


TO ORDER

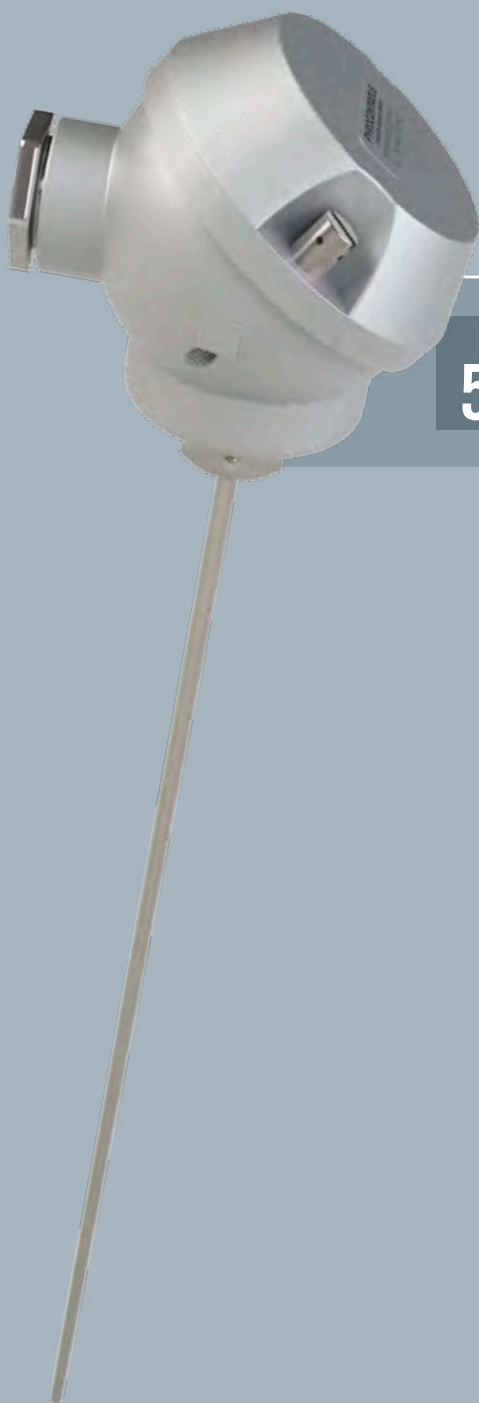
Order our standard references on p. 101

CONNECTION

Standard 3-pin connectors



For any other configuration, please contact us.



S51

Pt100

IP
54CLASS
1IEC
60751SINGLE
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 |
| | | IP54 |
| Accessories (p. 338) | | Leak-tight fittings, rotating fittings |

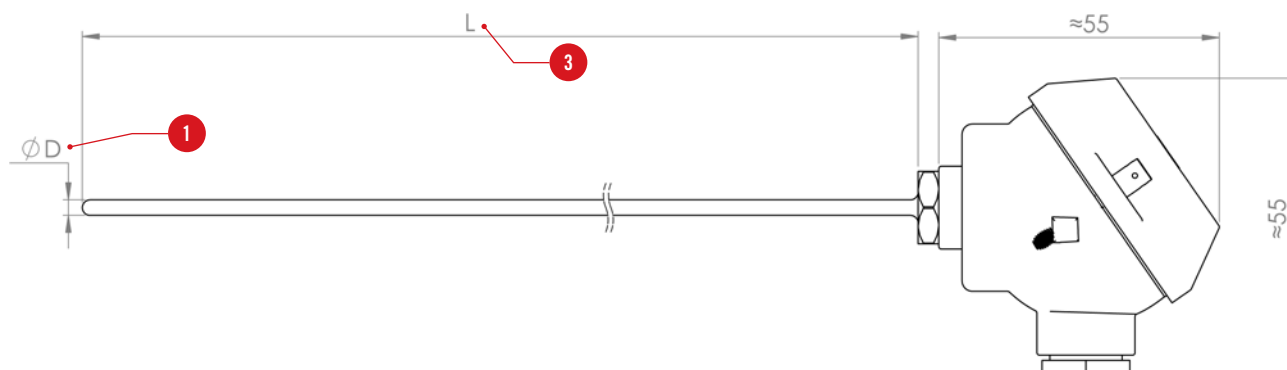
DESIGN YOUR SENSOR

CONFIGURATOR CODE

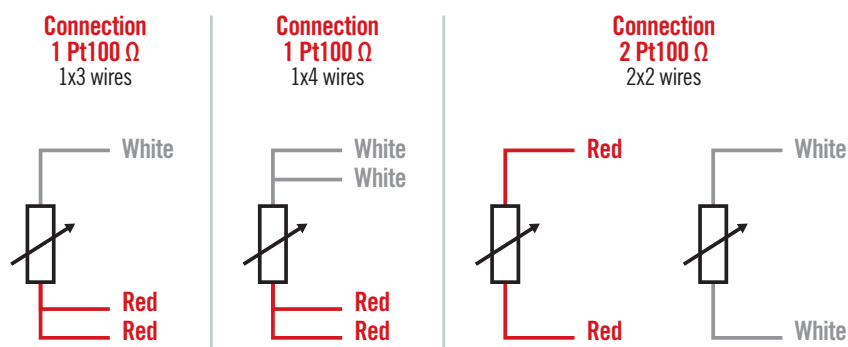
Parameters to be indicated when ordering. Example:

| MODEL | TEMPERATURE | Ø (mm) | MOUNTING | LENGTH L (mm) |
|--|----------------|---------------|--|---------------------------|
| S51 | 450 | 6 | B | 750 |
| <div>Reference in table and DIAGRAM (MM)</div> <div> <div>1</div> <div>2</div> <div>3</div> </div> | | | | |
| 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



LENGTH ACCORDING TO MOUNTING TYPE AND SHEATH DIAMETER

| | Number of Pt100 | 1 | | | 2 |
|---|-----------------|------------------|-----------|-----------|---|
| | | Type of mounting | | | |
| | | 1x3 wires | 1x4 wires | 2x2 wires | |
| 1 | 3 | 50/1500 | 50/1500 | - | 3 |
| | 4.5 | 50/1500 | 50/1500 | 50/250 | |
| | 6 | 50/1500 | 50/1500 | 50/250 | |

For any other configuration, please contact us.



Sx2

Pt100

IP
65CLASS
AIEC
60751SINGLE
OR
DUPLEX

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) |
| Accessories (p. 338) | | IP54 (standard) or IP65 (option) |
| | | Leak-tight fittings, rotating fittings |

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

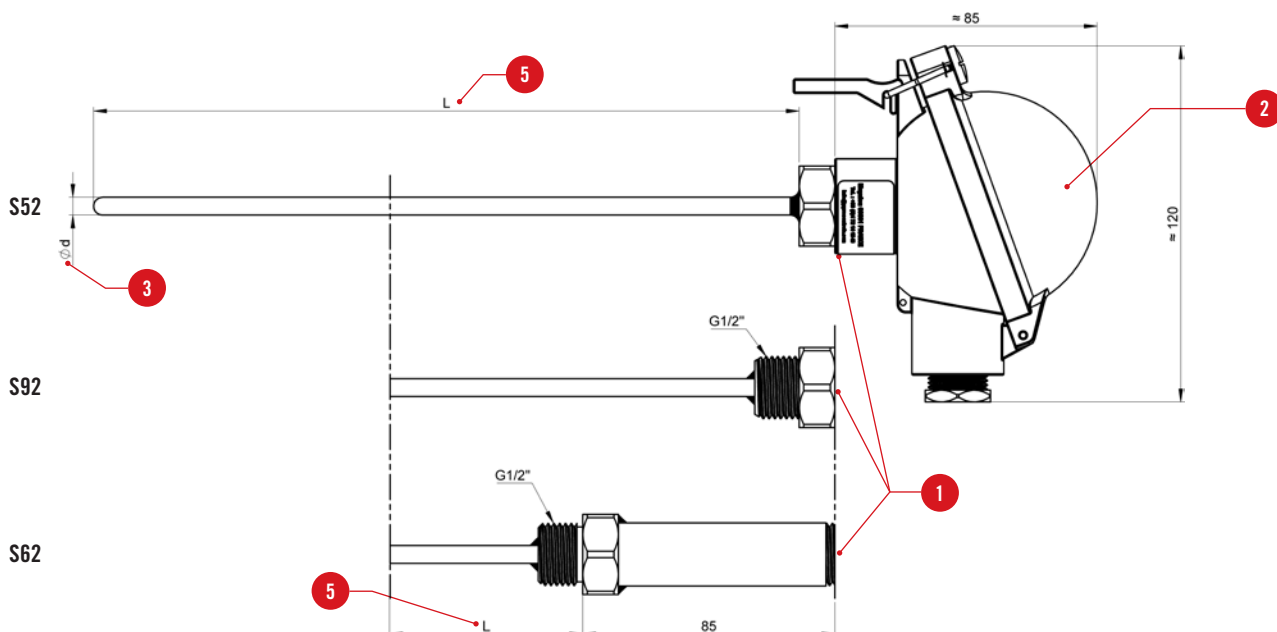
Parameters to be indicated when ordering. Example:

| MODEL | PROCESS CONNECTION | HEAD | TEMP. | β (mm) | MOUNTING | LENGTH L (mm) | TRANSMITTER | OPTION TRANSMIT. SCALE | OPTIONS | | | |
|-------------------------------------|---|------|----------------|---------------|--|---------------|---|--|---------|-------|---|---|
| S | 5 | 2 | - | 450 | - | 6 | - | 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 | | | | |

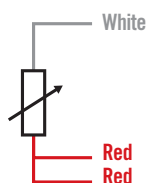
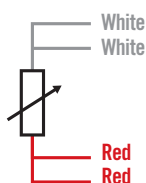
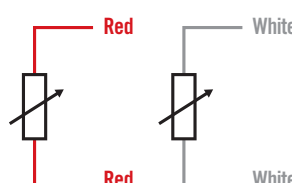
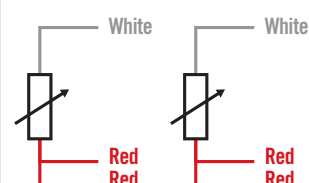
*2x2-wire mounting: length L limited to 250 mm

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

DIAGRAM (MM)



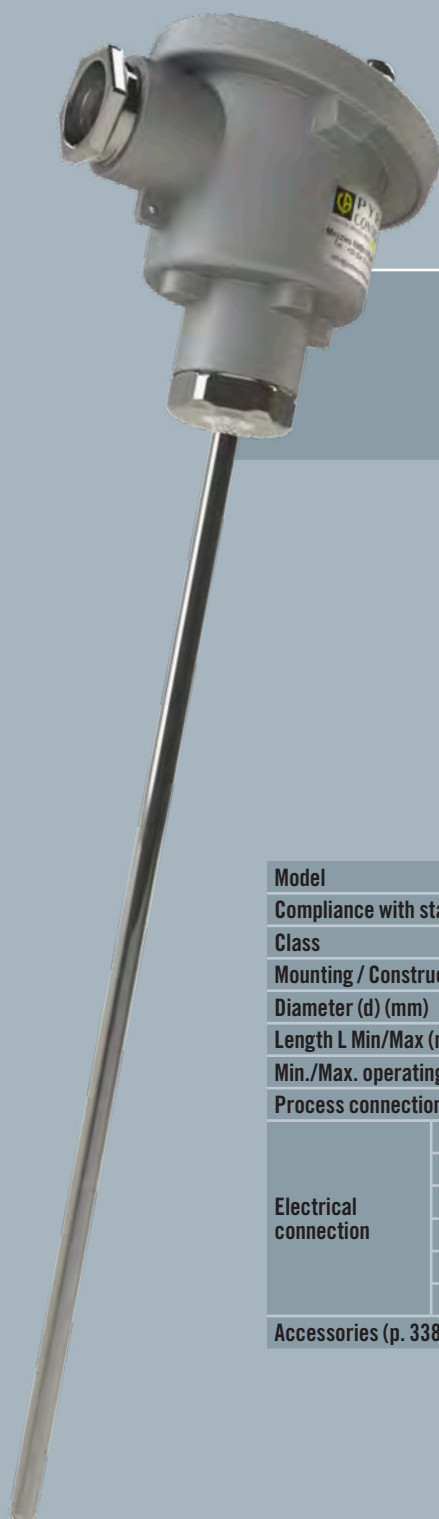
CONNECTIONS

Connection
1 Pt100 Ω
1x3 wiresConnection
1 Pt100 Ω
1x4 wiresConnection
2 Pt100 Ω
2x2 wiresConnection
2 Pt100 Ω
2x3 wires

TRANSMITTER (only with 1 Pt 100) - OPTION

| 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
54CLASS
AIEC
60751SINGLE
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 |

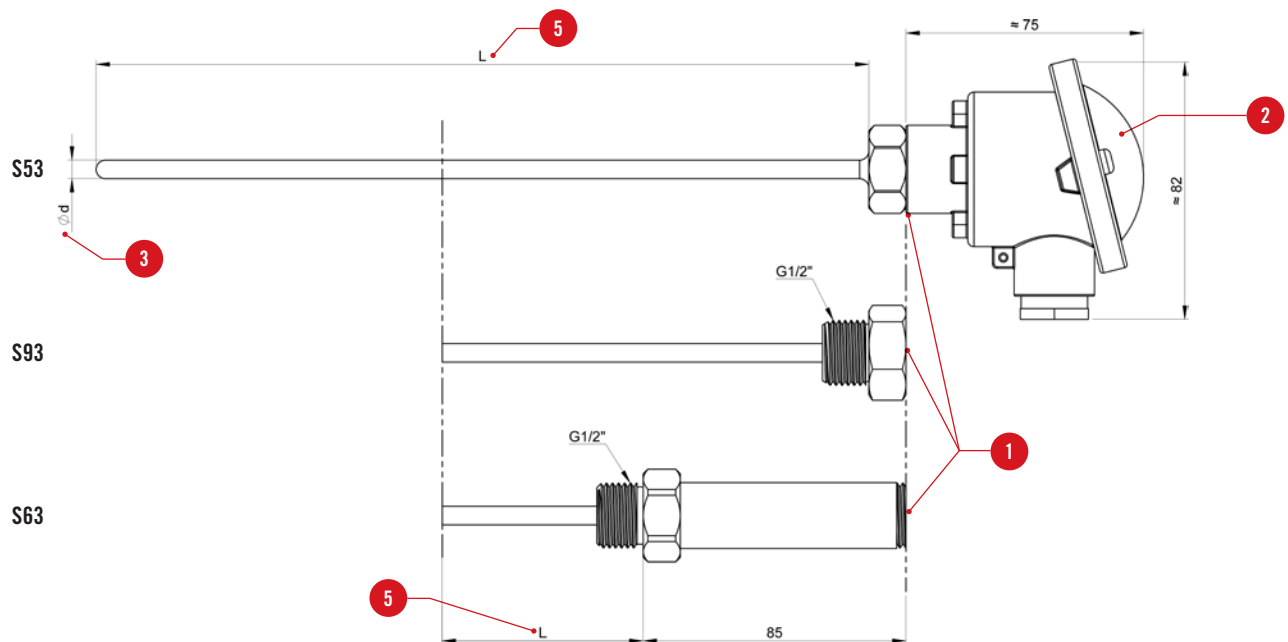
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

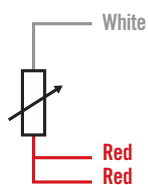
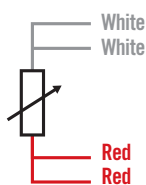
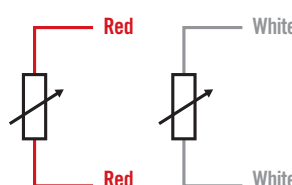
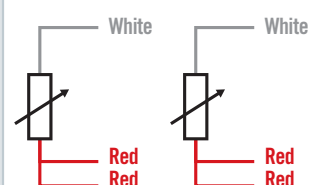
| MODEL | PROCESS CONNECTION | HEAD | TEMP. | Ø (mm) | MOUNTING | LENGTH L (mm) | OPTION | |
|-------------------------------------|--|-------|----------------|---------------|--|---------------|---|-------|
| S | 9 | 3 | 450 | 8 | E | 750 | C | 0/600 |
| Reference in table and DIAGRAM (MM) | 1 | 2 | | 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

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

| 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 |

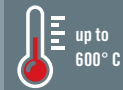
For any other configuration, please contact us.

SPxx

Pt100

CLASS
A

IEC
60751








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



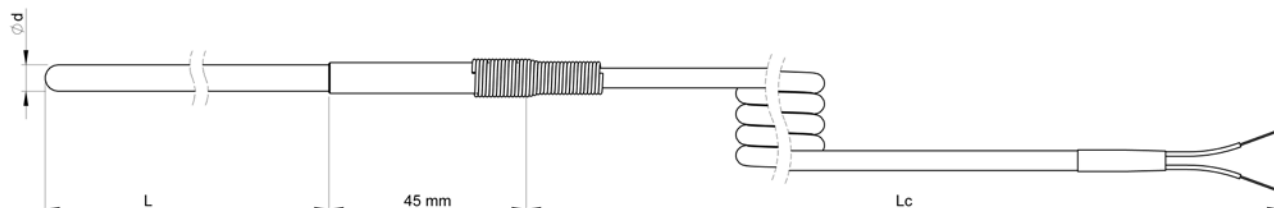
CA 1823
see page 343

TCG1



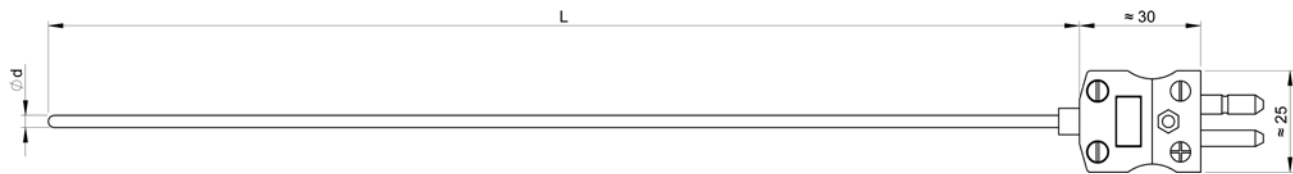
| TC | Sheath type | Ø sheath (mm) | Length L (mm) | Hot junction | Configurator code | Reference |
|----|-------------|---------------|---------------|--------------|-----------------------|-------------|
| 1K | INCONEL 600 | 0,5 | 262 | Insulated | TCG1-1K-CM-0,5-262-I | L220151-009 |
| 1K | INCONEL 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



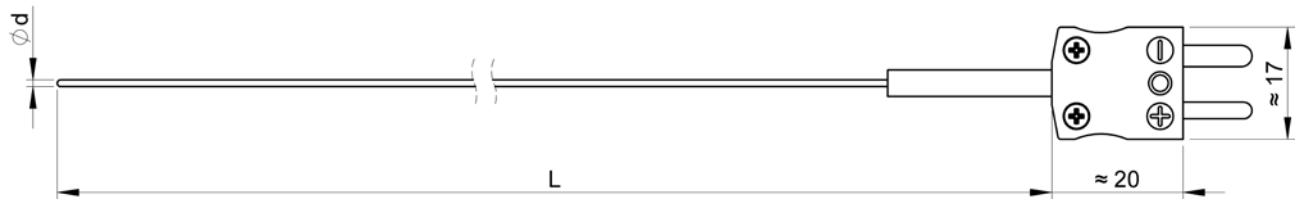
| TC | Sheath type | Ø sheath (mm) | Length L (mm) | Hot junction | Length Lc (mm) | Length L (mm) | Hot junction | Configurator code | Reference |
|----|-------------|---------------|---------------|--------------|----------------|---------------|--------------|---------------------------------|-----------------------------|
| 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



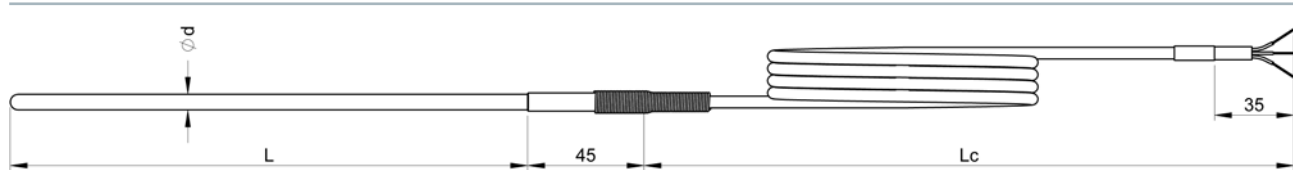
| TC | Sheath type | Ø sheath (mm) | Length L (mm) | Hot junction | Configurator code | Reference |
|----|-------------|---------------|---------------|--------------|-----------------------|--------------------|
| 1K | INCONEL 600 | 1,5 | 250 | Insulated | TCG6-1K-CM-1,5-250-I | L220653-009 |
| 1K | 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

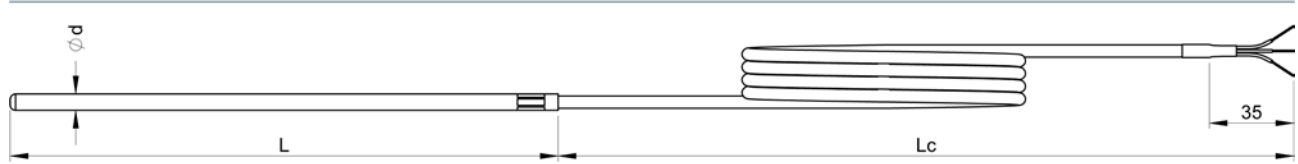


| TC | Sheath type | Ø sheath (mm) | Length L (mm) | Hot junction | Configurator code | Reference |
|----|-------------|---------------|---------------|--------------|------------------------|--------------------|
| 1K | INCONEL 600 | 1 | 250 | Insulated | TCG11-1K-CM-1-250-I | L221152-009 |
| 1K | INCONEL 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

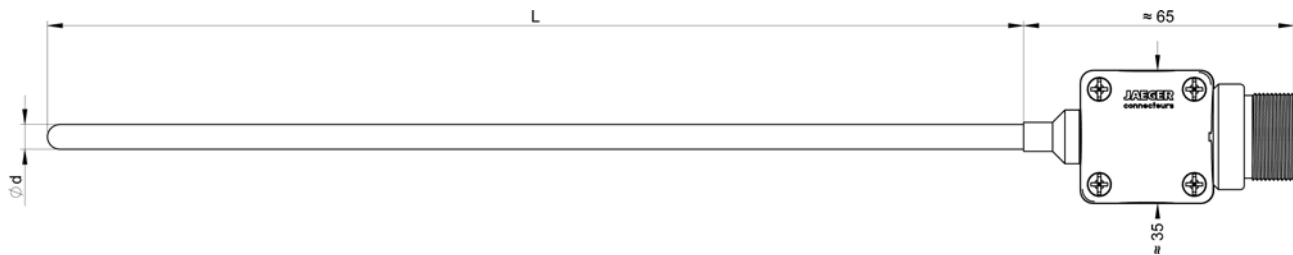


| PT100 number | Mounting | Diameter | Length | Cable | Cable length | Connection | Spring | Class A temperature | Max temperature | Configurator code |
|--------------|----------|----------|--------|-------|--------------|------------|--------|---------------------|-----------------|-------------------------------|
| 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



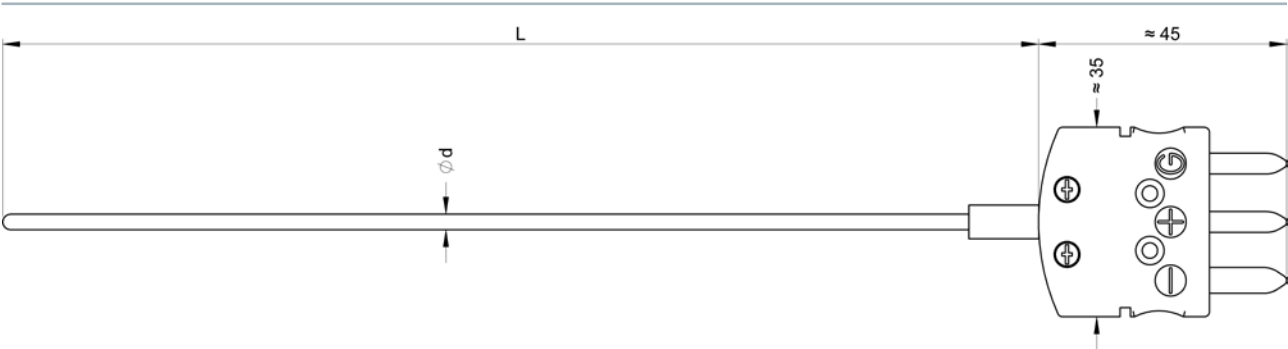
| PT100 number | Mounting | Diameter | Length | Class A temperature | Max temperature | Configurator code |
|--------------|----------|----------|--------|---------------------|-----------------|--------------------|
| 1 | C | 3 | 500 | 450 | 600 | S41-450-C-3-500 |
| 1 | C | 3 | 1000 | 450 | 600 | S41-450-C-3-1000 |
| 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



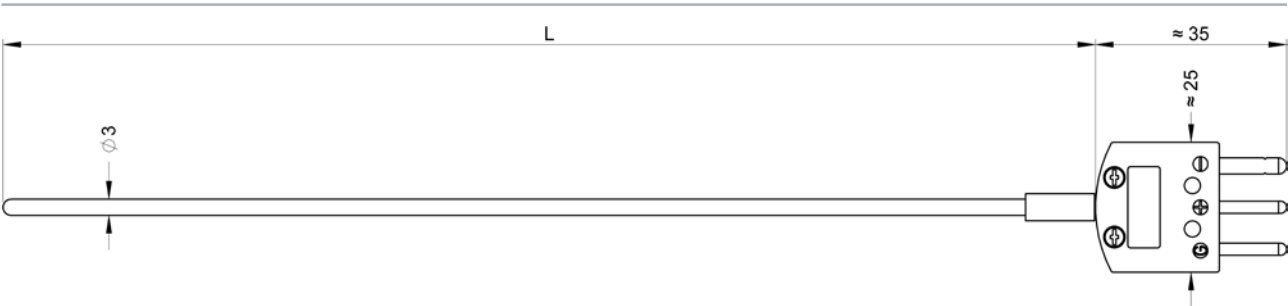
| PT100 number | Mounting | Diameter | Length | Class A temperature | Max temperature | Configurator code |
|--------------|----------|----------|--------|---------------------|-----------------|--------------------|
| 1 | C | 3 | 500 | 450 | 600 | S40-450-C-3-500 |
| 1 | C | 3 | 1000 | 450 | 600 | S40-450-C-3-1000 |
| 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

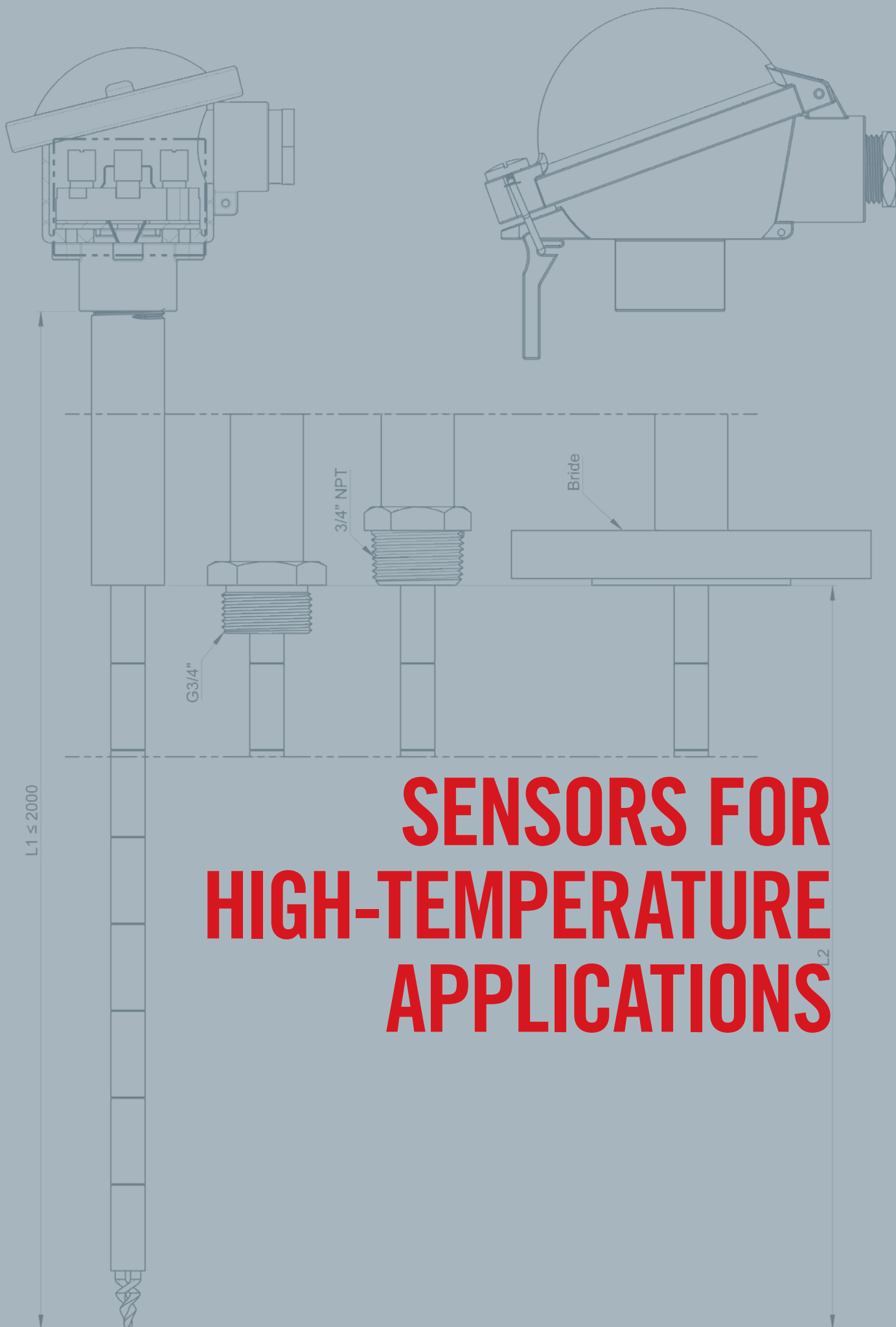


| PT100 number | Diameter | Length | Class A temperature | Max temperature | Configurator code |
|--------------|----------|--------|---------------------|-----------------|-------------------|
| 1 | 3 | 500 | 450 | 600 | S44-450-3-500 |
| 1 | 3 | 1000 | 450 | 600 | S44-450-3-1000 |
| 1 | 3 | 1500 | 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 |

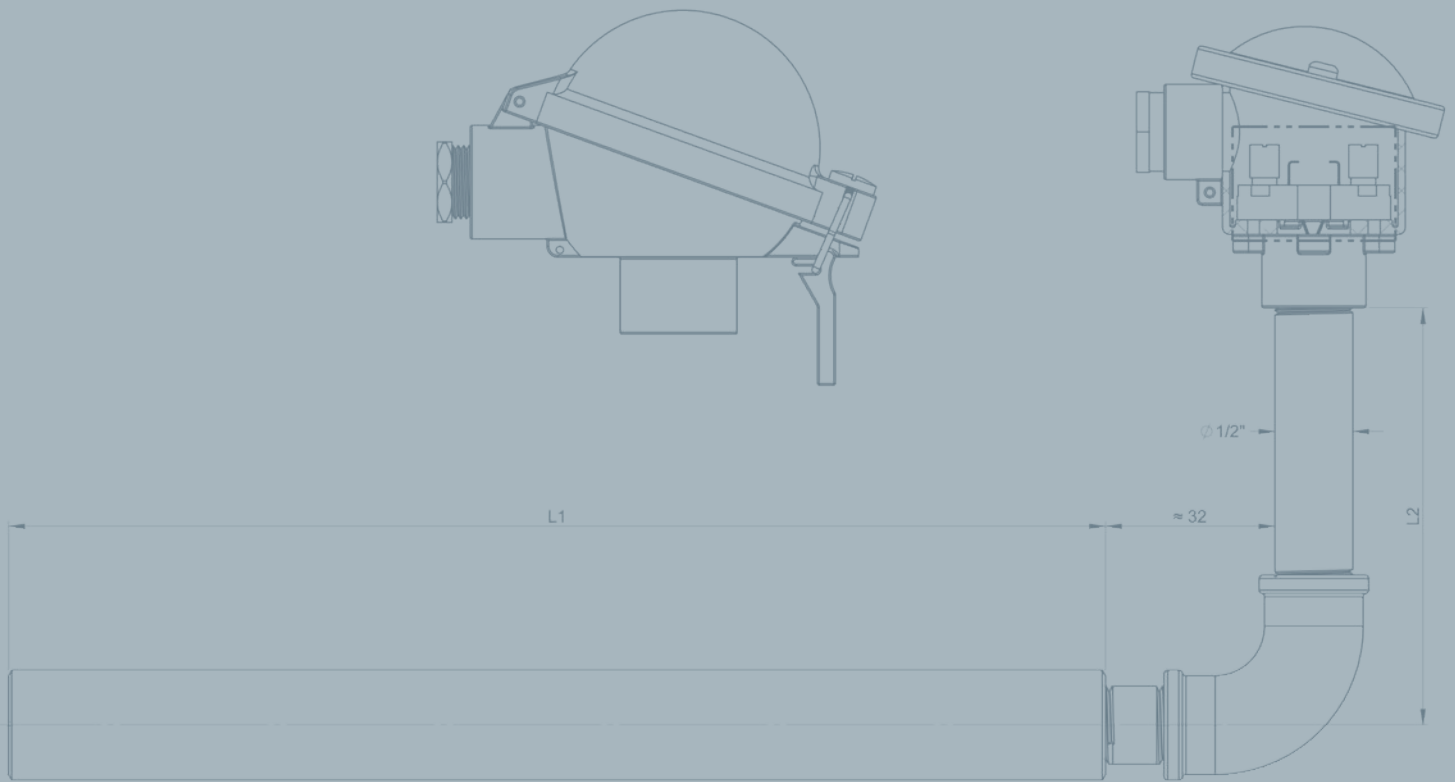
S43



| 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 | | | Straight | Demountable straight | Demountable elbows | Bent |
|-------------------------|---|-------------------------------------|---|---|---|---|
| Protective tube profile | | |  |  |  |  |
| 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 | — | — | — |

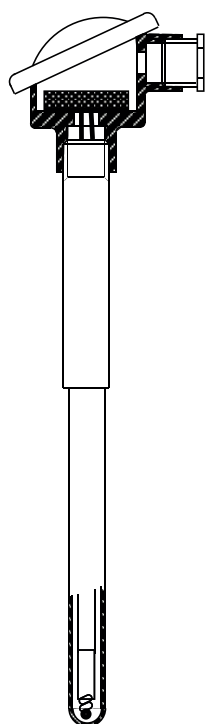
1 CHOOSE YOUR CADID ASSEMBLY



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 | | 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 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

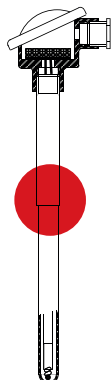
- Choose a thermocouple with a higher temperature withstand
- Increase the diameter of the thermocouple wires
- Protect the thermocouple with a 2nd alumina 710 sheath

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

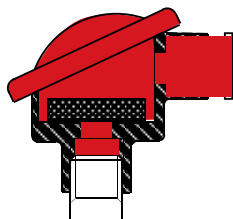
| Series | Atmosphere | Max. temperature | Protective tube material |
|------------------|---------------------------|------------------|--------------------------|
| Normal | Neutral or oxidizing | 800°C | AISI 304L |
| | | 1,050°C | AISI 316L |
| | Reducing | 1,050°C | AISI 446 |
| | | 1,100°C | Inconel 600 |
| | Sulphurous or carburizing | 1,050°C | AISI 446 |
| Reinforced | Corrosive | - | AISI 446 |
| | 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 3/4 sleeve max. | Screw-on cover 1/2 sleeve max. | Captive pivoting cover 1/2 sleeve max. |
| | Easy wiring | The smallest and the most economical | Quick opening/closing Cover part of base |

1 CHOOSE YOUR CADID ASSEMBLY



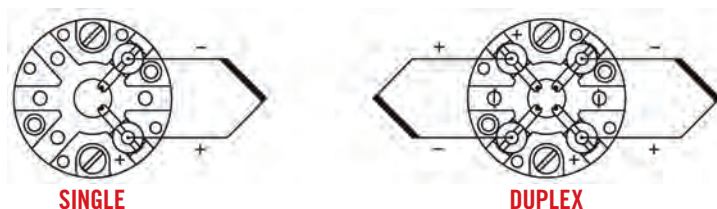
2 CONFIGURE YOUR CADID ASSEMBLY



3 COMMISSIONING GUIDE

ELECTRICAL CONNECTION

Thermocouple wiring DIAGRAM (MM)s



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
54CLASS
1IEC
584-1NF EN
60584-1

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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | LENGTH L1 (mm) | FASTENING | LENGTH L2 (mm) | OPTION | | | | | | | | | | |
|-------------------------------------|------|----------------------|-------------------|------------------------|-----------------|---|-----------------|--|---|-------|---|-----|---|-----|---|---|---|-------|
| 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

| 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

| 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

| 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

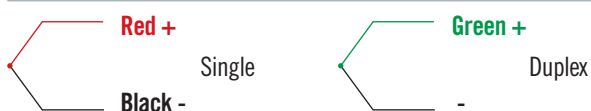
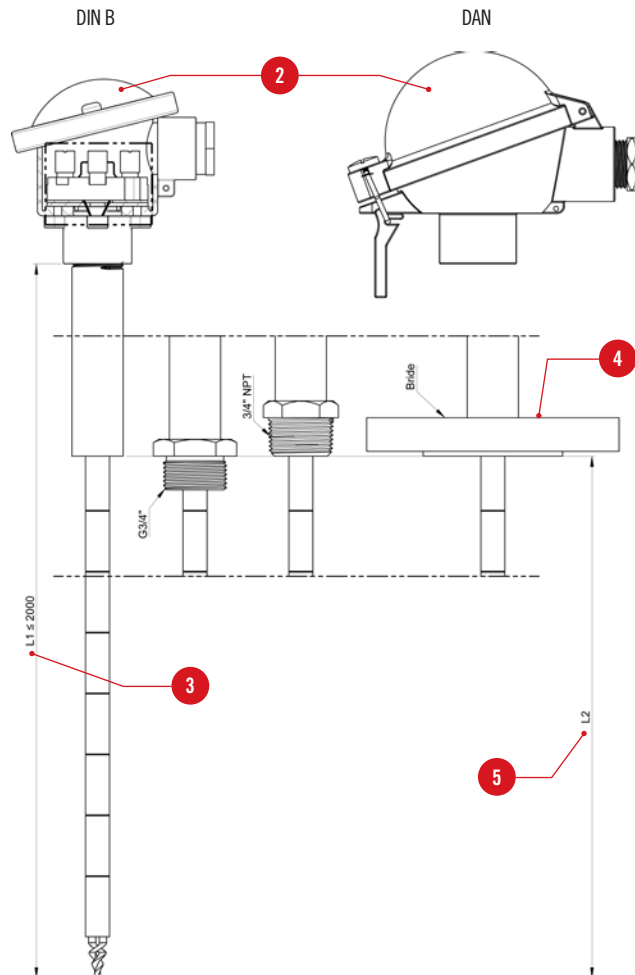


DIAGRAM (MM)



For any other configuration, please contact us.



CADID B

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| | | Necked welded | |
| Protective tube | 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 | |
|-------------------------------------|------|----------------------|-------------------|--------------------------|--|--------------|-----------------|---|-----------------|---|---------|
| 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

| 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 alloy | -40 | +1,000 | 1.5°C or 0.4% of t | 1.5 2.3 3.0 |

FASTENING

| 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

| 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

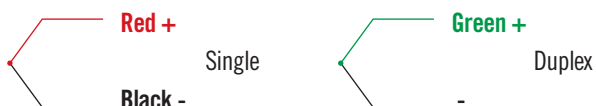
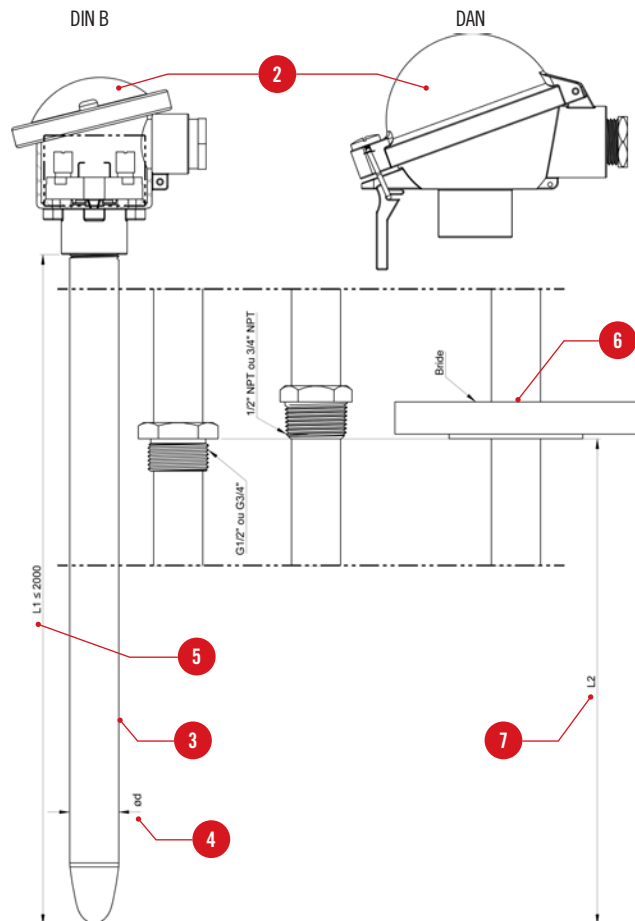


DIAGRAM (MM)



For any other configuration, please contact us.



CADID C

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| | | Necked welded | |
| Protective tube | 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:

| | | | | | | | | | | OPTION | |
|-------------------------------------|------|----------|-------------|------------------------|---------------------------------------|-----------------|---|-----------------|--|-------------------|--|
| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | FASTENING | LENGTH L2 (mm) | TRANSMITTER | 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

| 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 |

FASTENING

| 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

| 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

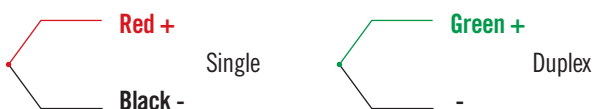
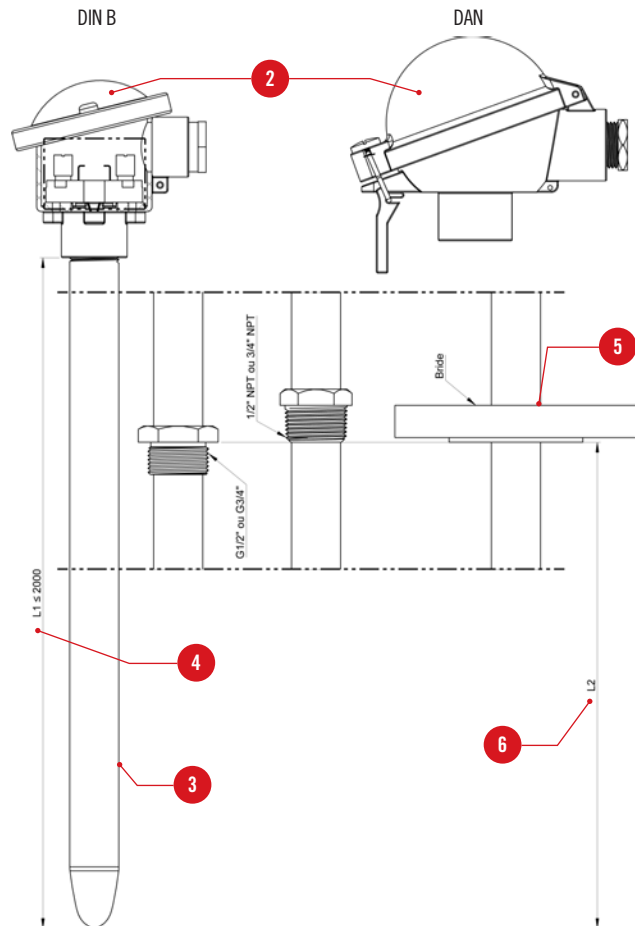


DIAGRAM (MM)



For any other configuration, please contact us.



CADID D

THERMOCOUPLE

IP
54

CLASS
1

IEC
584-1

NF EN
60584-1



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 | |
| | | Metal, drilled from bar stock | |
| Protective tube | 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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | OPTION | | | | | | | | | |
|-------------------------------------|------|----------------------|-------------------|------------------------|--|-----------------|--|-----|---|----|---|-----|---|---|---|-------|
| 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

| 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

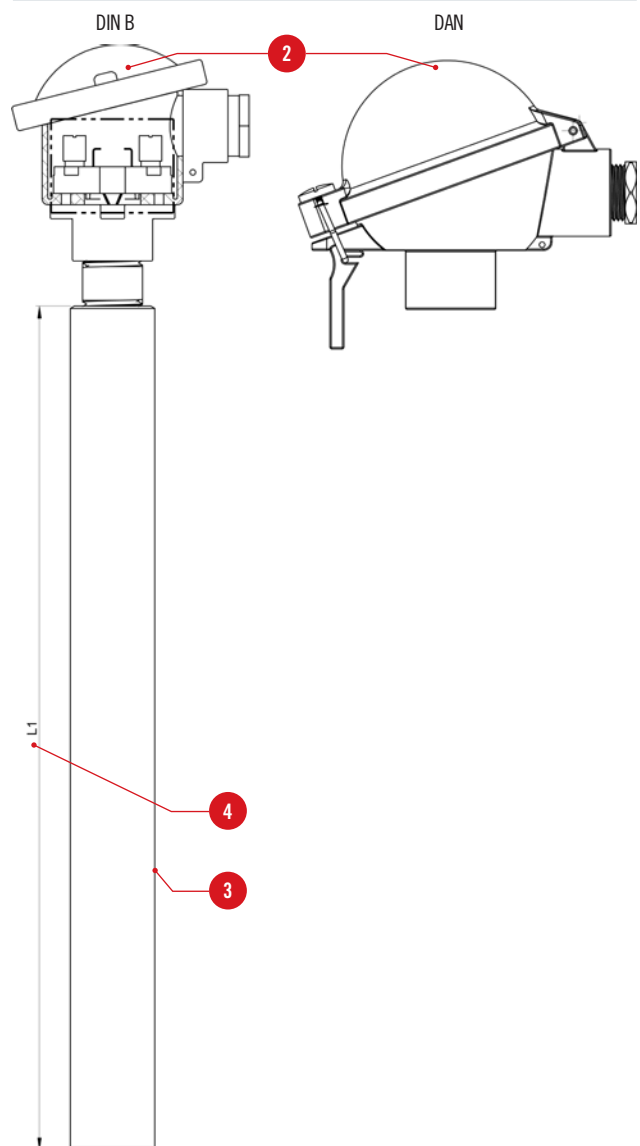
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)





CADID E

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| | | Metal, drilled from bar stock | |
| Protective tube | 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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | OPTION | |
|-------------------------------------|------|----------------------|--------------------|------------------------|--|-----------------|--|-------------------|
| CADID | E | 2S | 0.35 | DIB | BA | 1,200 | TRANSMITTER | TRANSMITTER SCALE |
| | | 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 | |

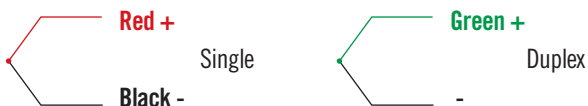
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| Conductor type | | Conductor type °C | | Tolerance values | Ø of wires (mm) |
|----------------|------------------------------------|-------------------|---------|--|---------------------|
| | | Min. | Max. | | |
| 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

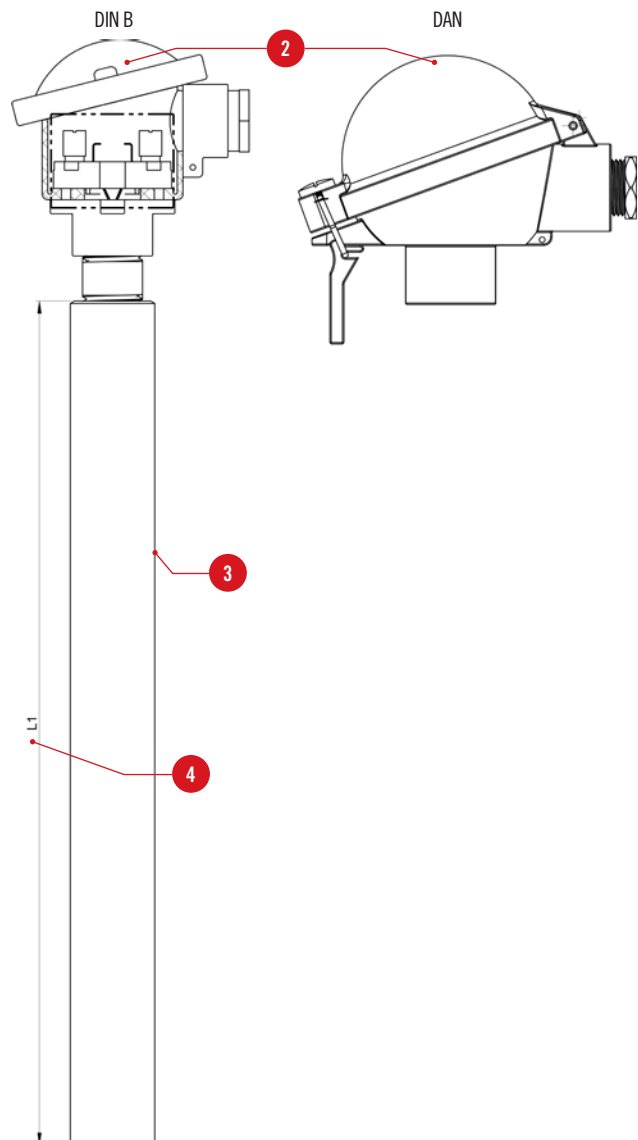
| Transmitter | | | |
|-------------|------------------|---------------------|--------------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)





CADID H

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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

| 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

| 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

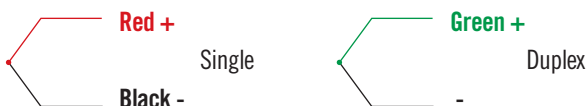
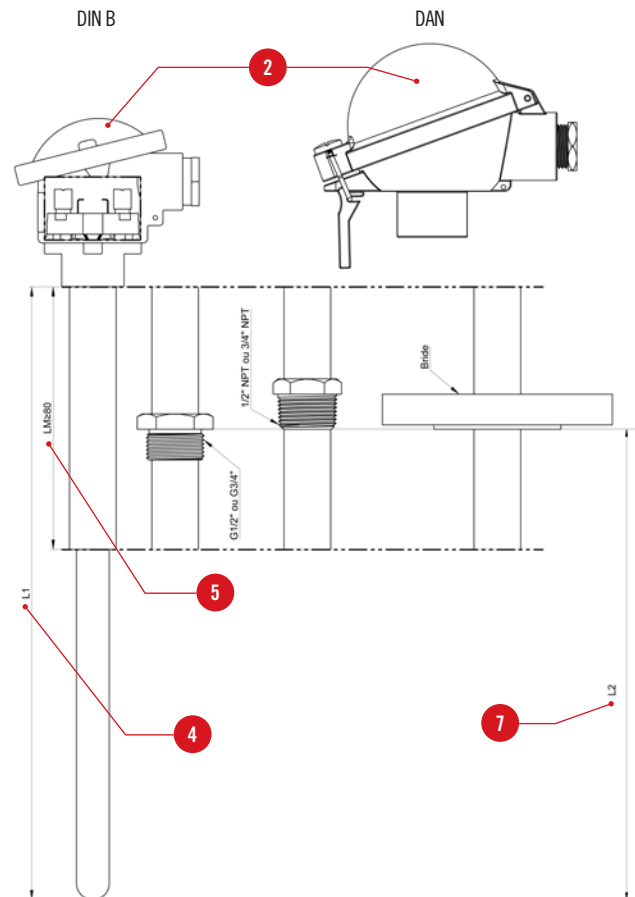
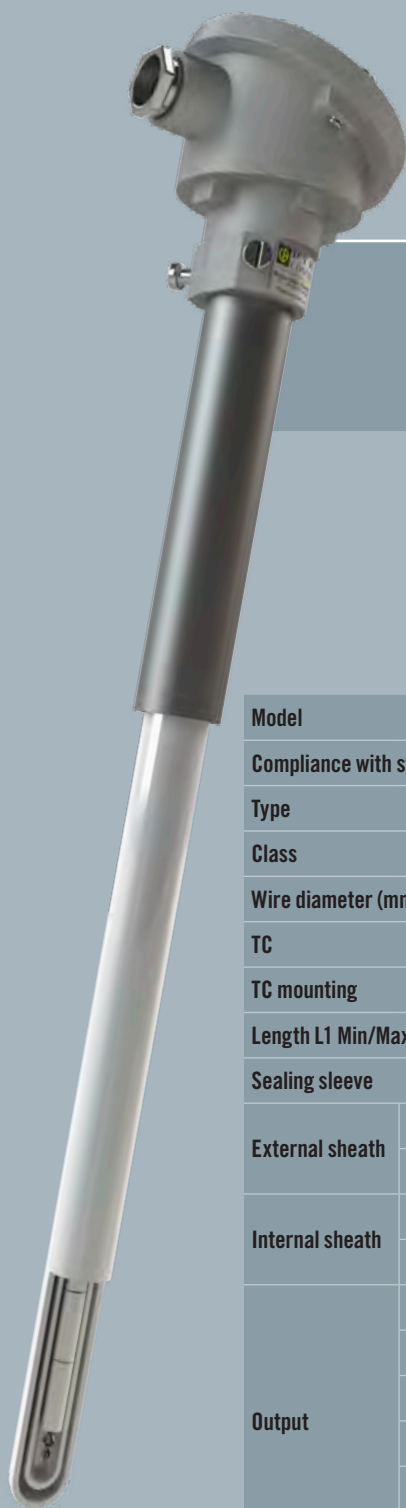


DIAGRAM (MM)



For any other configuration, please contact us.



CADID J

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1up 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

| 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

| 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

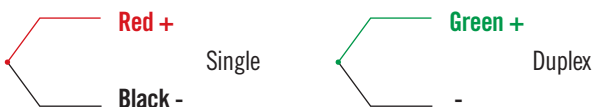
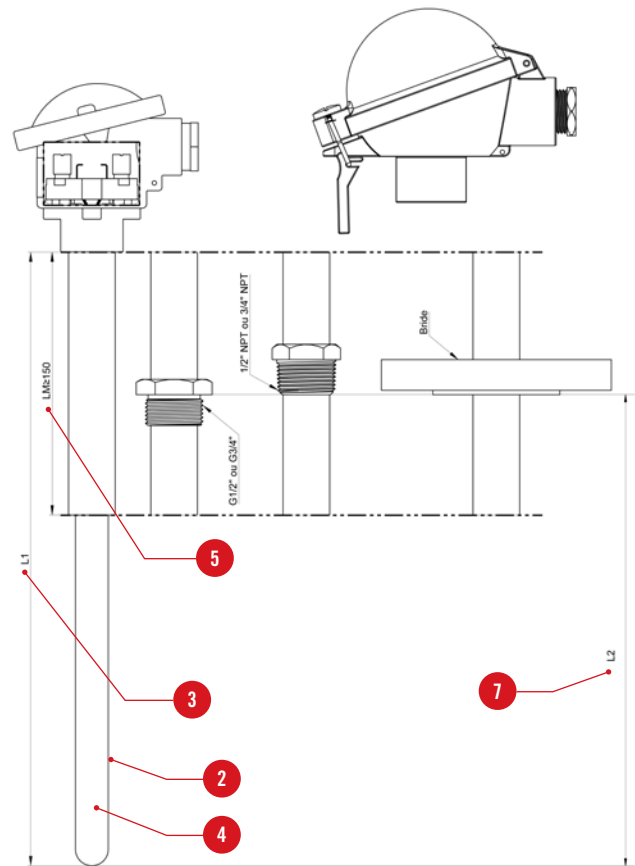


DIAGRAM (MM)



For any other configuration, please contact us.



CADID F

THERMOCOUPLE

IP
54

CLASS
1

IEC
584-1

NF EN
60584-1



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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | OPTION | | | | | | | | | |
|-------------------------------------|------|----------------------|-------------------|------------------------|--|-----------------|--|----|---|----|---|-----|---|---|---|-------|
| 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 | | | | | | | | | |

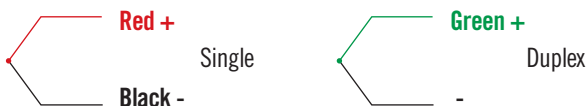
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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 alloy | -40 | +1,000 | 1.5°C or 0.4% of t | 1.5 2.3 3.0 |

TRANSMITTER (1 TC ONLY) - OPTION

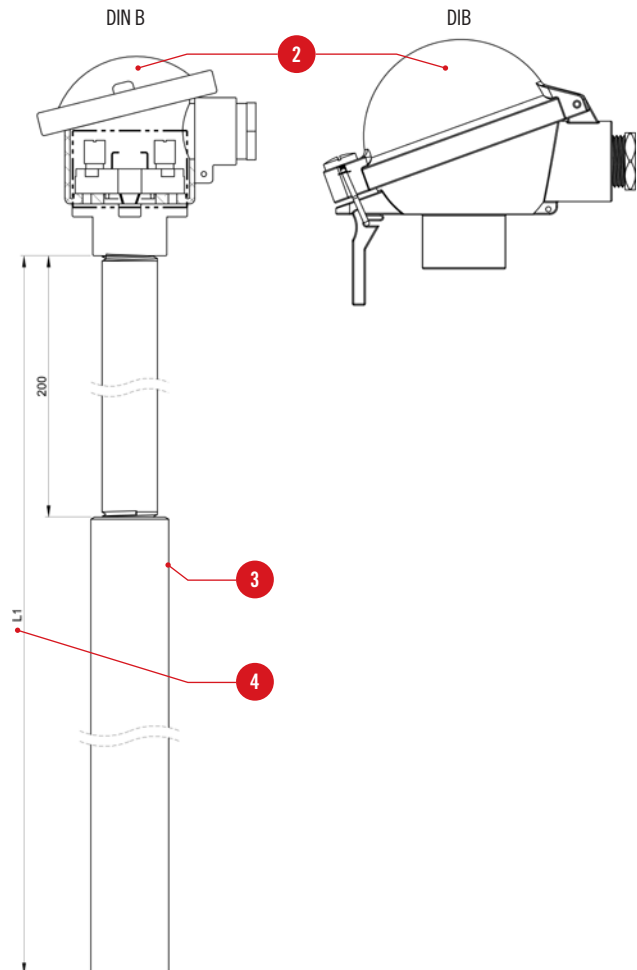
| Transmitter | | | |
|-------------|------------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)





CADID G

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| | | Metal, drilled from bar stock | |
| Protective tube | 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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | OPTION | | | | | | | | | |
|-------------------------------------|------|----------------------|--------------------|------------------------|--|-----------------|--|-----|---|----|---|-----|---|---|---|-------|
| 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

| Conductor type | | Conductor type °C | | Tolerance values | Ø of wires (mm) |
|----------------|---------------------------------|-------------------|---------|---|---------------------------|
| | | Min. | Max. | | |
| 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

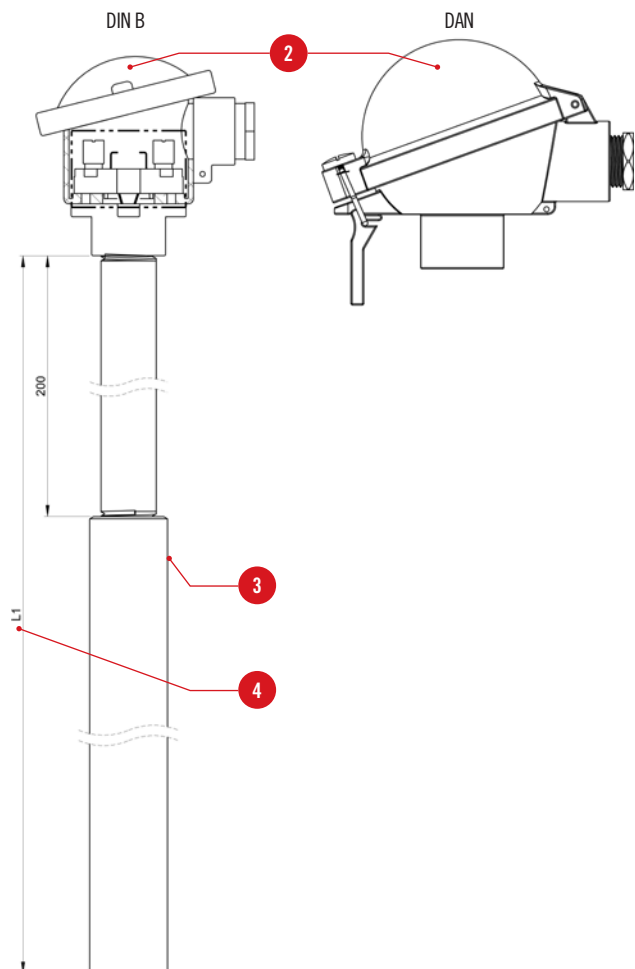
| Transmitter | | | |
|-------------|---------------|---------------------|--------------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)



CADID LB

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | Ø PROT. | LENGTH L1 (mm) | LENGTH L2 (mm) | OPTION | |
|-------------------------------------|------|----------------------|-------------------|------------------------|---|--------------|-----------------|-----------------|--|---------|
| 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 | |

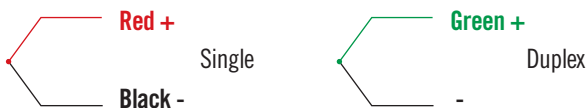
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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 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

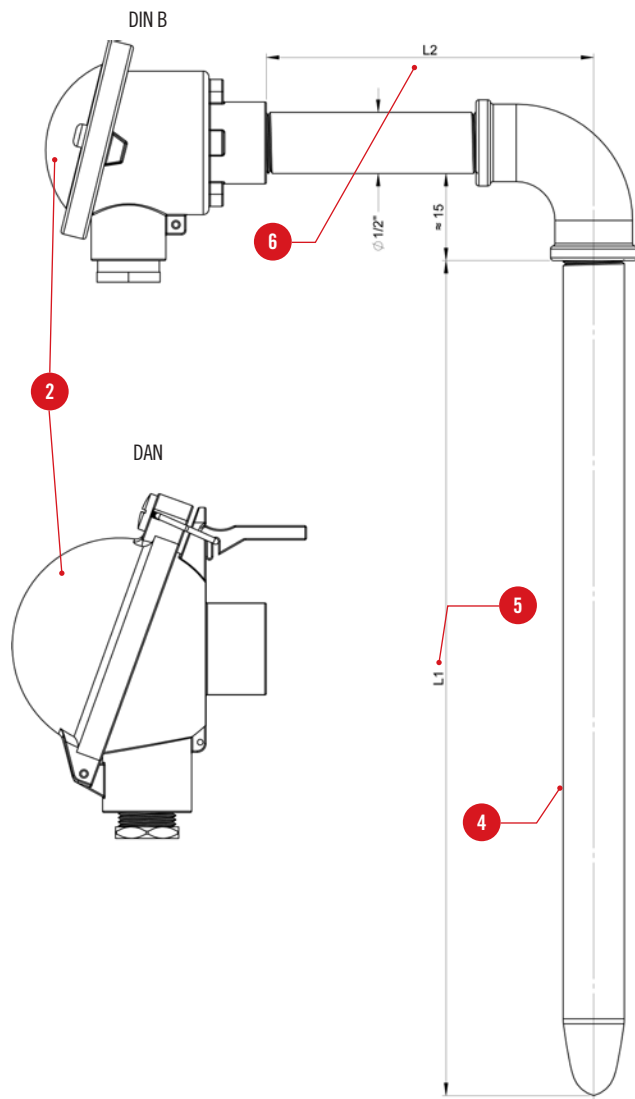
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)



CADID LC

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| | | Necked welded | |
| Protective tube | 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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | Ø PROT. | LENGTH L1 (mm) | LENGTH L2 (mm) | OPTION | |
|-------------------------------------|------|----------|-------------|------------------------|---------------------------------------|--------------|-----------------|-----------------|--|-------|
| 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 | |

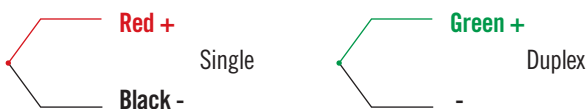
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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 |

TRANSMITTER (1 TC ONLY) - OPTION

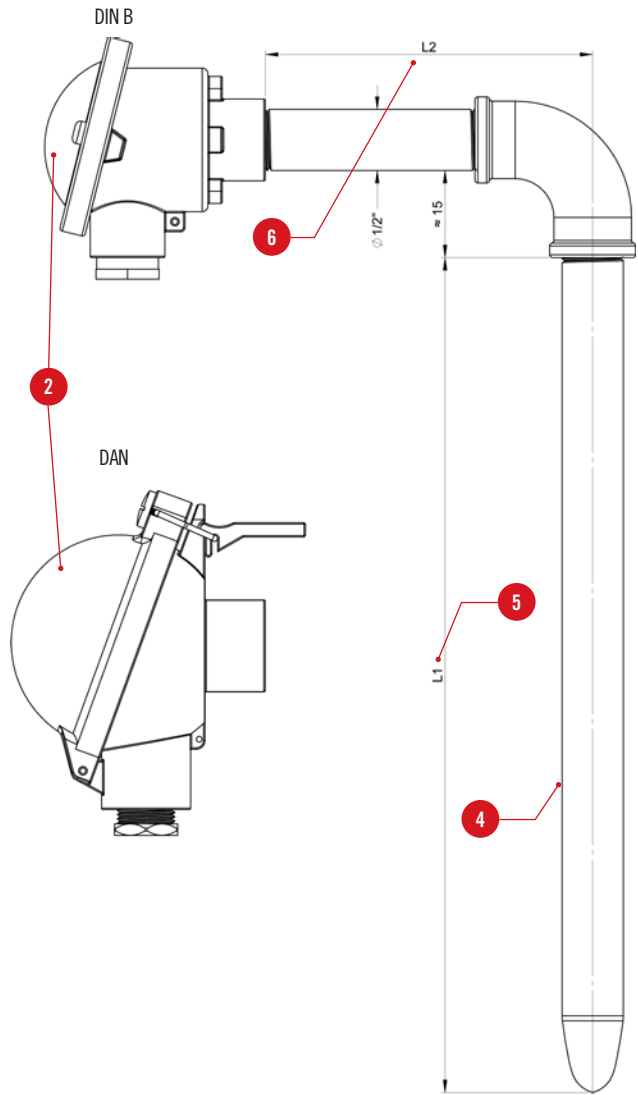
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



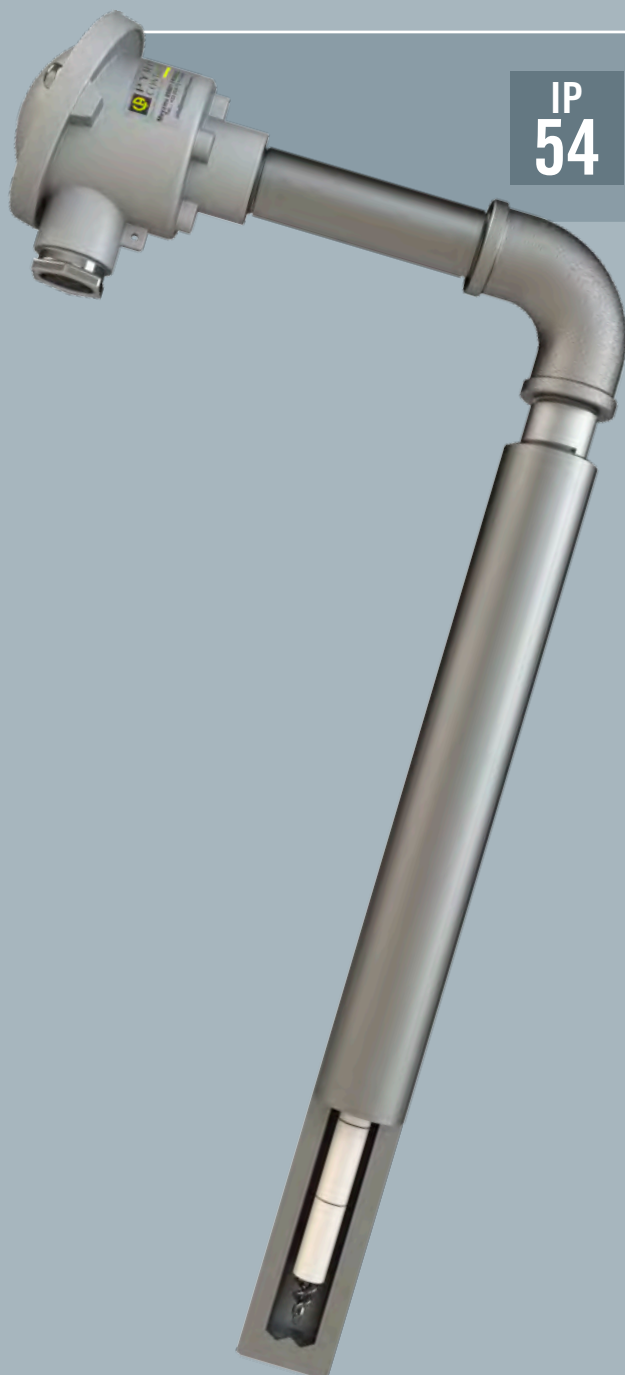
For any other configuration, please contact us.

DIAGRAM (MM)



CADID LD

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

DESCRIPTION

Demountable elbowed temperature measurement assembly

CARACTÉRISTIQUES

| | | | |
|---------------------------|-------------|--|-------|
| 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" | |
| | | Metal, drilled from bar stock | |
| Protective tube | 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:

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | LENGTH L2 (mm) | OPTION | |
|-------------------------------------|------|--------------------|-------------------|------------------------|--|-----------------|-----------------|--|-------|
| 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 | |

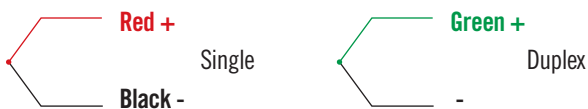
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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

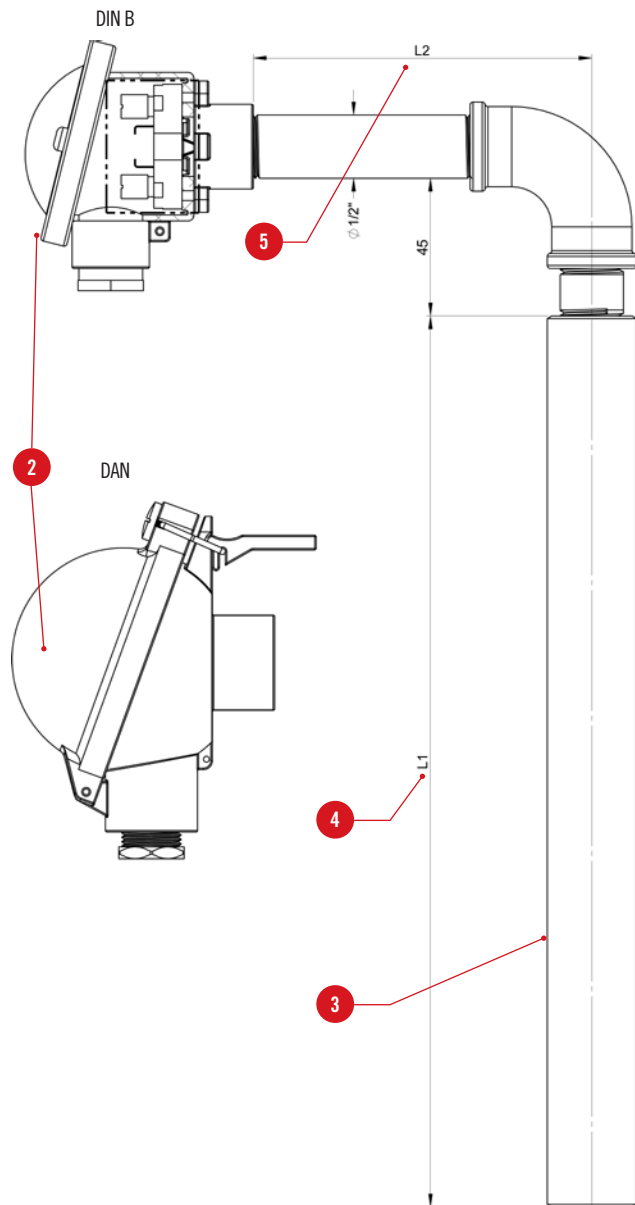
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



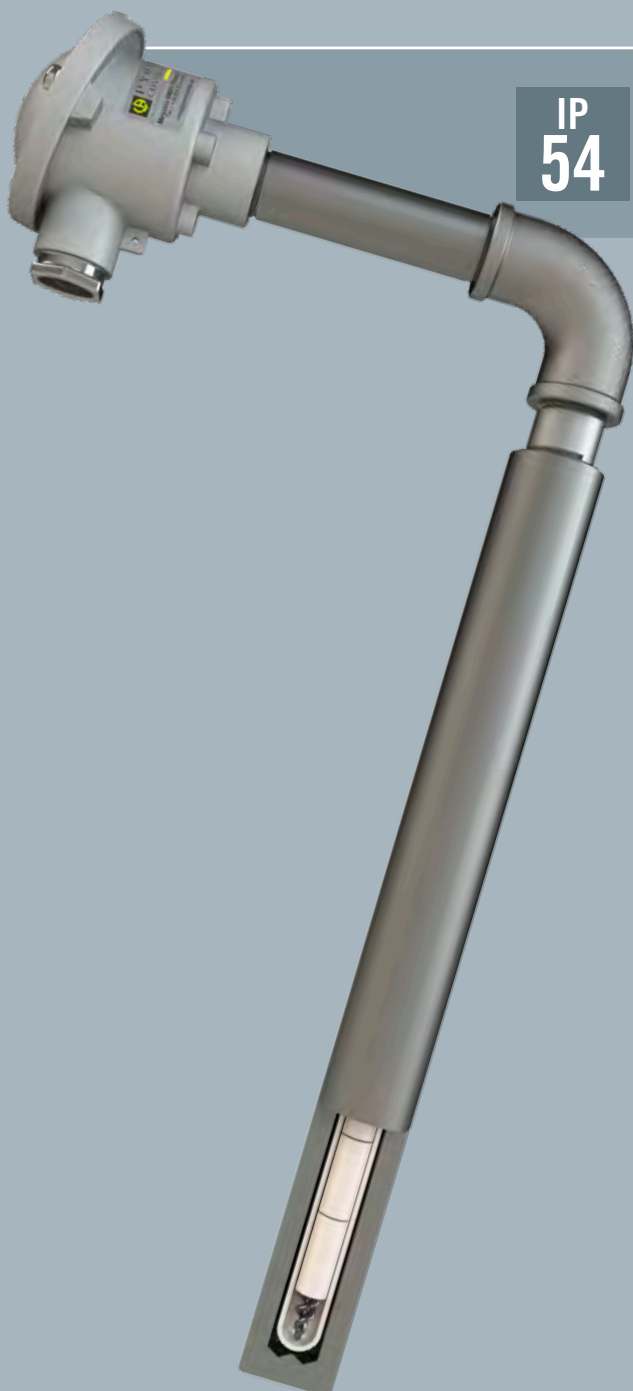
For any other configuration, please contact us.

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

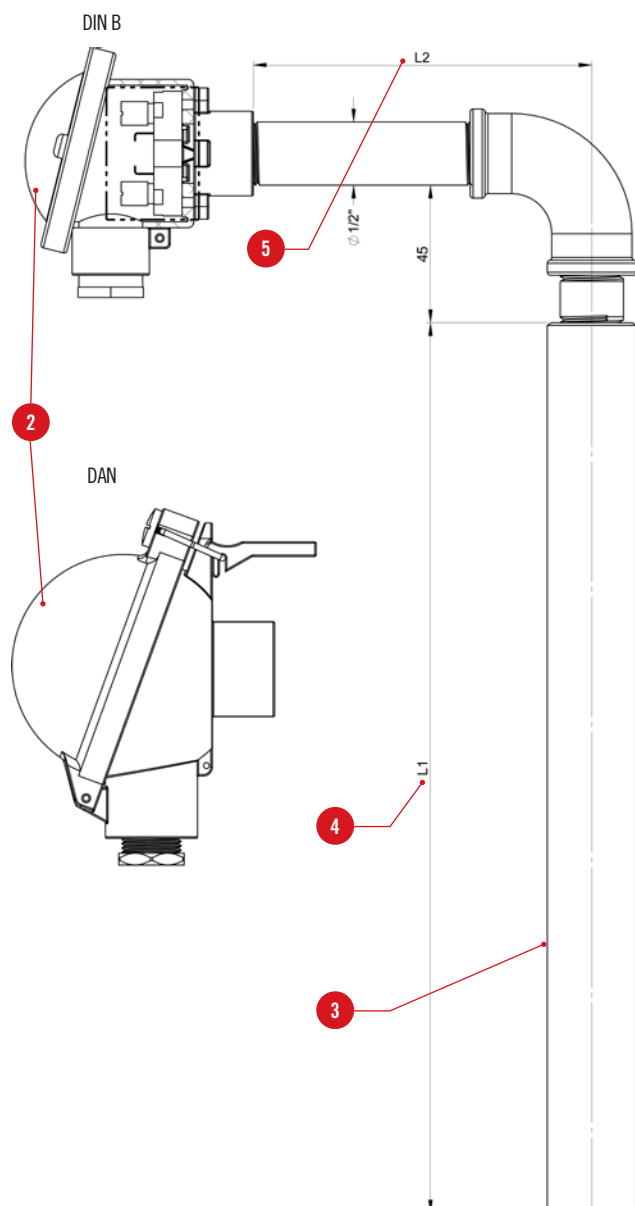
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | TYPE | TC | Ø WIRE | HEAD | PROTECTIVE TUBE | LENGTH L1 (mm) | LENGTH L2 (mm) | OPTION | |
|-------------------------------------|------|----------------------|--------------------|------------------------|--|-----------------|-----------------|--|---|
| 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

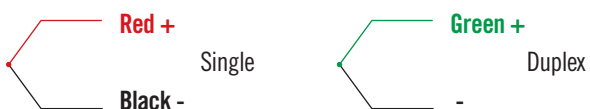
| Conductor type | | Conductor type °C | | Tolerance values | Ø of wires (mm) |
|----------------|---------------------------------|-------------------|---------|---|---------------------------|
| | | Min. | Max. | | |
| K | Nickel-Chrome / Nickel | - 40 | + 1,000 | 1.5°C or 0.4% of t | 1.5 |
| S | 10% 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 |

DIAGRAM (MM)

TRANSMITTER (1 TC ONLY) - OPTION

| 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.

CADID XB

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | WIRE | HEAD | PROTECTIVE TUBE | Ø PROT. | LENGTH L1 (mm) | LENGTH L2 (mm) | LENGTH L3 (mm) | OPTION | |
|-------------------------------------|------|----------------------|-------------------|------------------------|--|--------------|-----------------|----------------|----------------|--|---------|
| 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

| 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

| 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

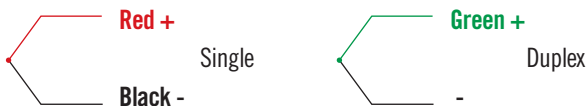
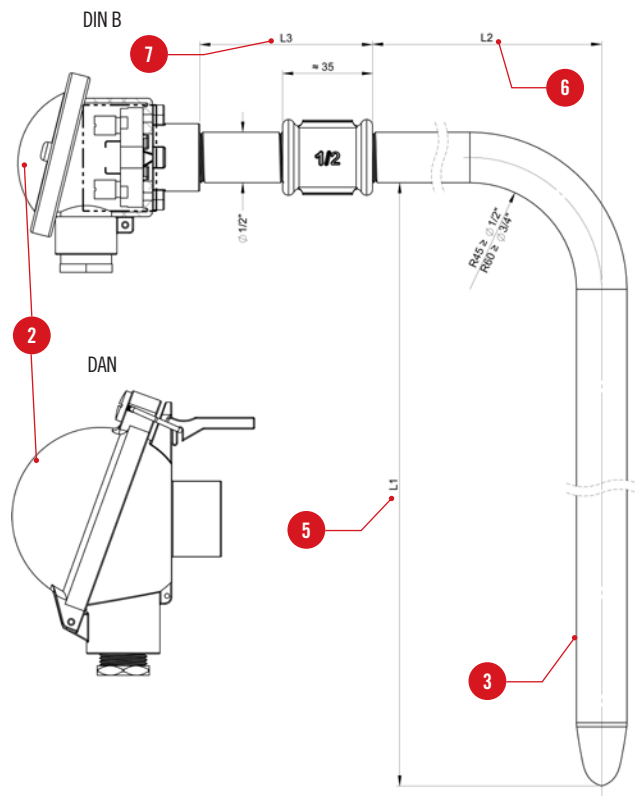


DIAGRAM (MM)



For any other configuration, please contact us.



CADID XC

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| Sortie | Diameter | 1/2" - 3/4" | |
| | 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:

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 | | | | | | | | | | | | |
|-------------------------------------|------|----------|-------------|------------------------|---------------------------------------|--------------|-----------------|----------------|----------------|--|---|------|---|-----|---|-----|---|-----|---|---|---|-------|
| 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

| 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 |
| | | | | | |

TRANSMITTER (1 TC ONLY) - OPTION

| 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

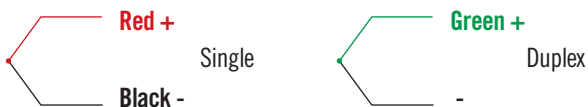
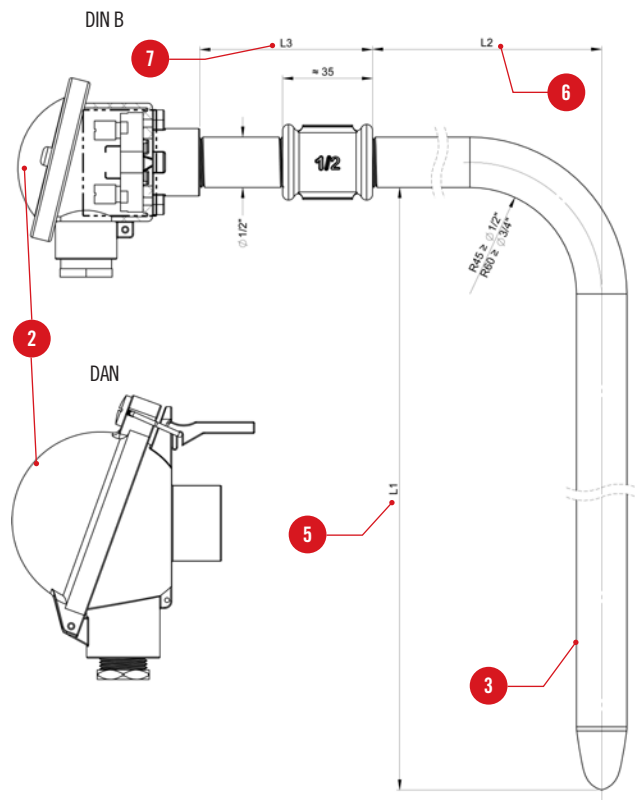


DIAGRAM (MM)



For any other configuration, please contact us.



CADID XD

THERMOCOUPLE

IP
54

CLASS
1

IEC
584-1

NF EN
60584-1



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:

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 | |
|-------------------------------------|------|----------------------|-------------------|------------------------|--|-----------------|----------------|----------------|--|-------|
| 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 | |

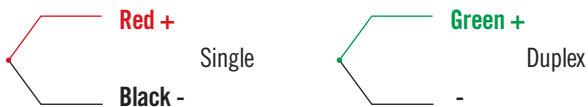
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| 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

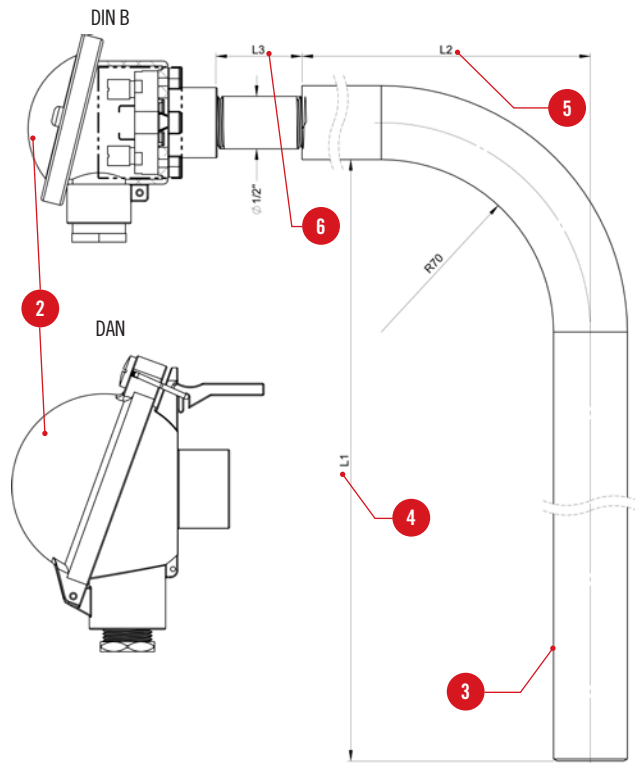
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTION ON TERMINAL STRIP



For any other configuration, please contact us.

DIAGRAM (MM)



CADID XE

THERMOCOUPLE

IP
54CLASS
1IEC
584-1NF EN
60584-1

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 | |
| Internal sheath | Diameter | 30 x 7 mm | |
| | Material | Ceramic 610 | |
| Output | Diameter | 15 x 2 mm | |
| | 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 | |
| Accessories (p. 338) | | IP54 | |
| | | Extension cables, compensation cables | |

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

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 | |
|-------------------------------------|------|----------------------|--------------------|------------------------|--|-----------------|----------------|----------------|--|-------|
| 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 | |

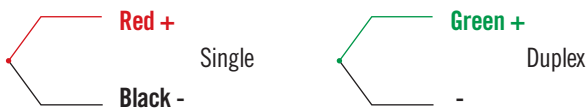
TABLE OF CONDUCTOR TYPE - WIRE DIAMETER

| Conductor type | | Conductor type °C | | Tolerance values | Ø of wires (mm) |
|----------------|---------------------------------|-------------------|--------|---|---------------------------|
| | | Min. | Max. | | |
| 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

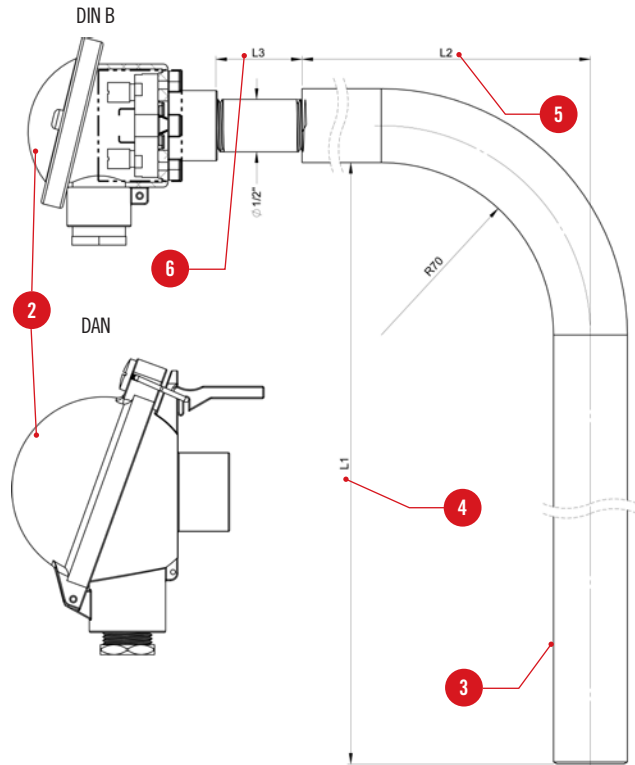
| Transmitter | | | |
|-------------|---------------|---------------------|--------------------|
| Input | Output | Galvanic insulation | Reference |
| TC | 4-20mA | 1.5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

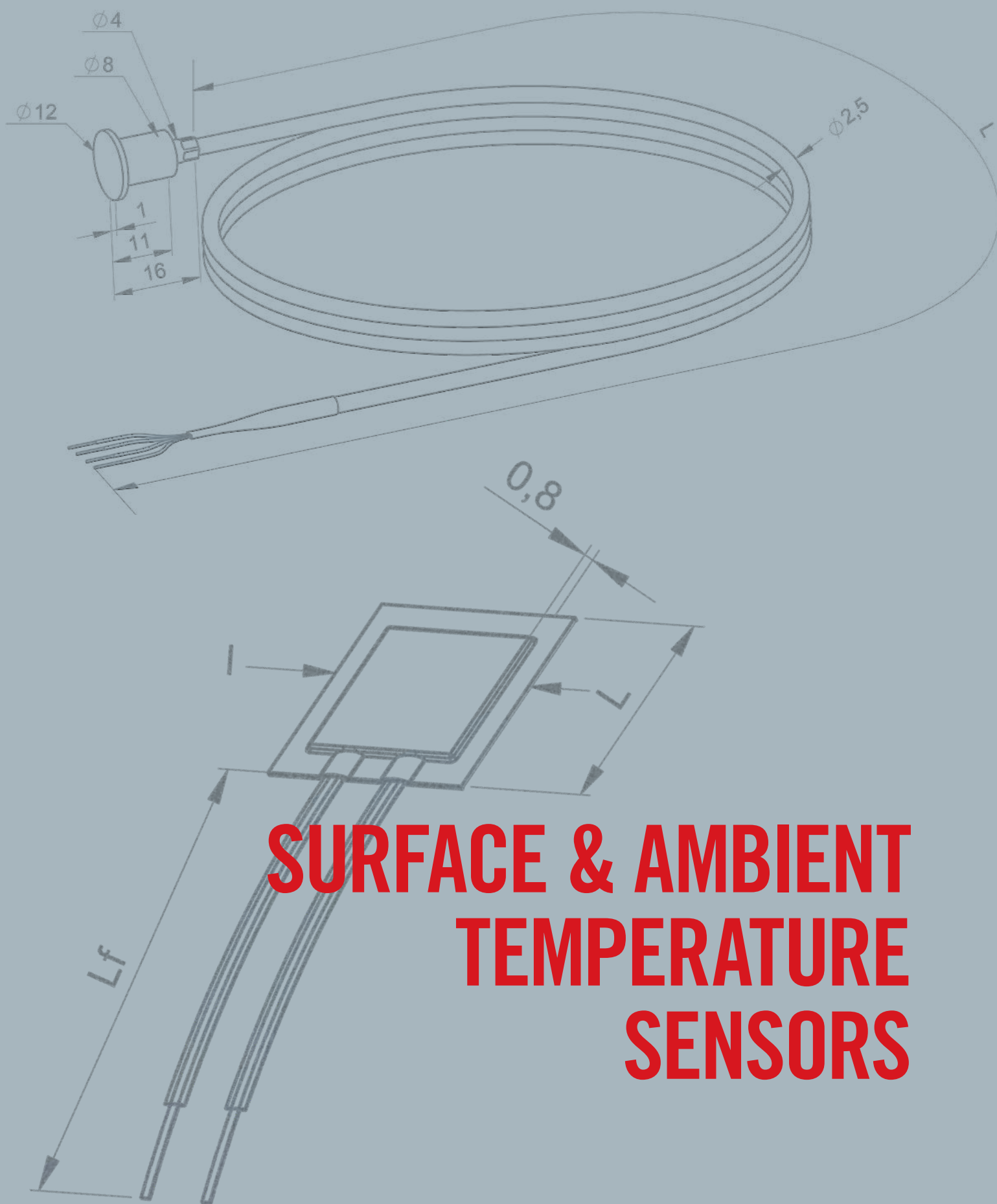
CONNECTION ON TERMINAL STRIP



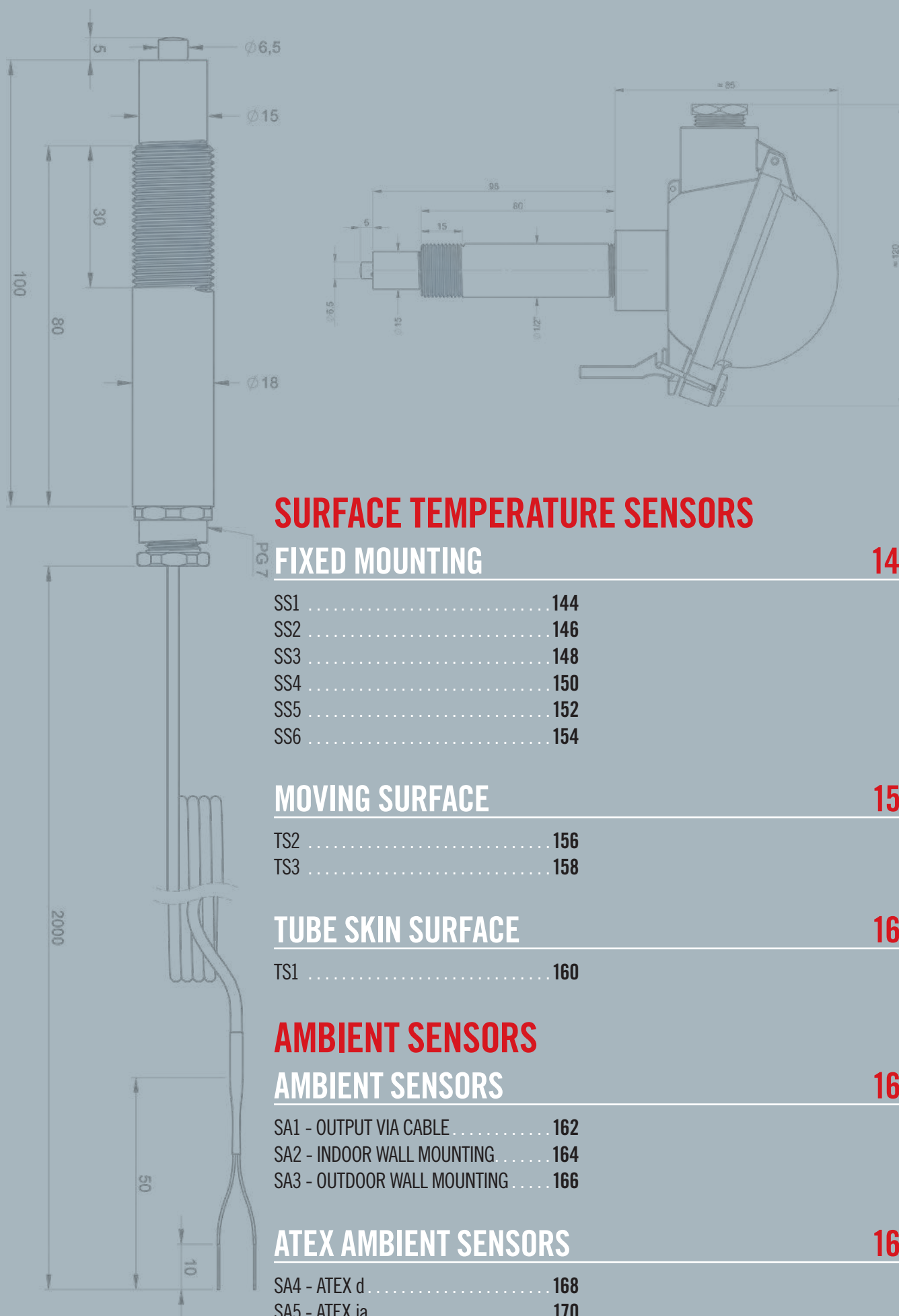
For any other configuration, please contact us.

DIAGRAM (MM)





SURFACE & AMBIENT TEMPERATURE SENSORS



SURFACE TEMPERATURE SENSORS

FIXED MOUNTING

144

| | |
|-----------|-----|
| SS1 | 144 |
| SS2 | 146 |
| SS3 | 148 |
| SS4 | 150 |
| SS5 | 152 |
| SS6 | 154 |

MOVING SURFACE

156

| | |
|-----------|-----|
| TS2 | 156 |
| TS3 | 158 |

TUBE SKIN SURFACE

160

| | |
|-----------|-----|
| TS1 | 160 |
|-----------|-----|

AMBIENT SENSORS

AMBIENT SENSORS

162

| | |
|-----------------------------------|-----|
| SA1 - OUTPUT VIA CABLE | 162 |
| 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**

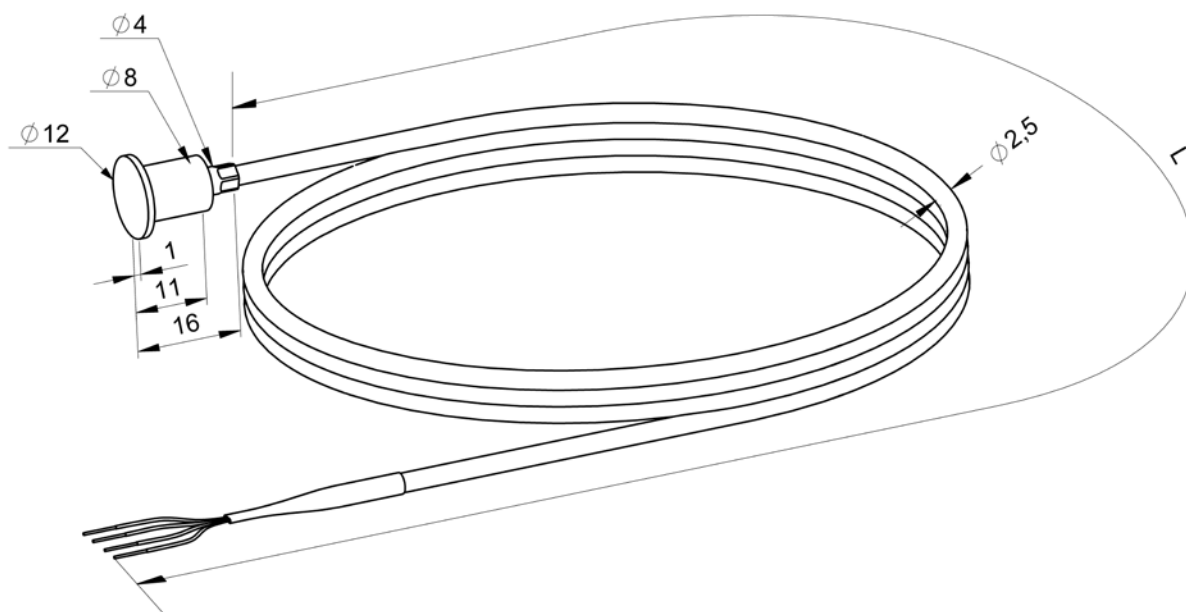
 up to
200°C

DESCRIPTION

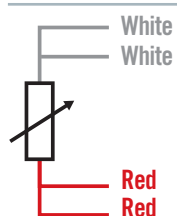
Pt100 sensor, Class B, 4 wires, as per IEC 60751, on Dural plate, output via FEP cable, for temperature measurement up to 200°C. Fastening by gluing or insertion in the material.

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 mm ² 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 |

CONNECTIONS

For any other configuration, please contact us.

SS2

Pt100

CLASS
BIEC
60751

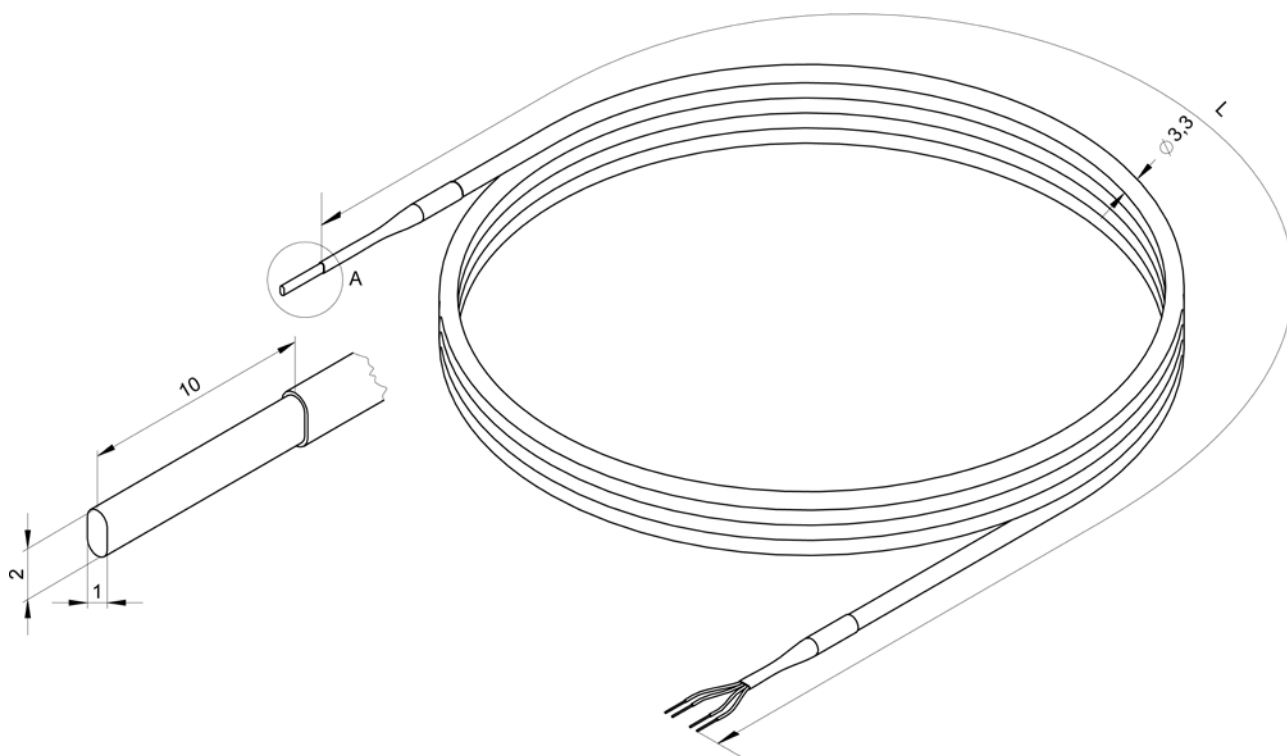
DESCRIPTION

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 mm ² , copper |
| | Length L (mm) | 1,000 / 2,000 / 5,000 mm |
| | Termination | Insulated bare wires |
| Fastening | By gluing on the surface | |

DIAGRAM (MM)

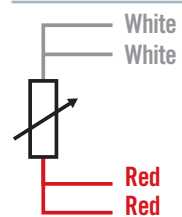


TO ORDER

| 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**

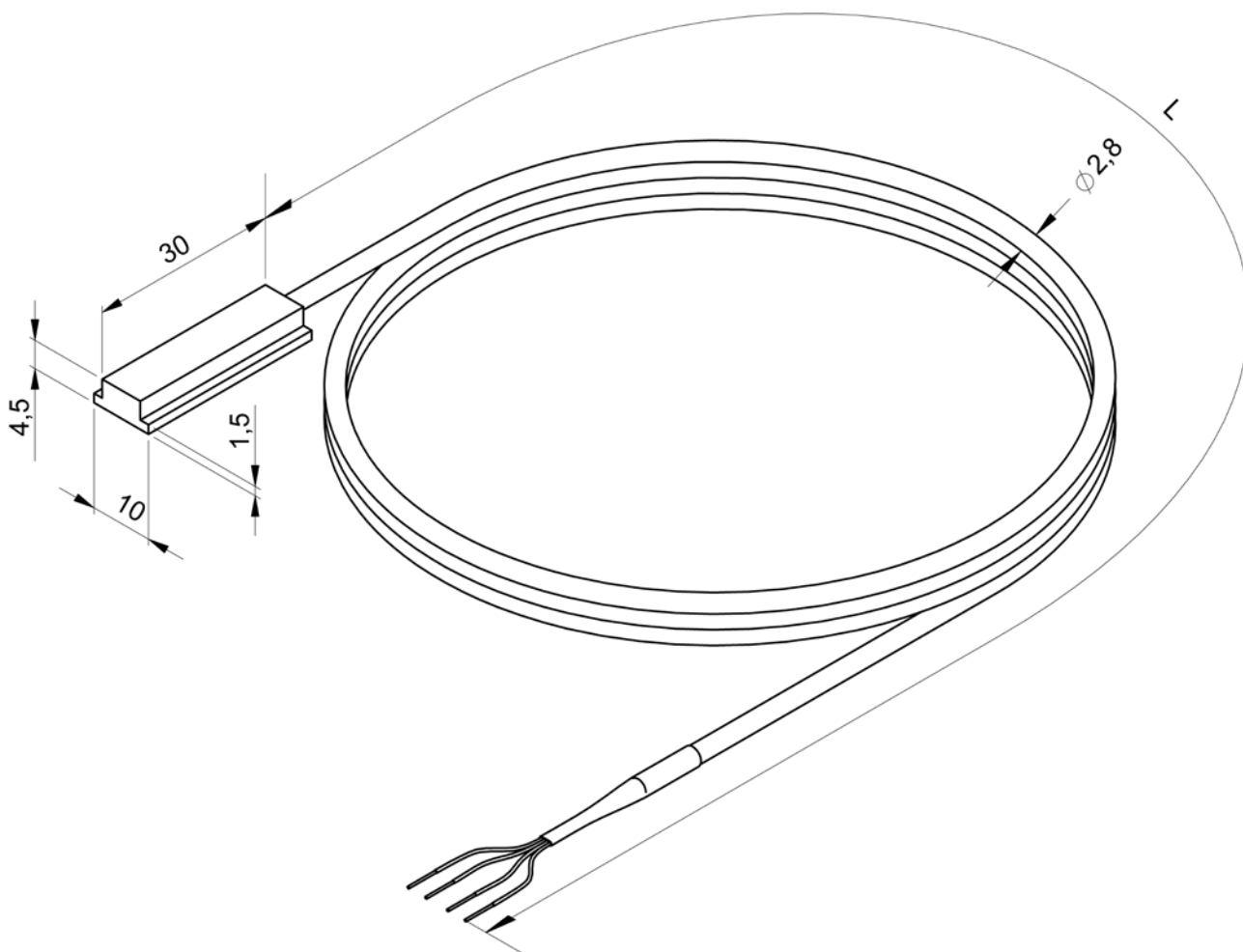

DESCRIPTION

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 mm ² , 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)

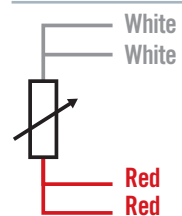


TO ORDER

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

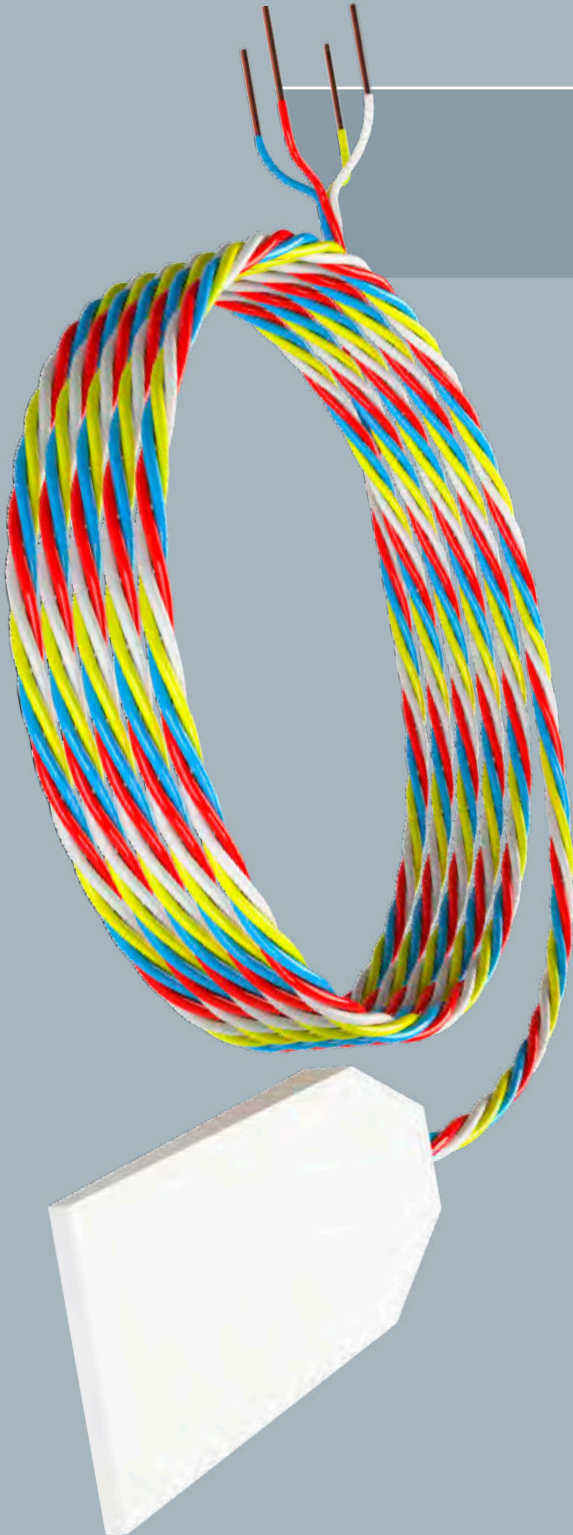
For any other configuration, please contact us.

CONNECTIONS



SS4

Pt100



CLASS
B

IEC
60751



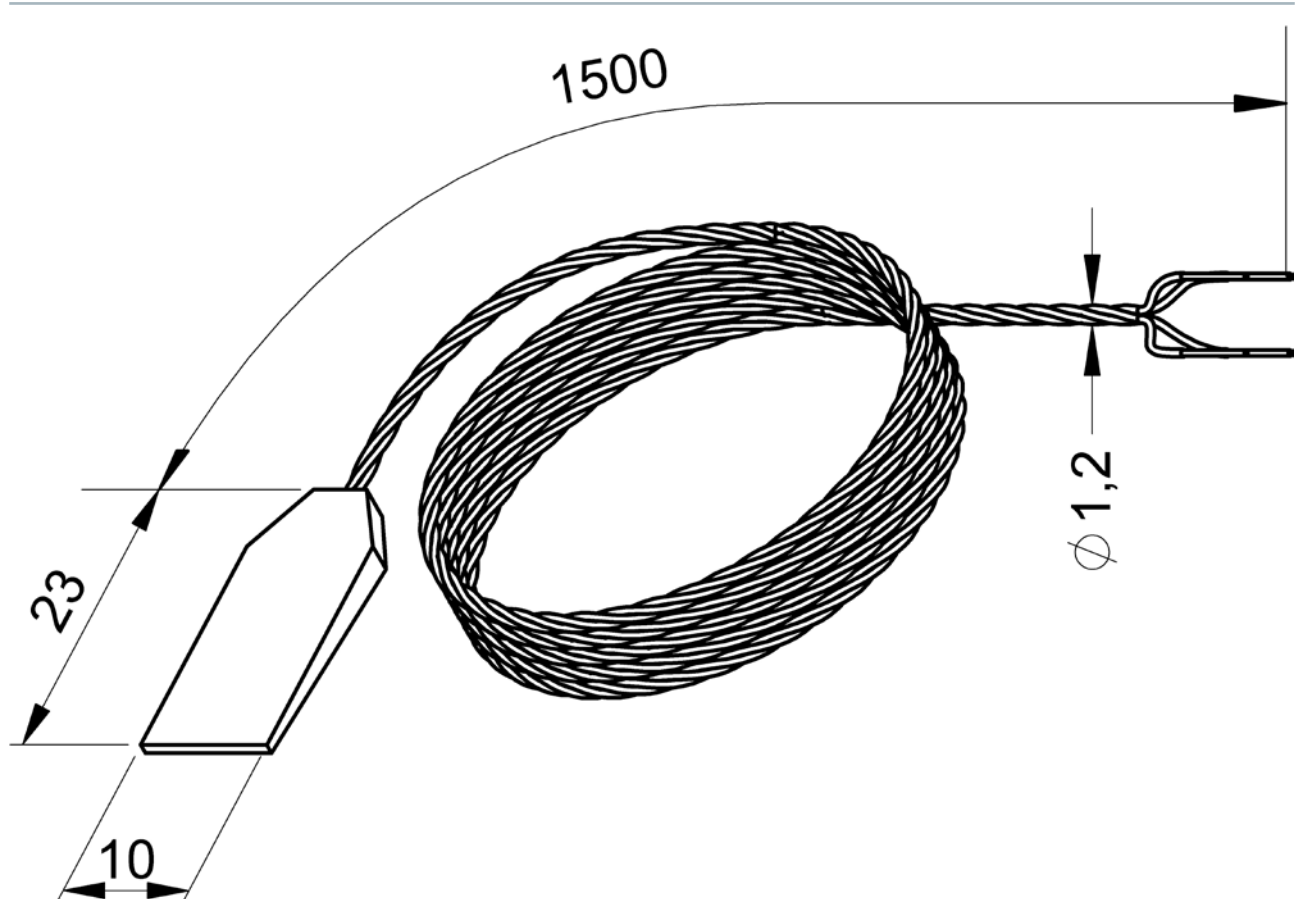
DESCRIPTION

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 mm ² , silver-plated copper |
| | Length L (mm) | 1,500 mm |
| | Termination | Insulated bare wires |
| Fastening | | By gluing |

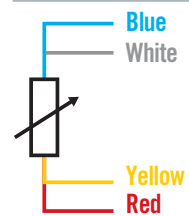
DIAGRAM (MM)



TO ORDER

| Cable length (mm) | Reference |
|-------------------|-------------|
| 1500 | L061822-000 |

CONNECTIONS



SS5

Pt100

**CLASS
B****IEC
60751**

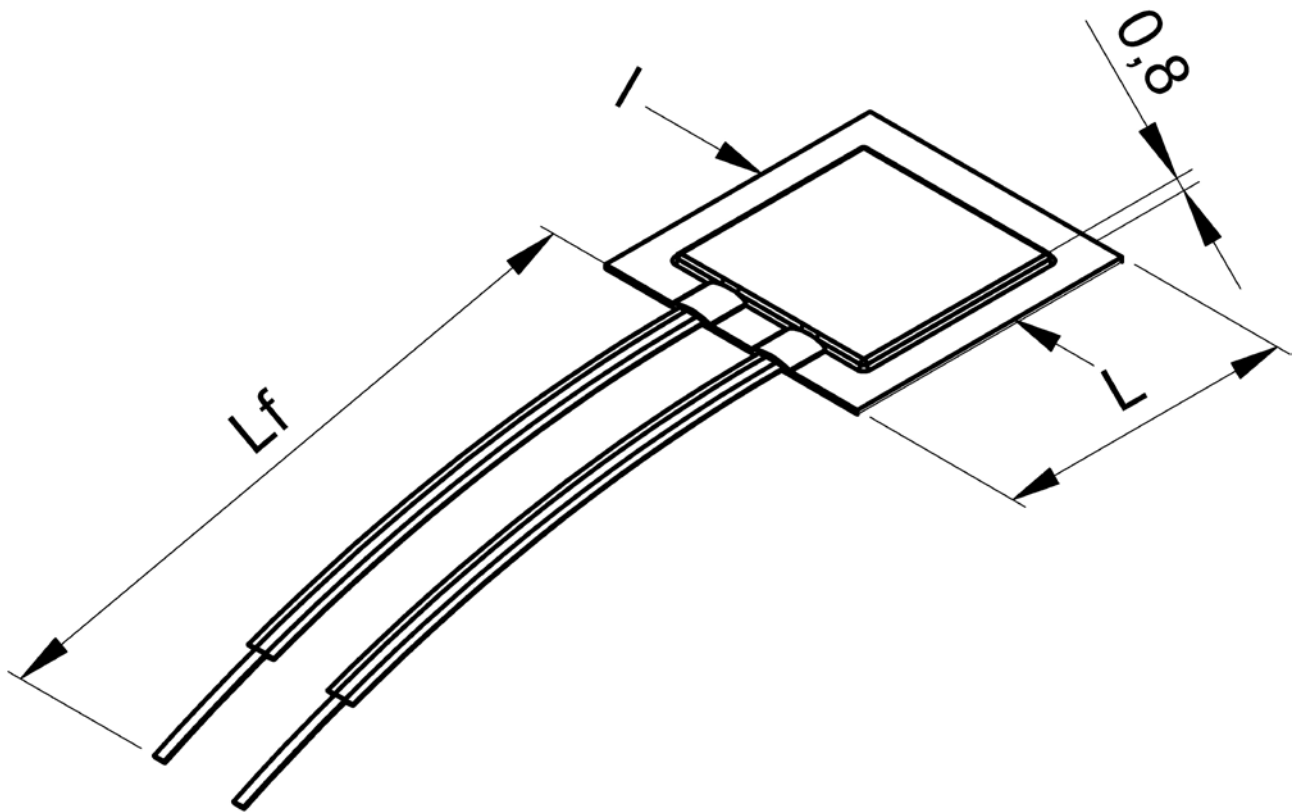
DESCRIPTION

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



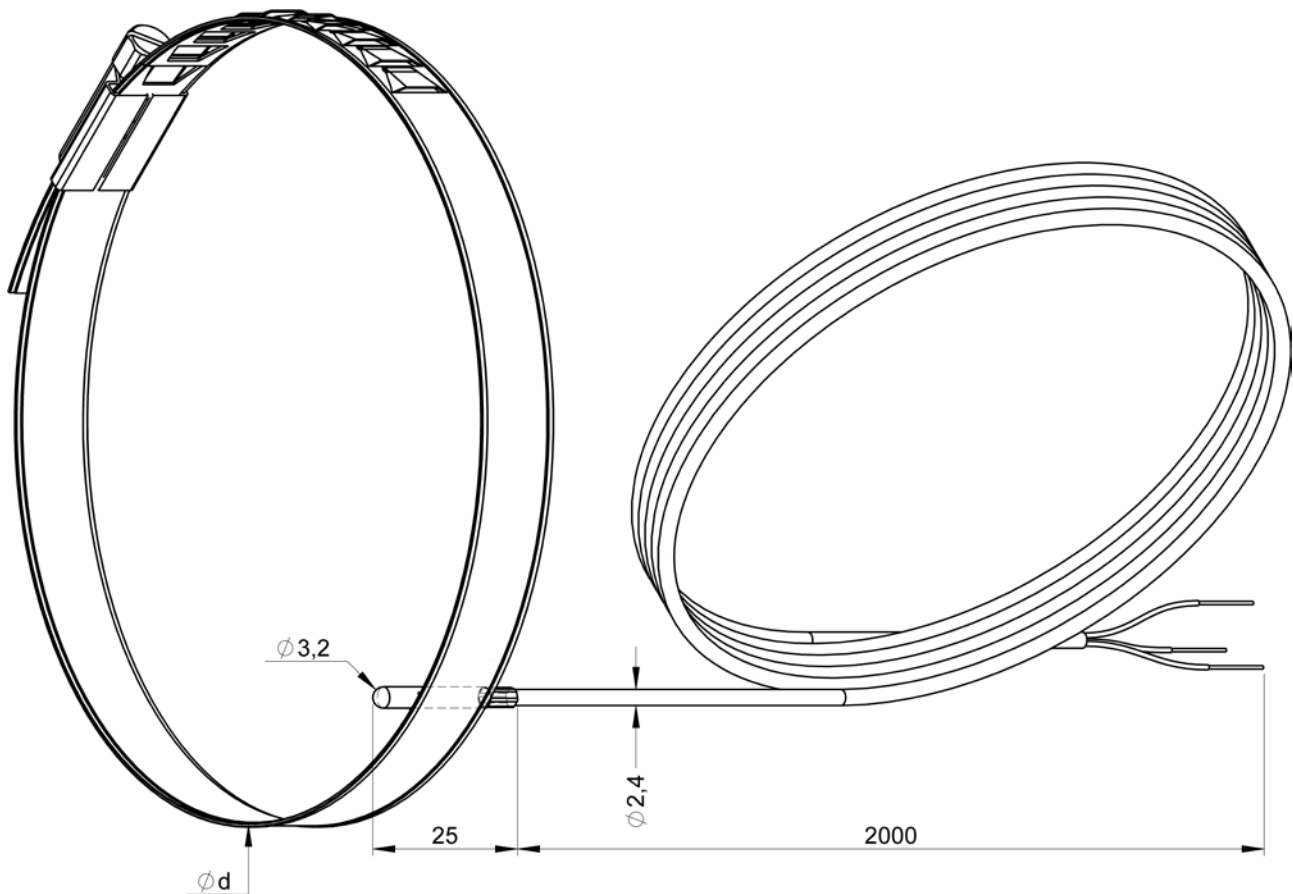
DESCRIPTION

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 mm ² , copper |
| | Length L (mm) | 2,000 mm |
| | Termination | Insulated bare wires |
| Fastening | | By stainless-steel Serflex clip |

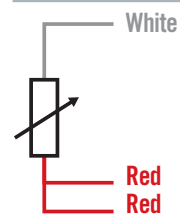
DIAGRAM (MM)



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

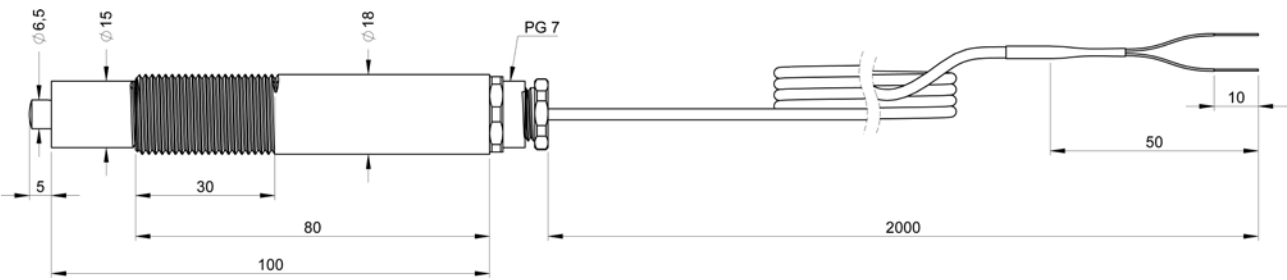

DESCRIPTION

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 mm ² , PVC insulation | | |
| | Length Lc (mm) | 2,000 mm | | |

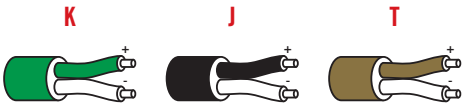
DIAGRAM (MM)



TO ORDER

| Thermocouple | Reference |
|--------------|-----------|
| J | P07602313 |
| K | P07602567 |
| T | P07602203 |

CONNECTIONS



For any other configuration, please contact us.



TS3

THERMOCOUPLE

CLASS
1

IEC
584-1

NF EN
60584-1

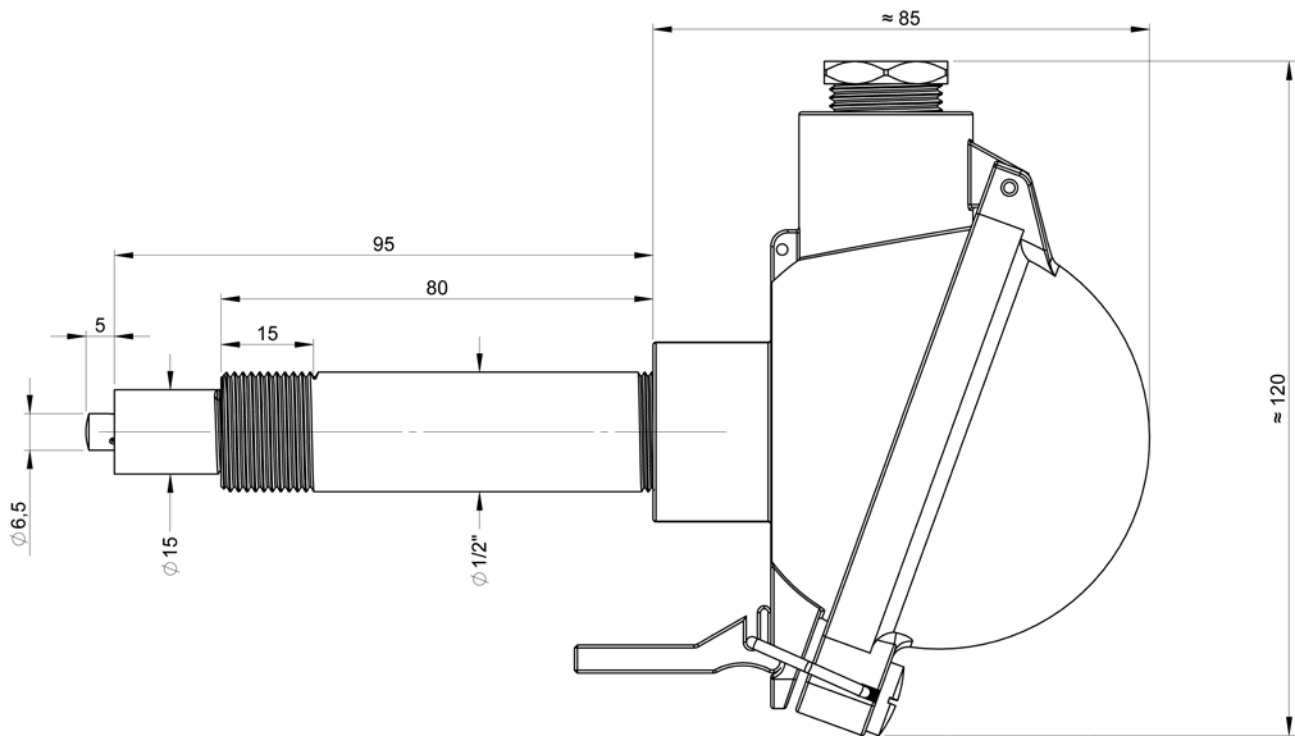

DESCRIPTION

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
60584-1IEC
584-1

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.

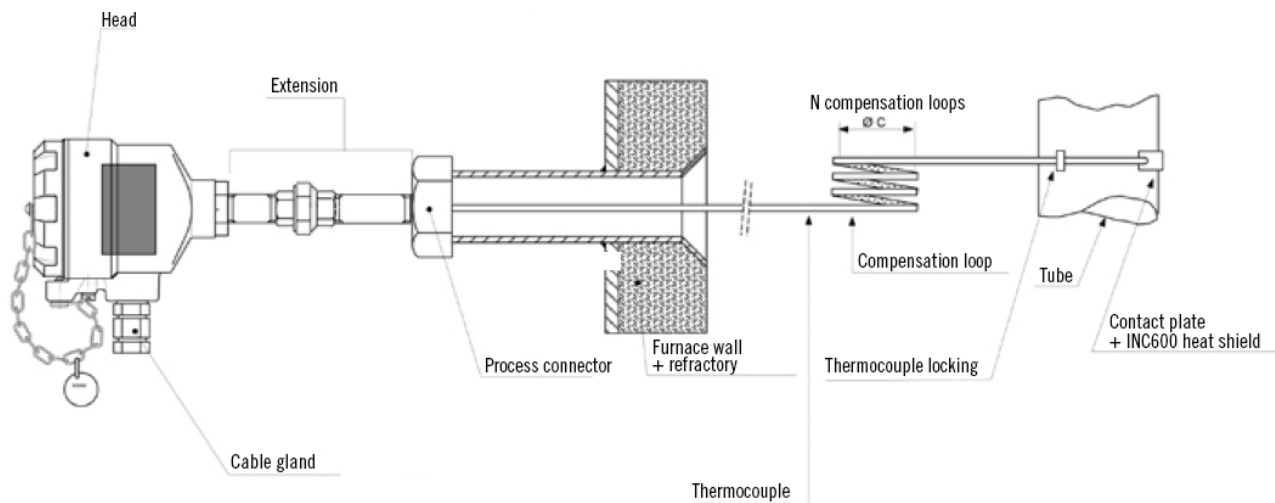
SPECIFICATIONS

| | | |
|--|-------------------------------|--|
| 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)

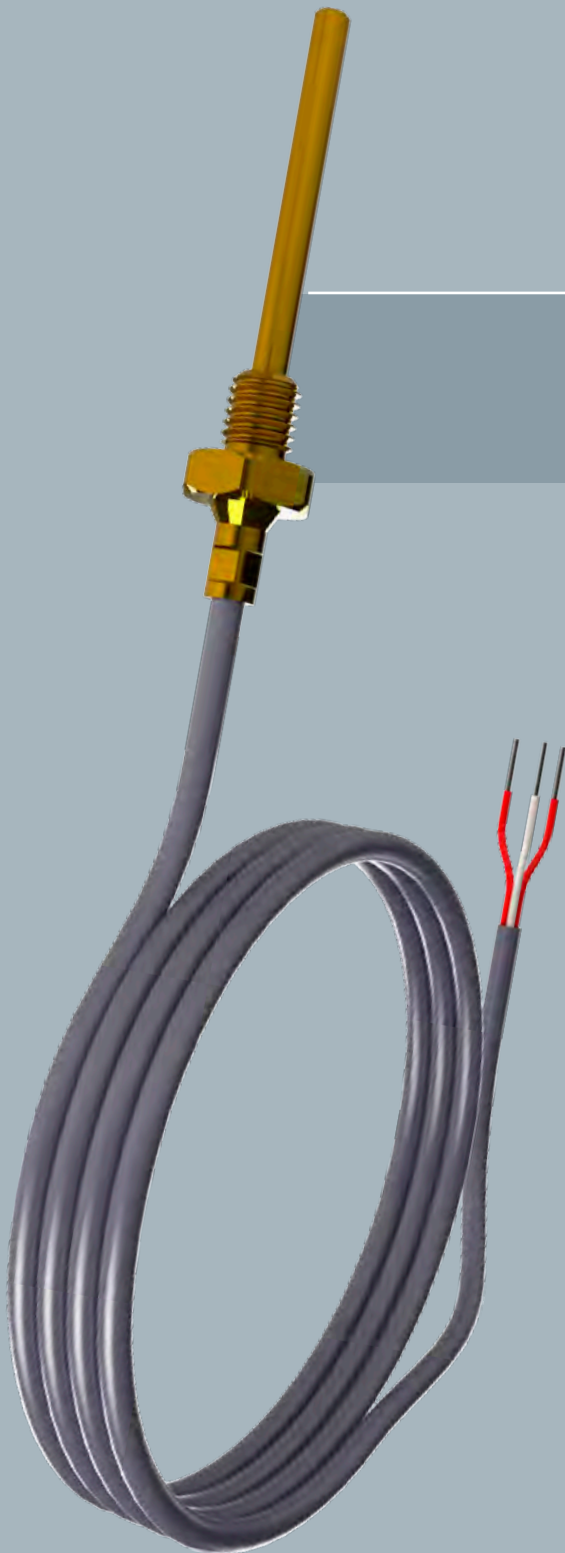


OTHER VERSIONS

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



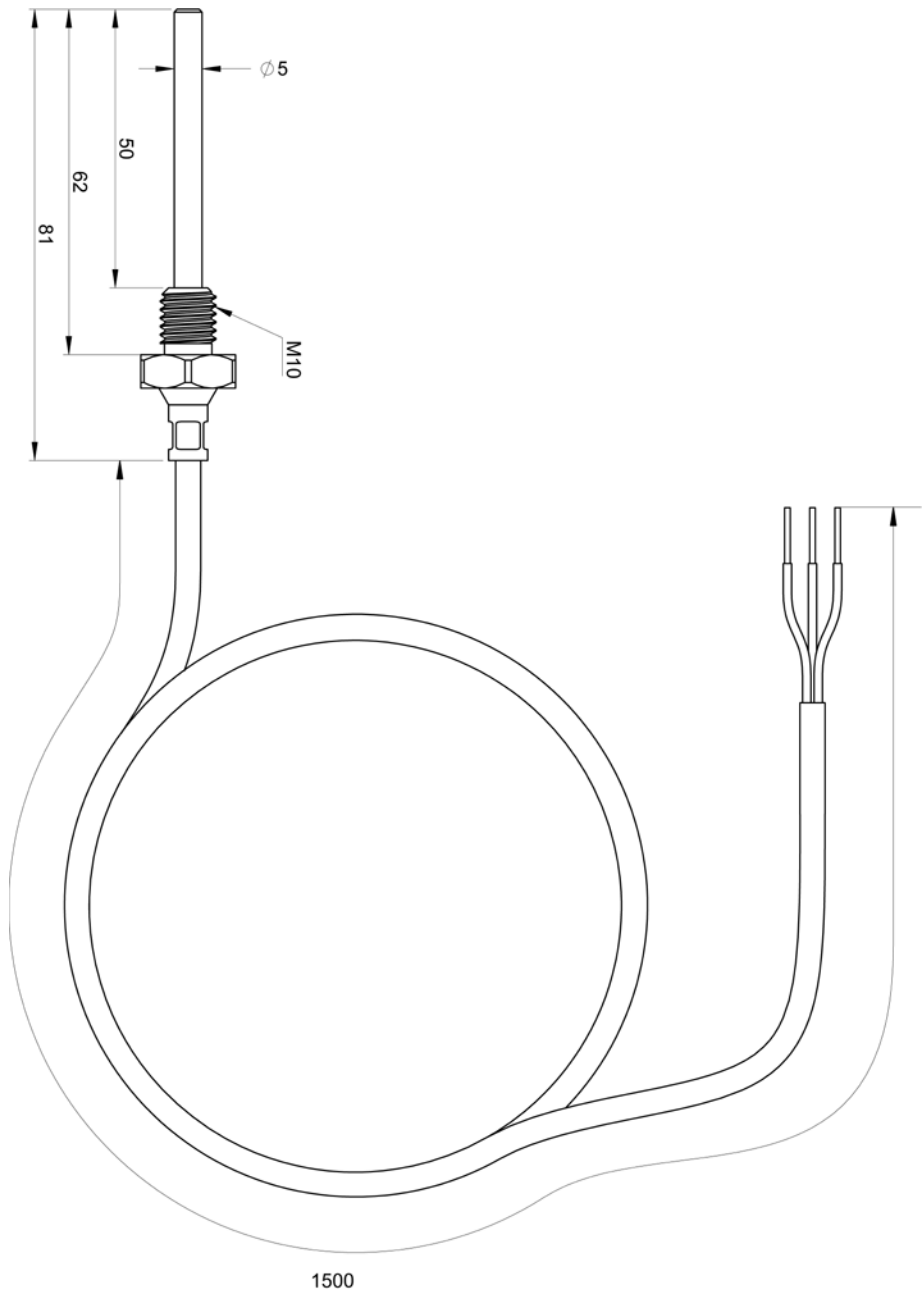
DESCRIPTION

Ambient temperature sensor with cable output.

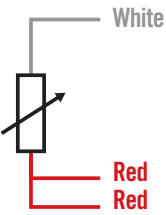
SPECIFICATIONS

| | | |
|---------------------------|------------------|--------------------------|
| 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 mm ² |
| | 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.

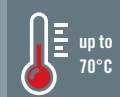
SA2

Pt100



CLASS
A

IEC
60751



WALL
MOUNTING

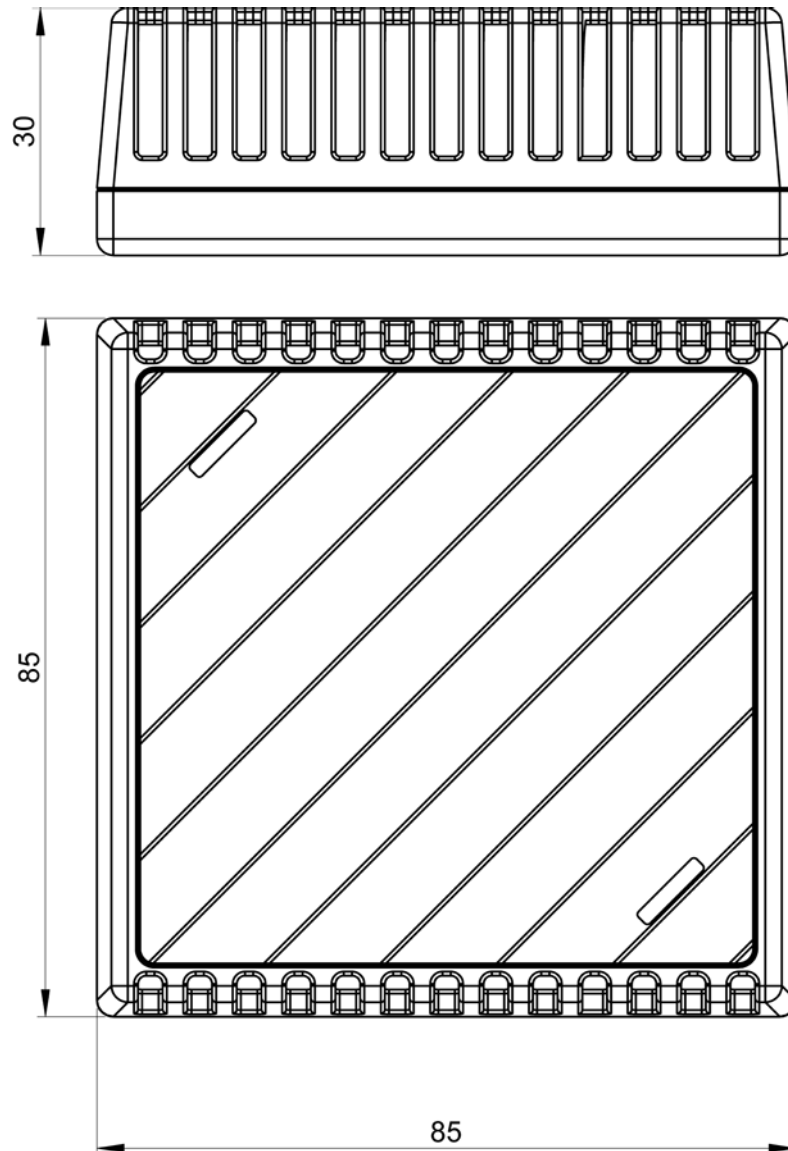
DESCRIPTION

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

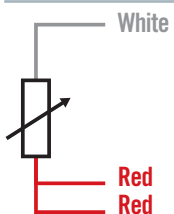
SPECIFICATIONS

| | | |
|---------------------------|-------------------------|--|
| 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)



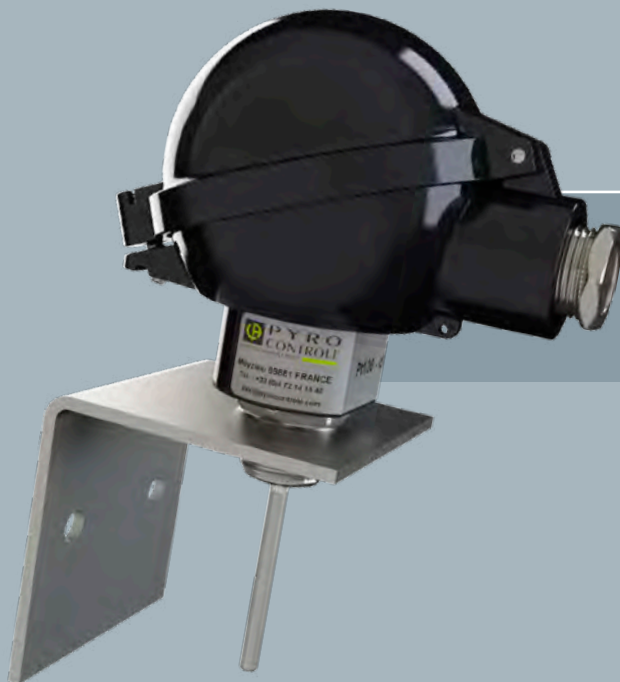
CONNECTIONS



TO ORDER

| | Reference |
|---------------------|-------------|
| Without transmitter | L915461-000 |
| With transmitter | L918856-001 |

For any other configuration, please contact us.



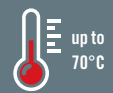
SA3

Pt100

CLASS
A

IEC
60751

IP
65



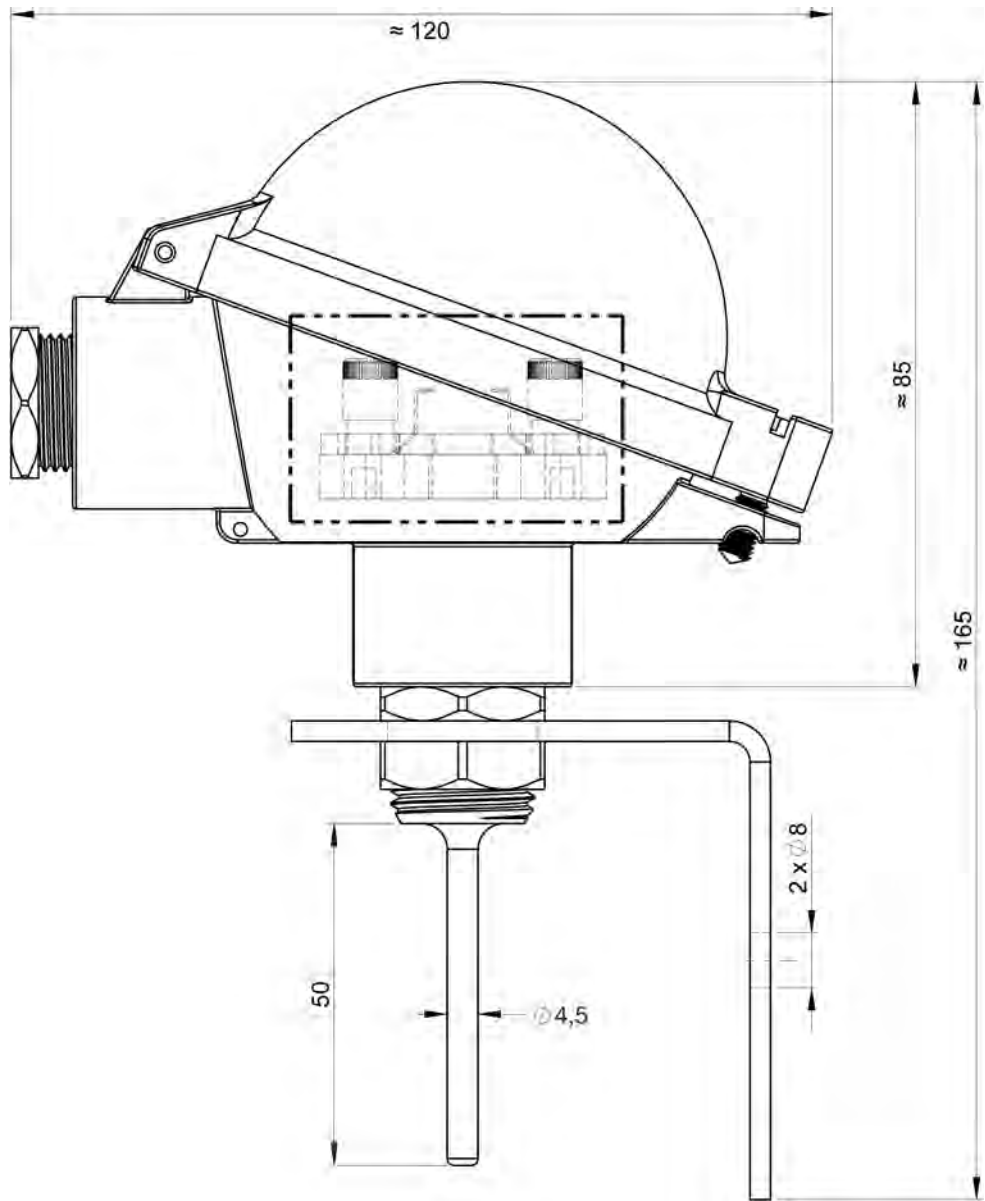
DESCRIPTION

Ambient temperature sensor in IP65 head for outdoor use.

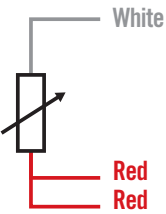
SPECIFICATIONS

| | | |
|----------------------------------|---------------|--|
| 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)



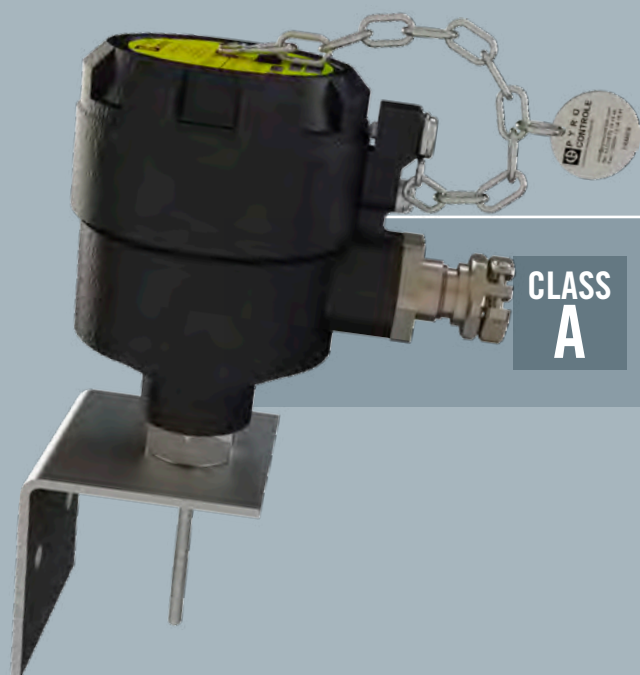
CONNECTIONS



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



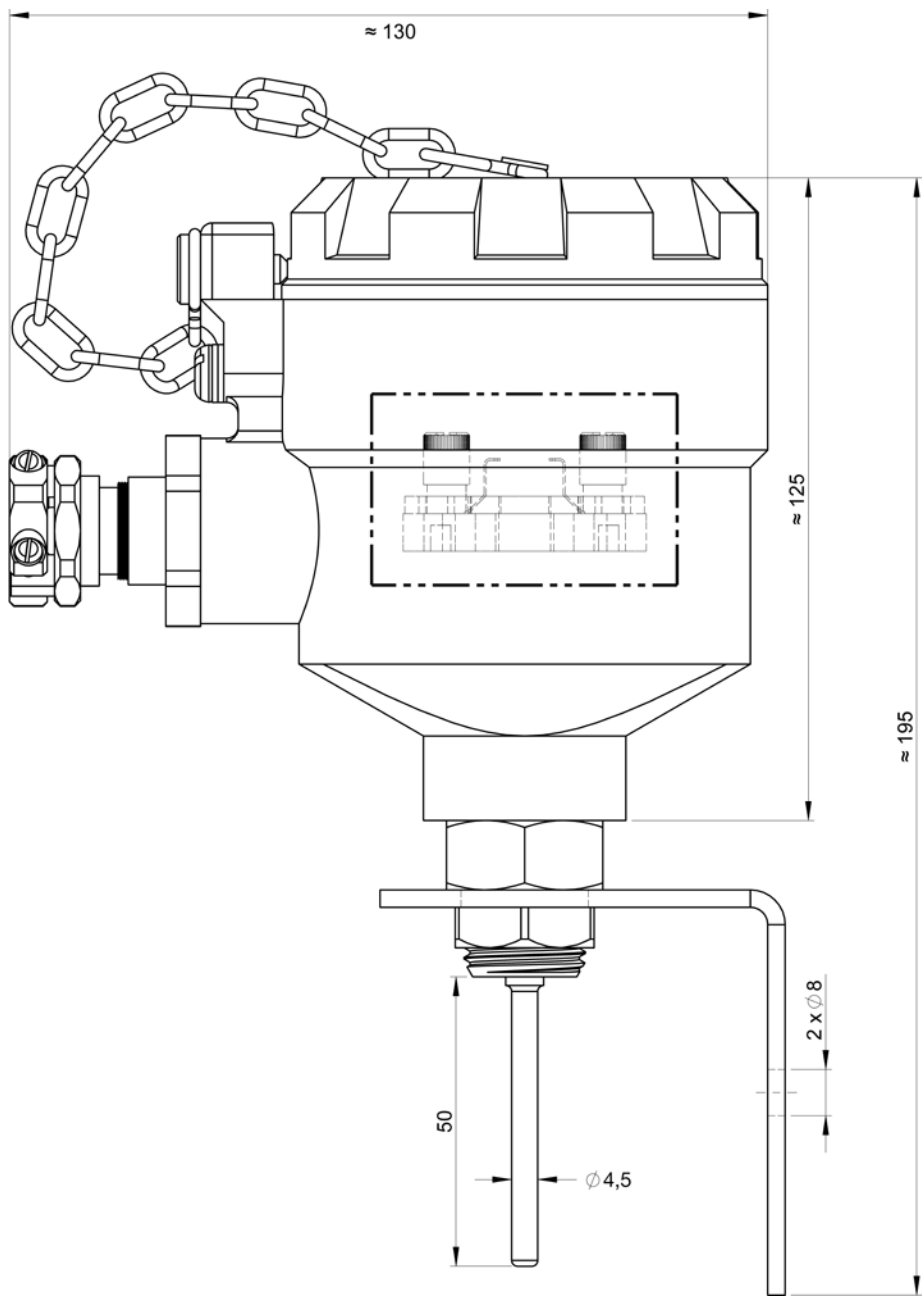
DESCRIPTION

Ambient temperature sensor in IP65 head for outdoor use.

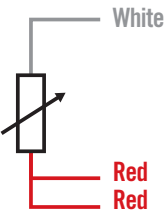
SPECIFICATIONS

| | | |
|--|---------------|---|
| Model | | SA4 |
| Compliance with standards | | IEC 60751 / EN 60079-0 : 2012 + A11:2013 |
| Marking as per directive 2014/34/EU | | ⚠ II 2 GD - Ex db IIC T6 Gb Ex tb IIIC T85°C Db IP6X 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



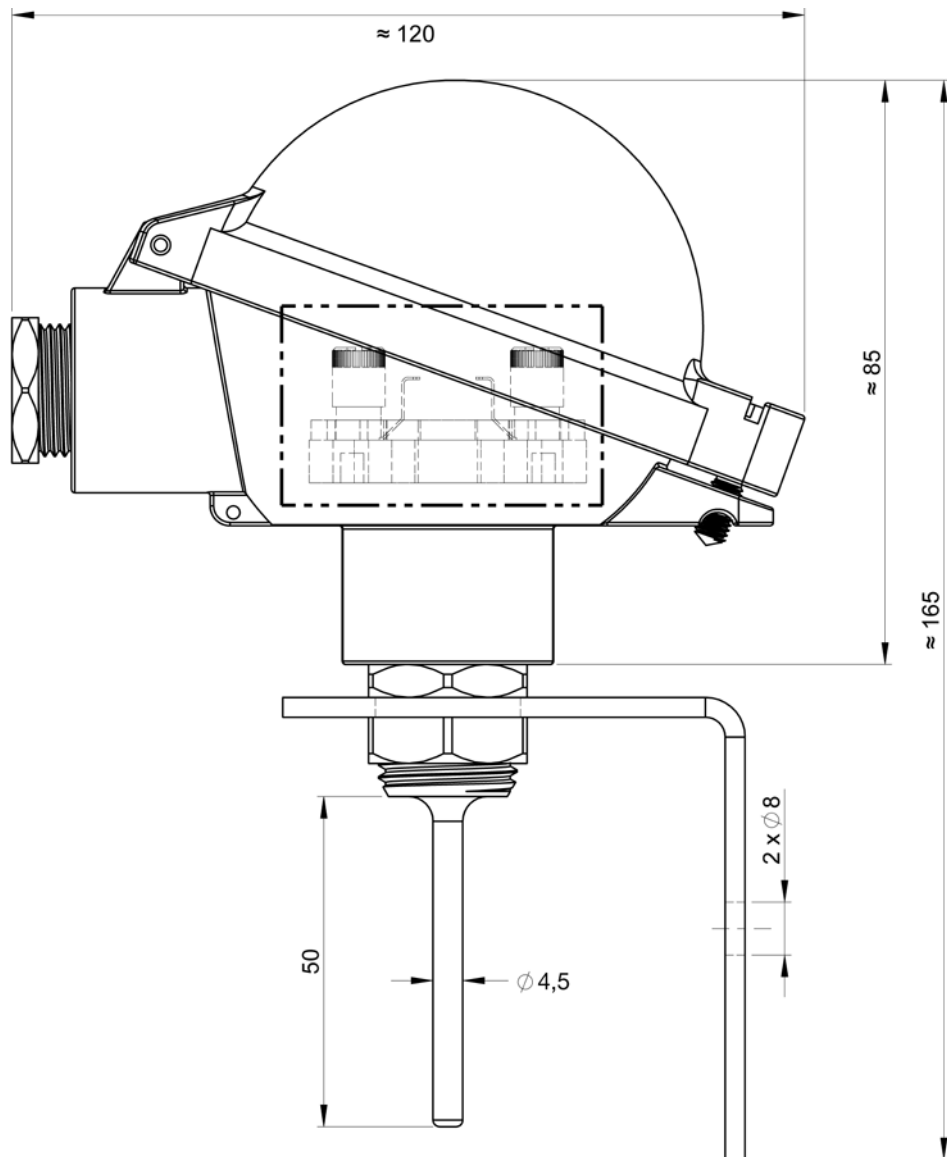
DESCRIPTION

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

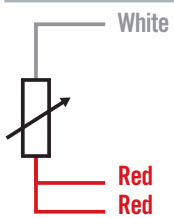
SPECIFICATIONS

| | | |
|--|----------------------|--|
| Model | | SA5 |
| Compliance with standards | | IEC 60751 / EN 60079-0 : 2012 + A11:2013 |
| Marking as per directive 2014/34/EU | | ⚠ II 1 GD Ex ia IIC T4...T6 Ga Ex ia IIC 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)



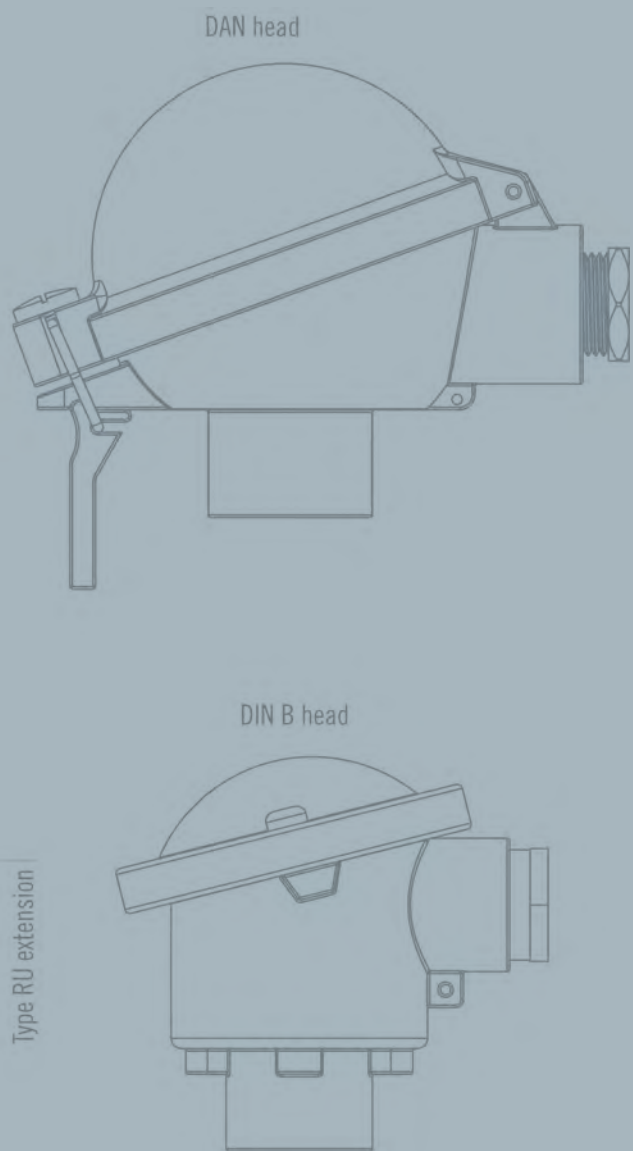
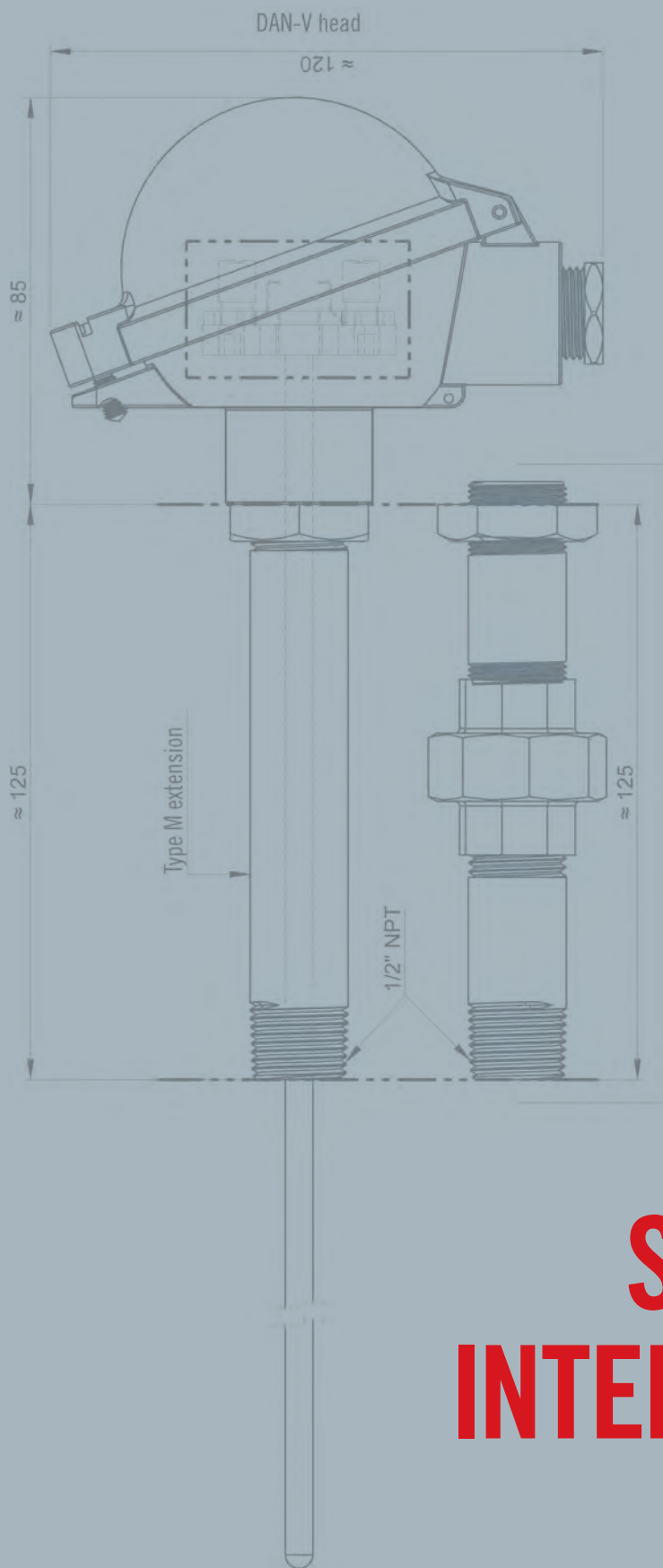
CONNECTIONS



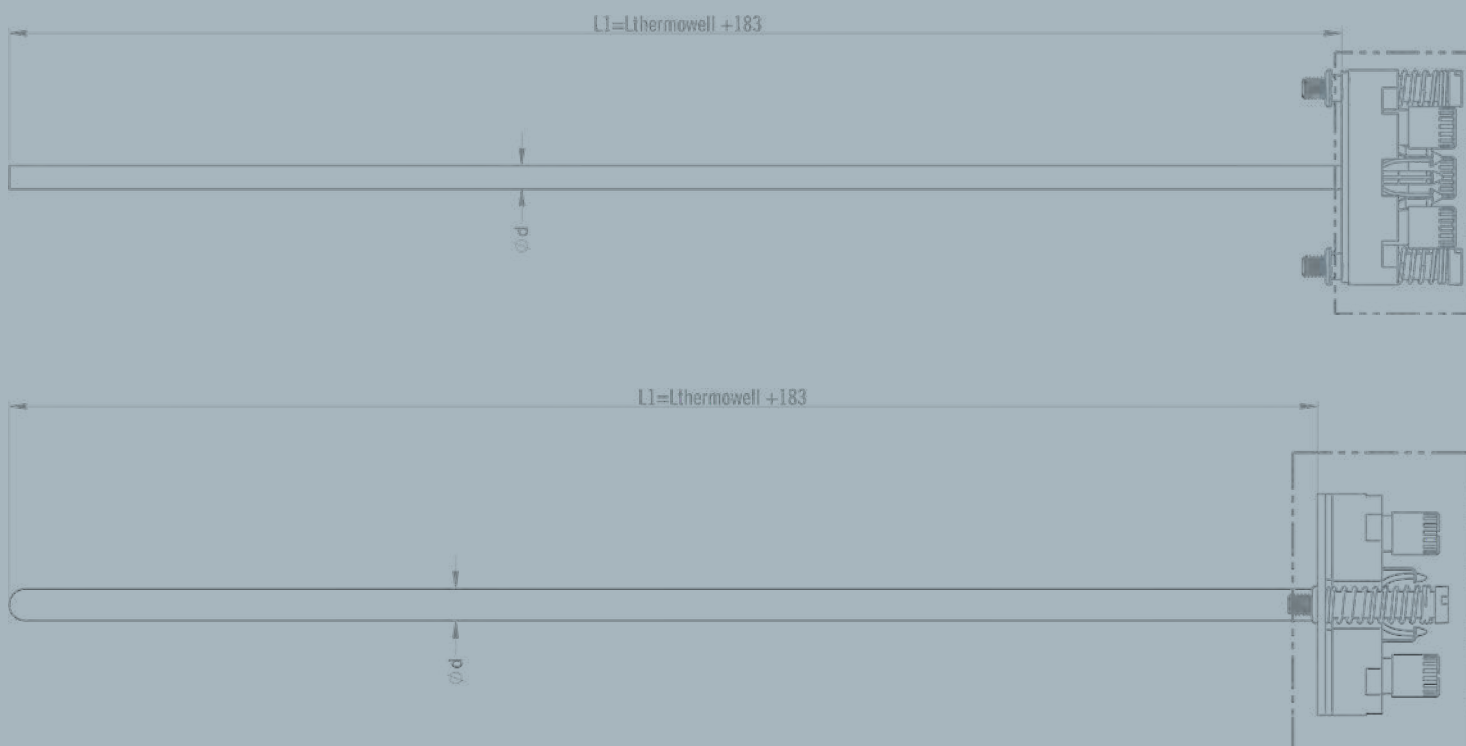
TO ORDER

| | Reference |
|---------------------|-------------|
| Without transmitter | L915461-000 |
| With transmitter | L918856-001 |

For any other configuration, please contact us.



PROCESS SENSORS WITH INTERCHANGEABLE ELEMENTS

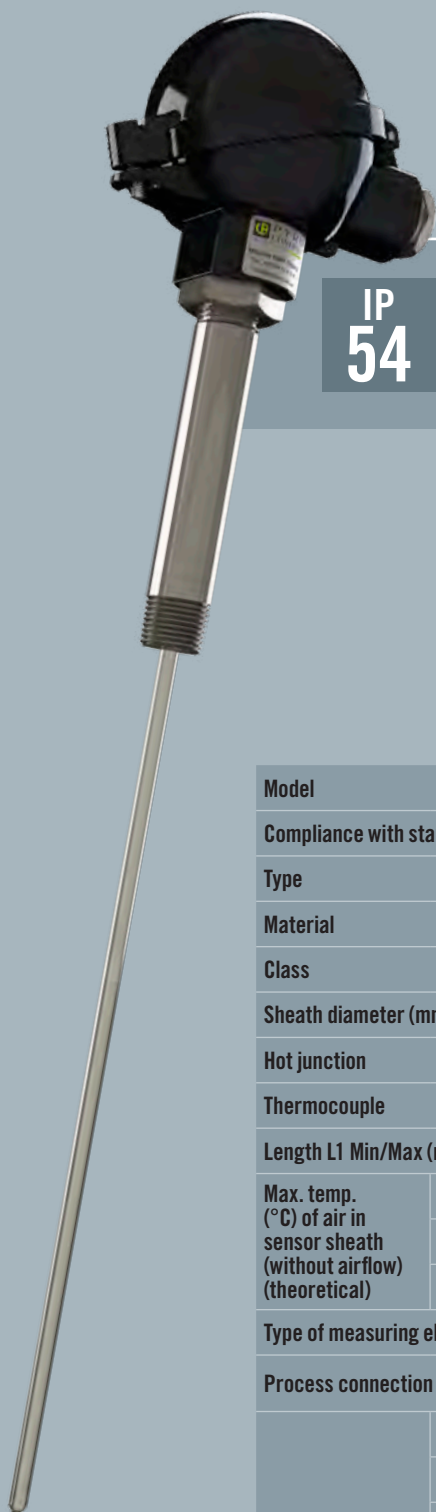


TPS: THERMOCOUPLE **174**

SPS: Pt100 **176**

**DG / TG: INTERCHANGEABLE THERMOCOUPLE
ELEMENTS** **178**

DS / TS: INTERCHANGEABLE PT100 ELEMENTS **180**



TPS

THERMOCOUPLE

IP
54IP
65CLASS
1IEC
584-1SINGLE
OR
DUPLEX

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 | |
|--------------------------------|--------------------------------------|----------------------------------|--|---------------|--------------------|--|-------------------------|--|-------|
| 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 |
| T (class2) | 316L | 316L |
| J | 316L | 316L |
| K | INCONEL600 | INCONEL600 |
| N | INCONEL600 | - |
| | PYROSIL | PYROSIL |
| 2J | 316L | 316L |
| 2K | INCONEL600 | INCONEL600 |

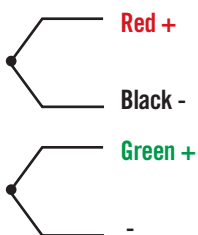
TRANSMITTER INFORMATION

| 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

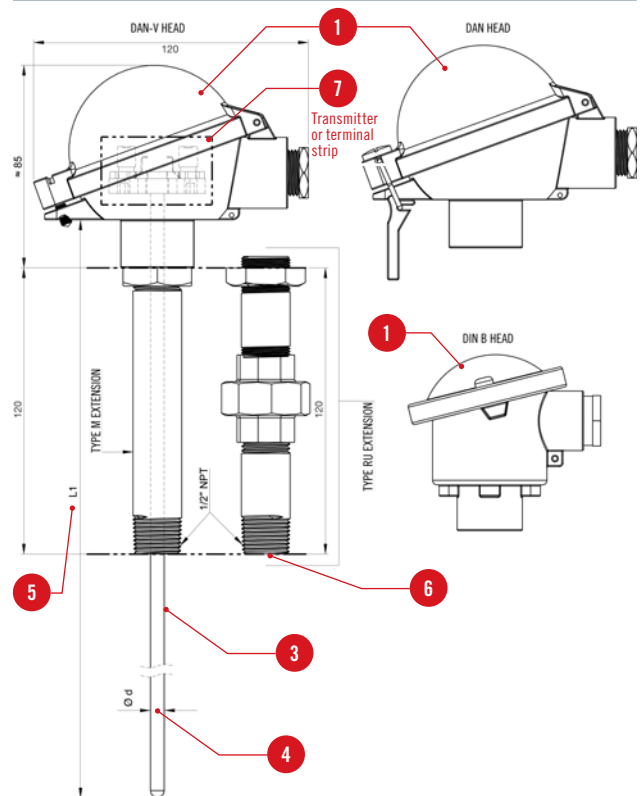
Duplex thermocouple



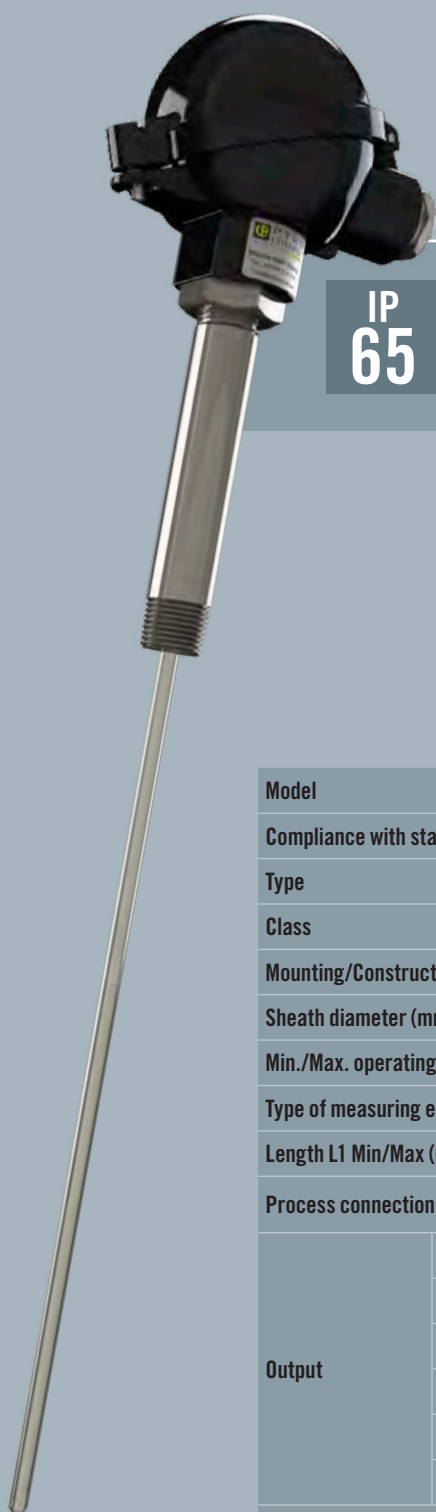
Single thermocouple



DIAGRAM (MM)



For any other configuration, please contact us.



SPS

Pt100

IP
65IP
54CLASS
AIEC
60751SINGLE
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 | | |

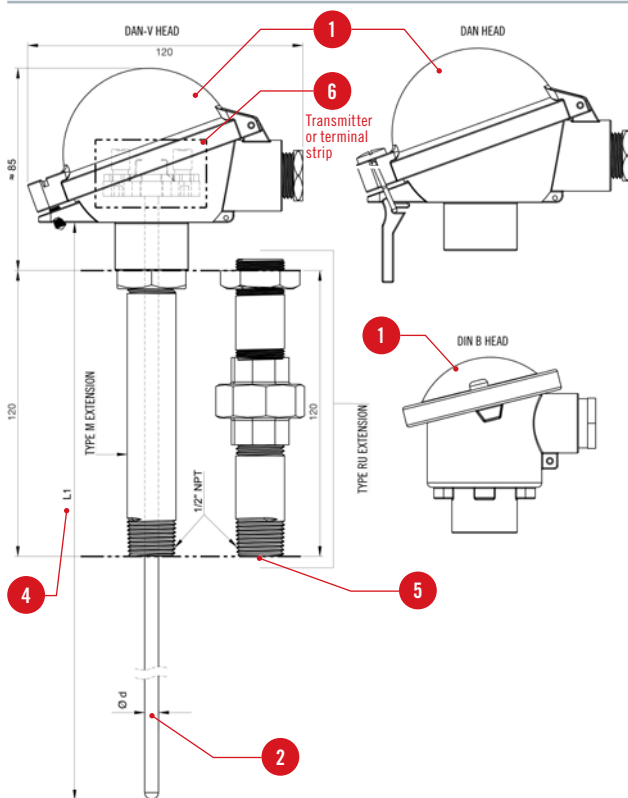
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | HEAD | DIAMETER (mm) | MOUNTING | LENGTH L1 (mm) | EXTENSION | 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)



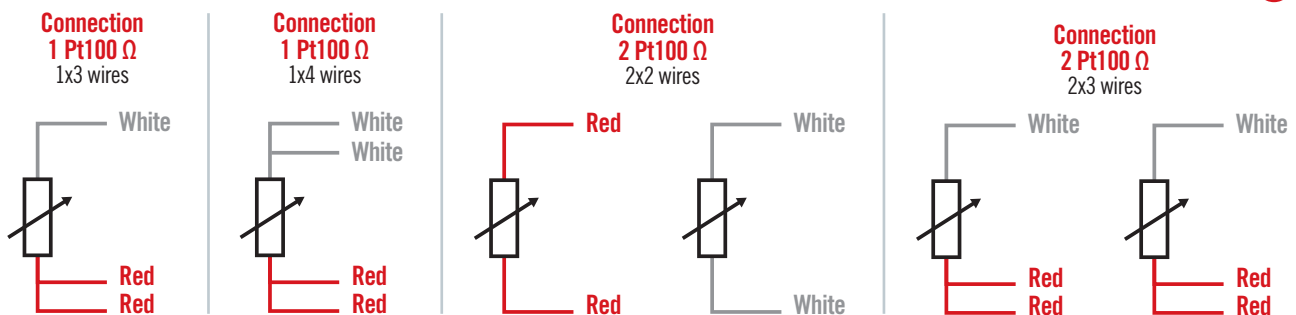
TRANSMITTER INFORMATION

| 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





DG/TG

THERMOCOUPLE

CLASS
1
IEC
584-1
SINGLE
OR
DUPLEX


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:

| Reference in table and DIAGRAM (MM) | TYPE OF TERMINAL STRIP | ELEMENT TYPE | DIAMETER (mm) | TC TYPE | SHEATH TYPE | LENGTH L1 (MM) | HOT JUNCTION | OPTION | |
|---|--|--|------------------|------------------|--|--------------------|--|--|----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | TRANSMITTER | TRANSMITTER SCALE |
| 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)

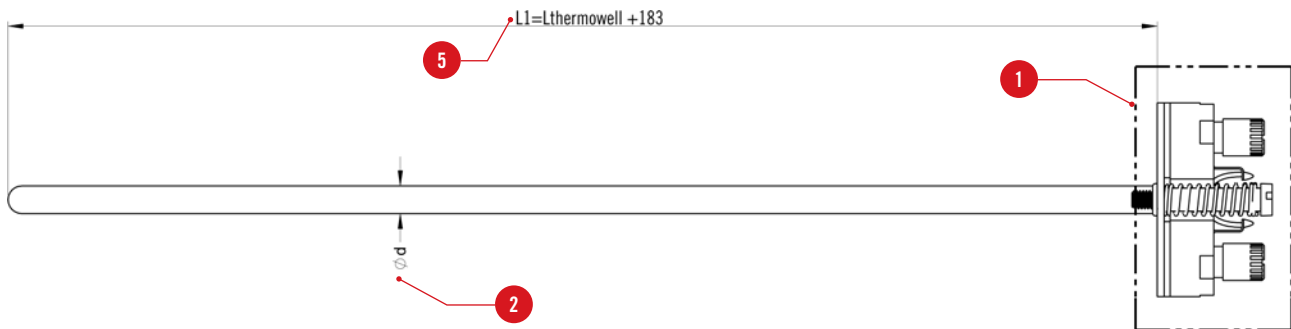


TABLE OF POSSIBLE ASSOCIATIONS

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

TRANSMITTER INFORMATION

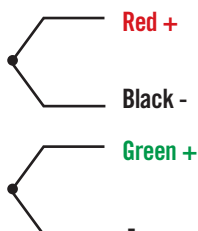
| Transmitter | | | | 6 |
|-------------|---------------|------------------------|-------------|---|
| Input | Output | Galvanic insulation | Reference | |
| TC | 4-20mA | 1.5kV | LC5334A-100 | |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 | |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 | |

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



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 |

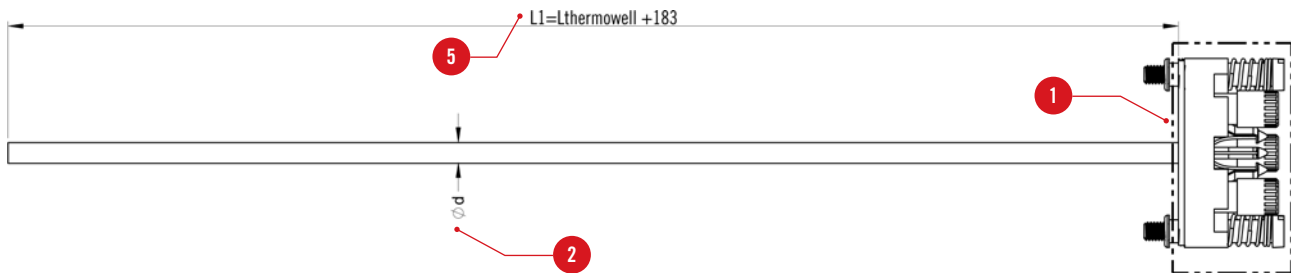
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| Reference in table and DIAGRAM (MM) | TYPE OF TERMINAL STRIP | ELEMENT TYPE | Ø (mm) | MOUNTING | LENGTH L1 (mm) | EN OPTION | |
|---|--|--|---------------|---|-------------------|--|-------|
| | D | S1 | 8 | 4 | 900 | A | 0/150 |
| 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)

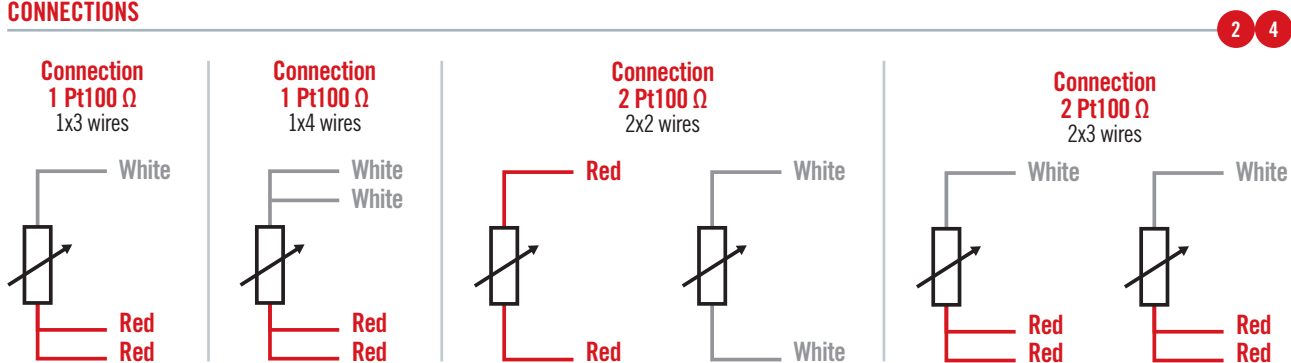


TRANSMITTER INFORMATION

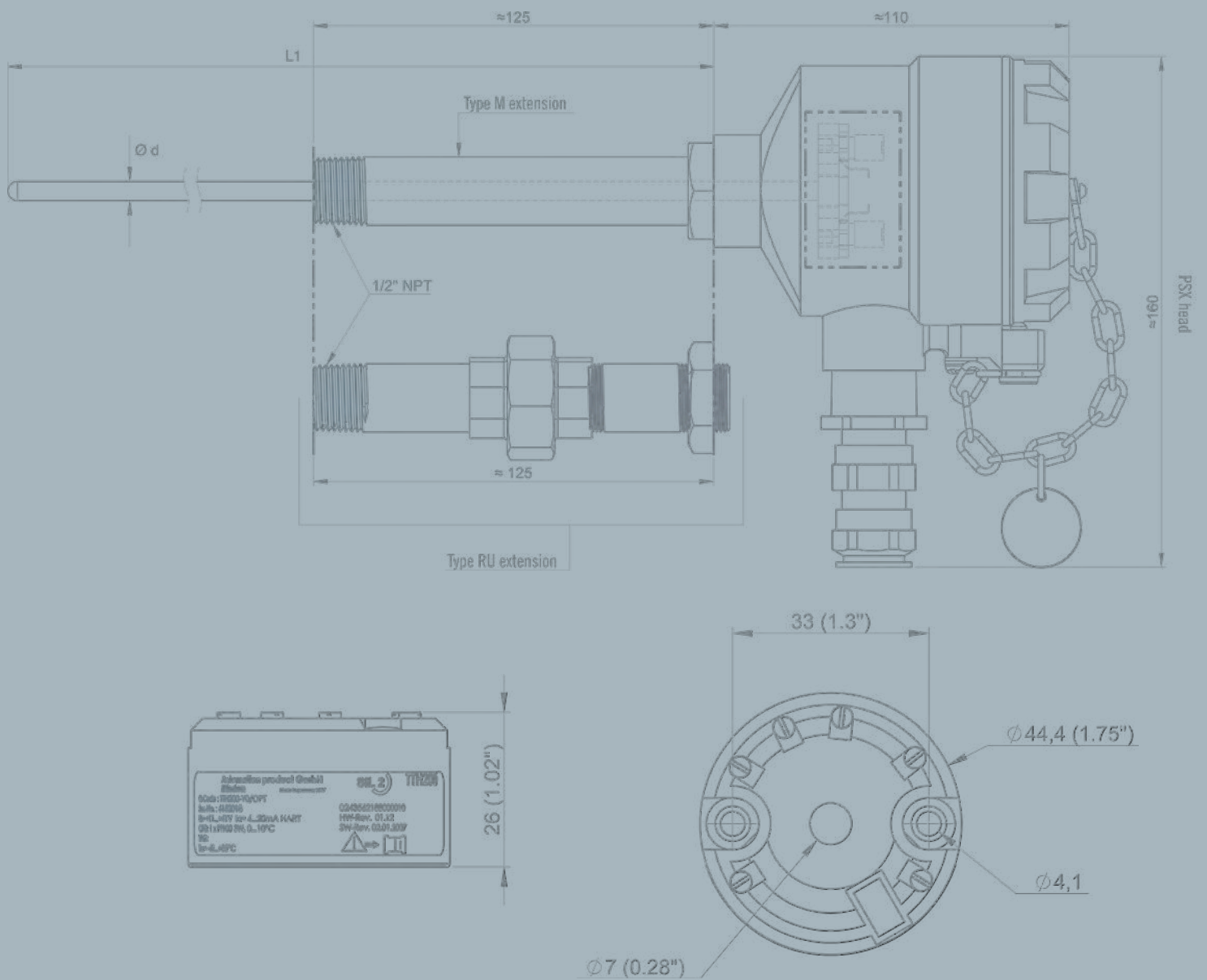
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| Pt100 | 4-20mA | NONE | LC5333A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

Not compatible with duplex version

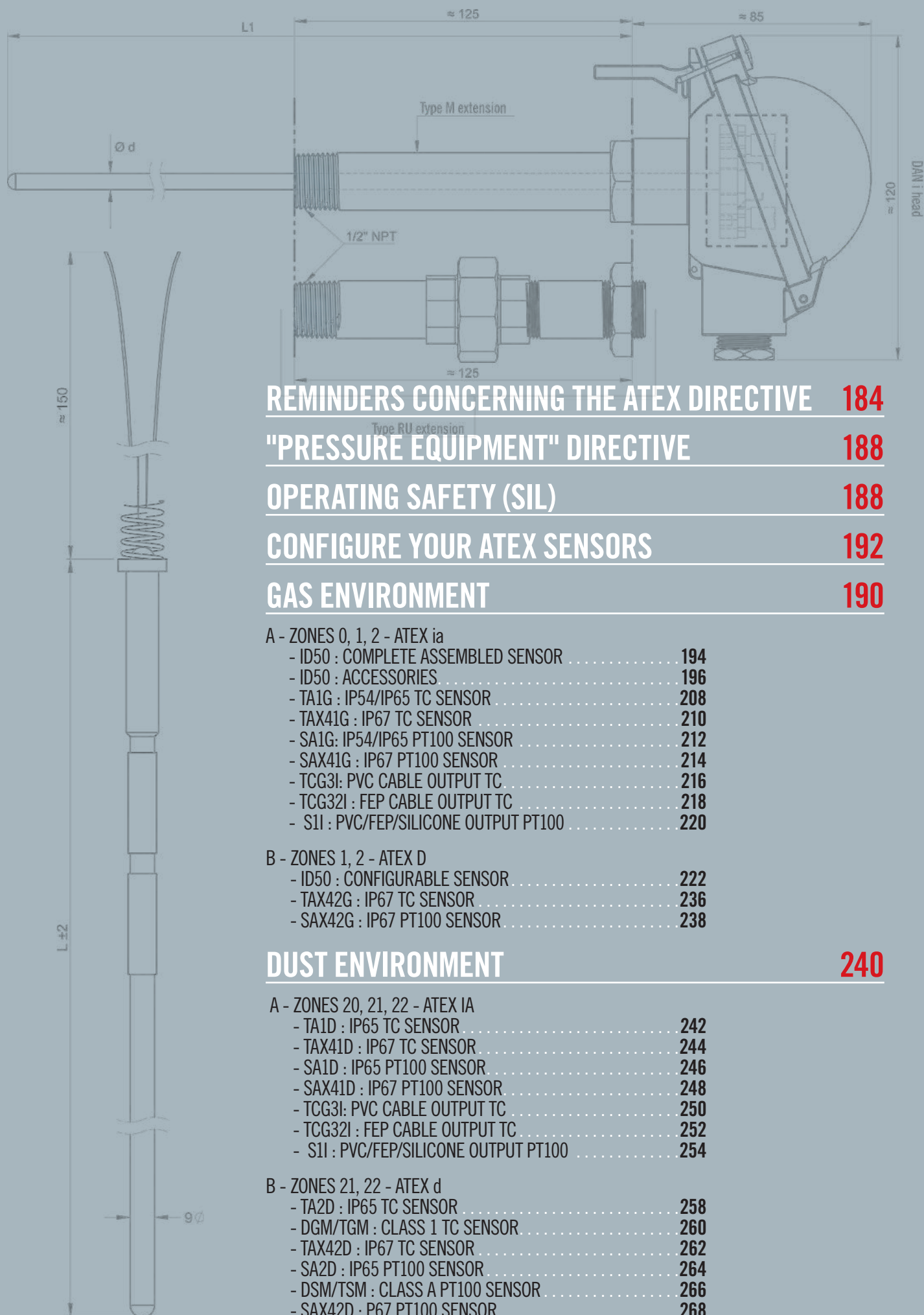
CONNECTIONS



For any other configuration, please contact us.



SENSORS FOR EXPLOSIVE ATMOSPHERES



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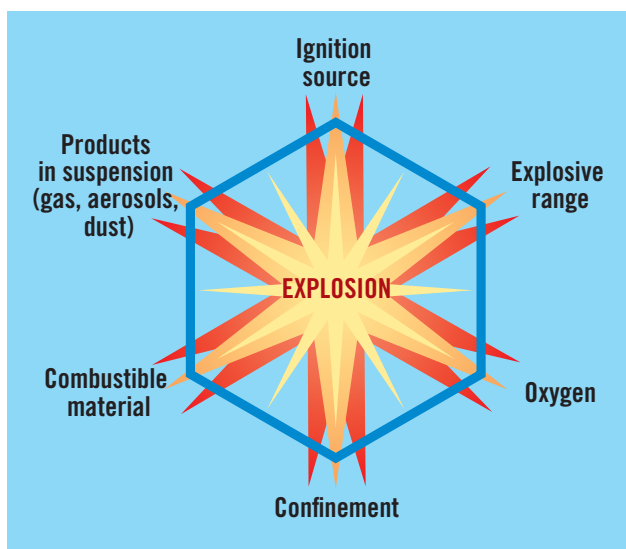
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| | |
|---------------------------------------|-----|
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THE ATEX 2014/34/EU DIRECTIVE



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.

| | IFA / INRS IDENTIFICATION NO. | DUST CLOUD | | 5 MM DUST LAYER | | |
|---------------|-------------------------------|------------------------------|---|------------------------------|---|---|
| | | 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

LCIE 14ATEX3020X

Notified body

Year of
certificationATEX
certificationCertification
numberSpecial
conditions of use
indicated in the
certificate

CE 0081 Ex II 1G Ex ia IIC Ga T4...T6

Regulatory
markingNumber
of notified
bodyATEX
productEquipment
group

Category

Environment
(in this case:
Gas)ATEX
productProtection
modeEquipment
groupGas
groupEquipment
protection
level

Temperature class

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.

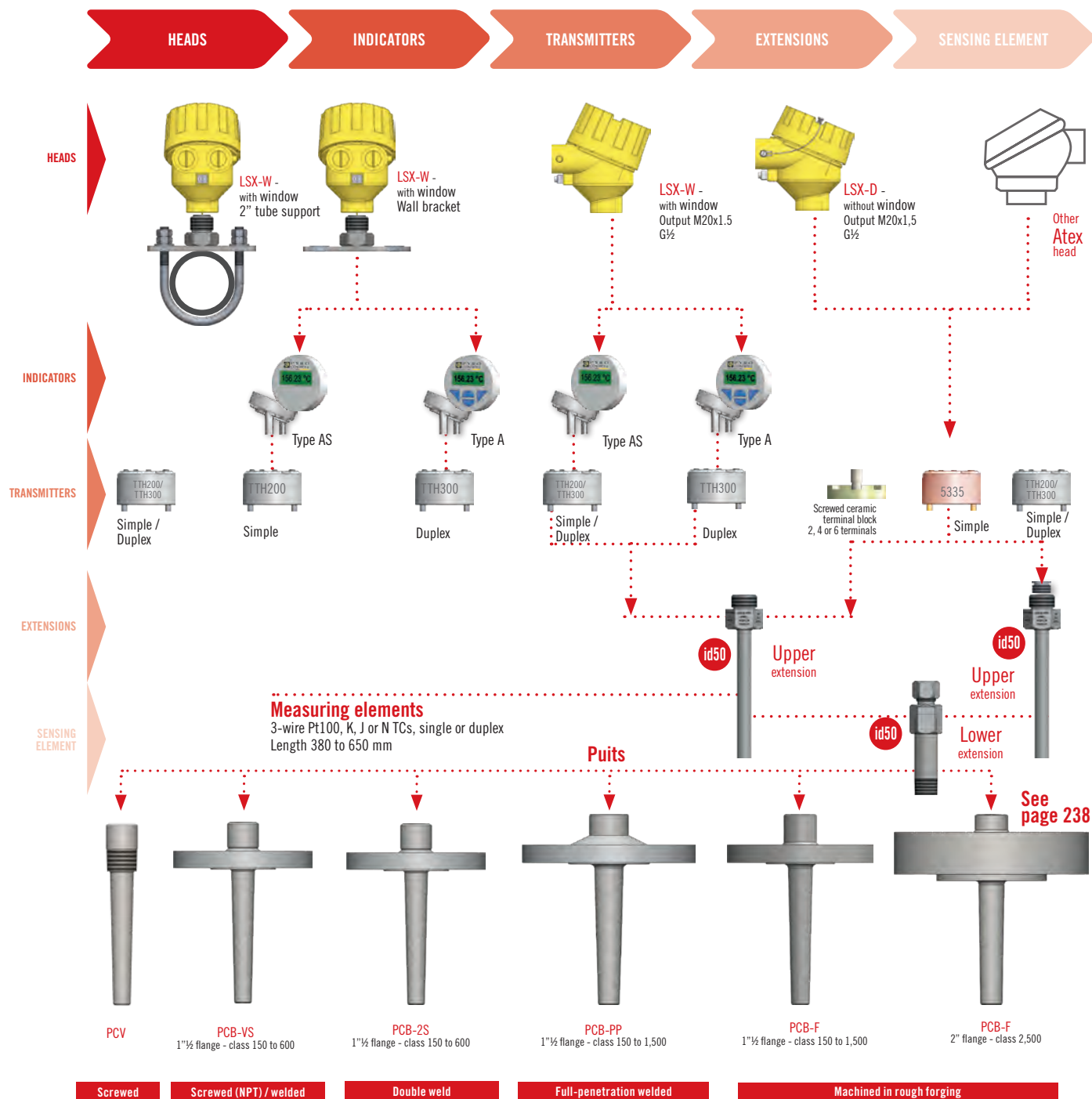
GAS ENVIRONMENT

ZONES 0, 1, 2 ATEX ia

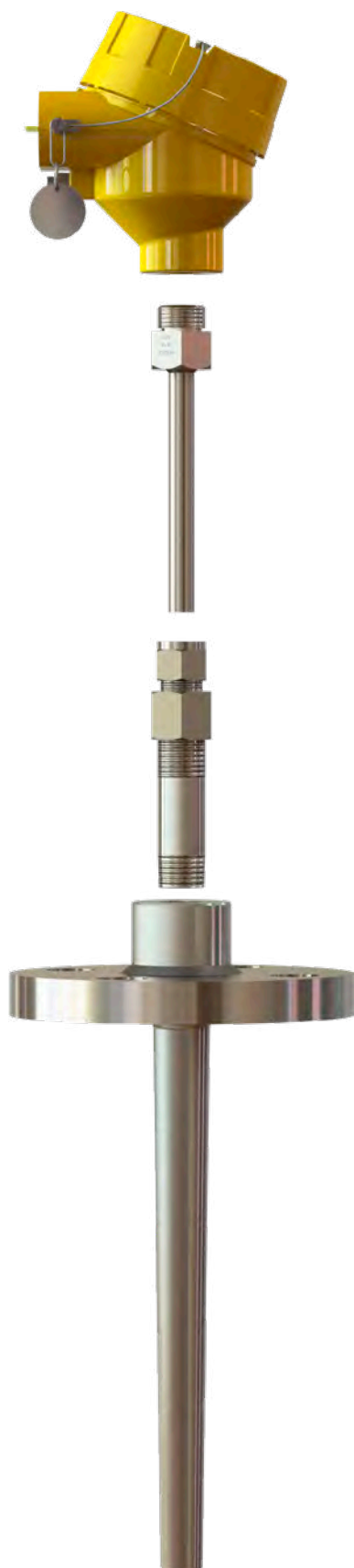
Complete, assembled sensor or totally configurable sensor: with CA PYROCONTROLE, you can choose.

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 | 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.

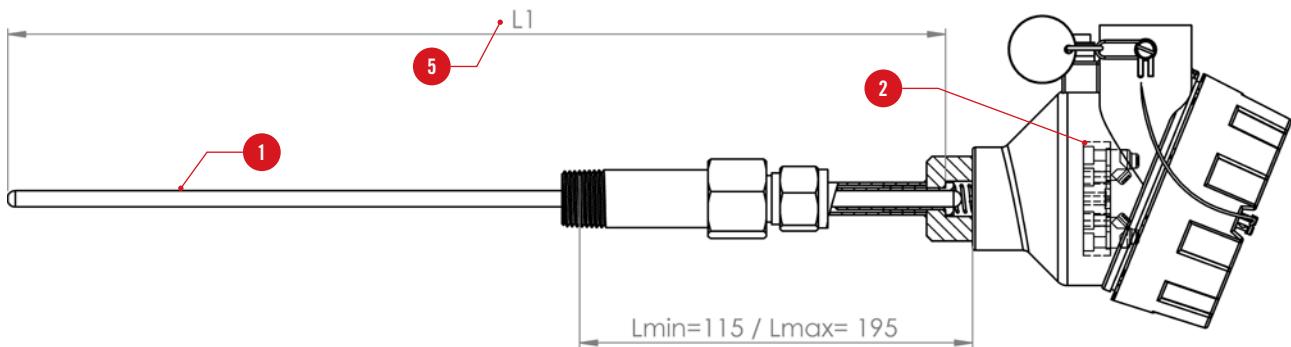
DESIGN YOUR SENSOR

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

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

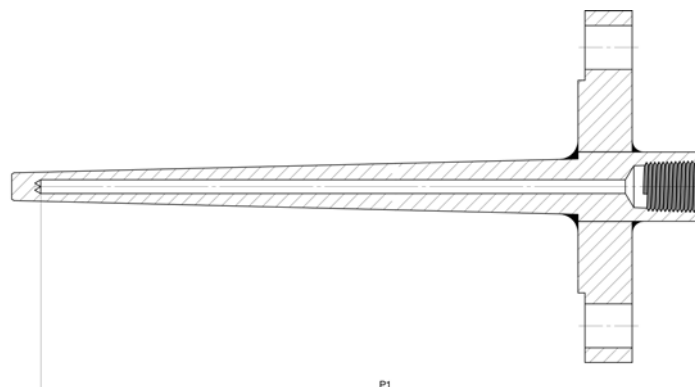
ATEX PROTECTION MODES

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

LENGTH L1

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 | ⚡ 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

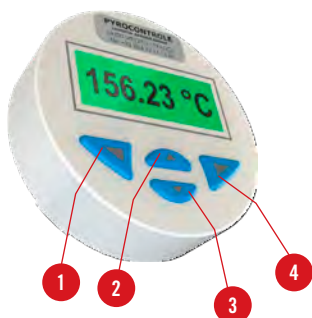
| Model | Type AS | Type A |
|-------------------------------|--|---|
| Reference | L810503-000 | L810502-000 |
| Properties | Graphical LCD indicator controlled by transmitter without configuration function | Graphical LCD indicator controlled by transmitter with configuration function (keypad) |
| 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



DISPLAY

Type A LCD indicator



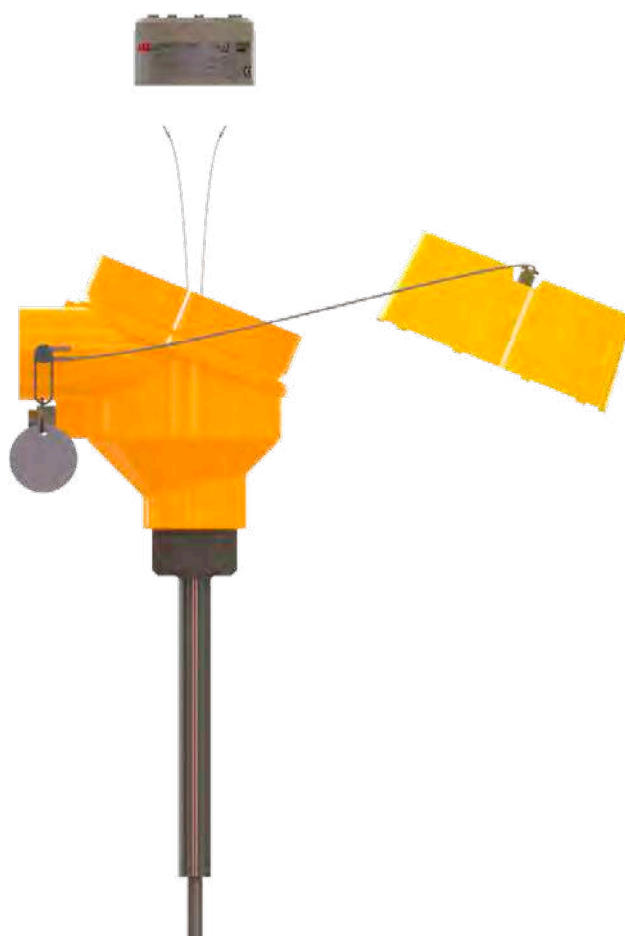
- 1 Quit / Cancel
- 2 Scroll back
- 3 Scroll forward
- 4 Confirm

Type AS LCD indicator



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.



TO ORDER

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

5335

TTH200/300

TRANSMITTERS FOR ID50



INSULATED
4-20 mA
OUTPUT

TTH300
DUPLIX
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 | ⚠ II 1 G Ex ia IIC T6 ⚠ II 2(1)G Ex [ia] ib IIC T6 ⚠ II 2 G (1D) Ex [iaD] ib IIC T6 | ⚠ II 1 G Ex ia IIC T6 Ga ⚠ II 2(1)G Ex [ia] ib IIC T6 Gb (Ga) ⚠ II 2 G (1D) Ex [iaD] ib IIC T6 Gb (Da) | ⚠ 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

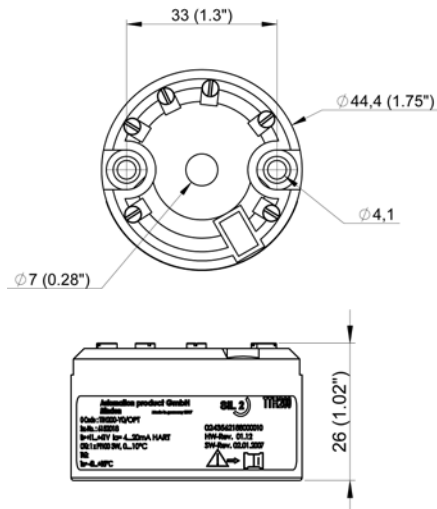
TRANSMITTER

EXTENSIONS

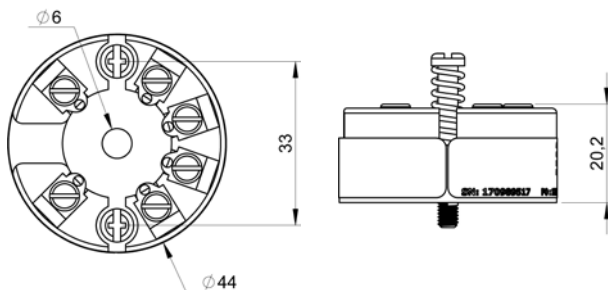
SENSING ELEMENT

CONNECTIONS

TTH200/300 transmitter

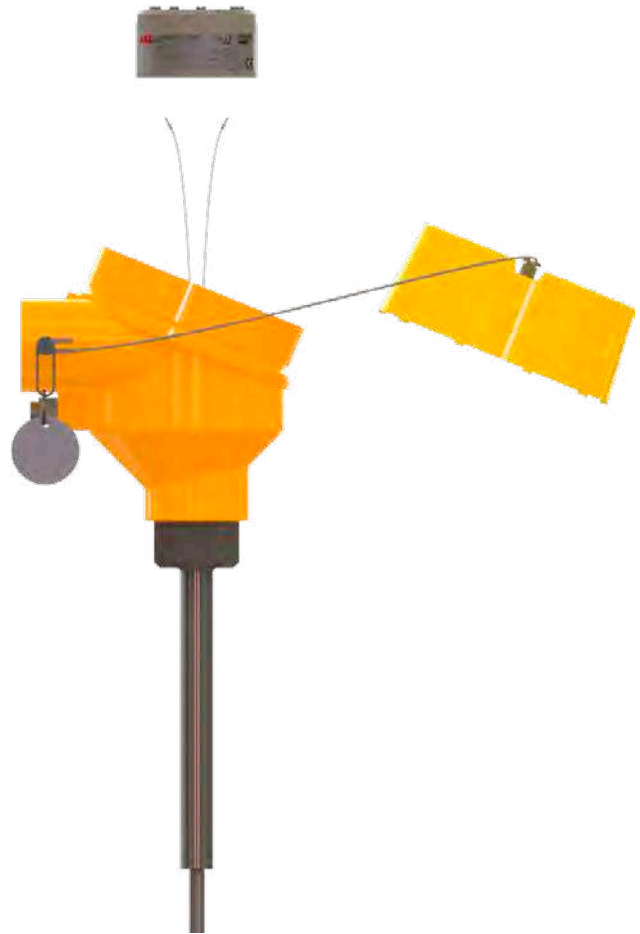


5335 transmitter



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.



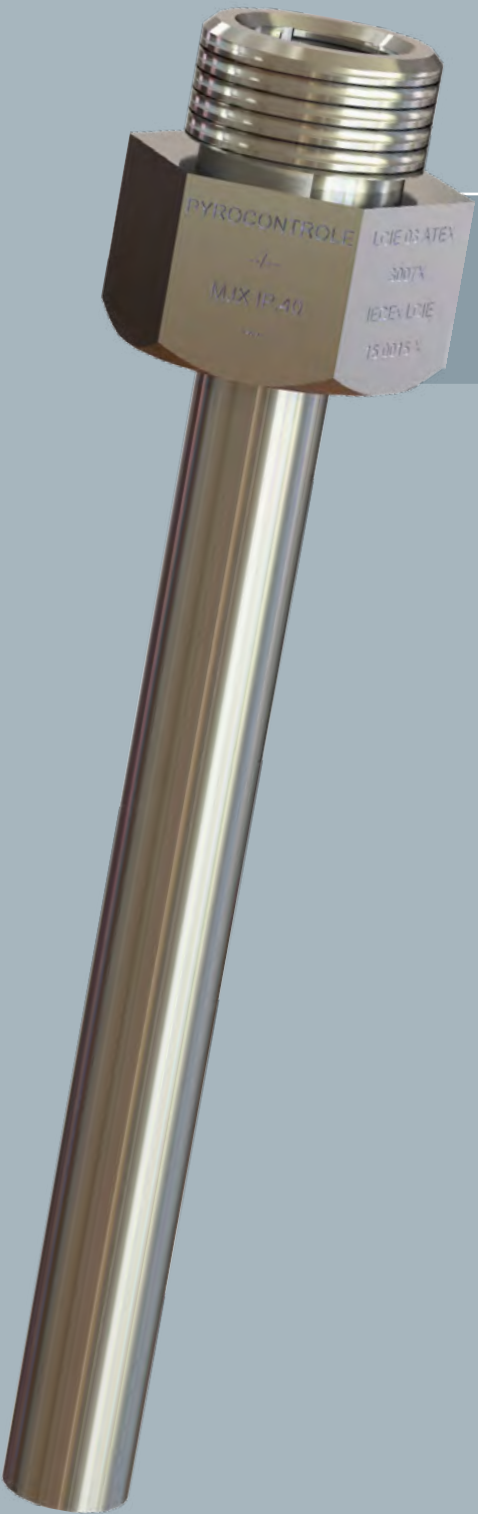
TO ORDER

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

| Ceramic terminal strip | ATEX | Reference |
|--|---------------|-------------|
|  2 terminals | Compatibility | L015078-000 |
| 4 terminals | | L015079-000 |
| 6 terminals | | 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.

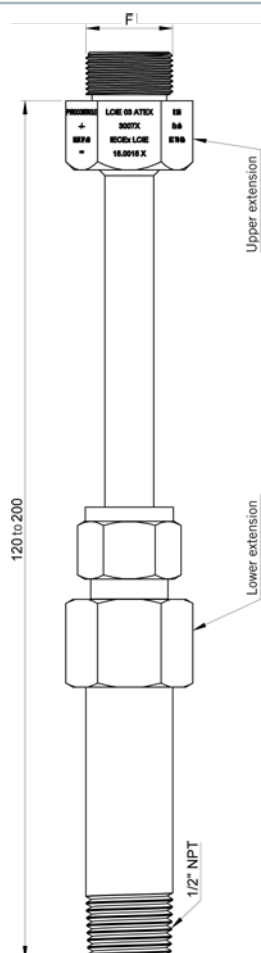
SPECIFICATIONS

| Part | Upper | Lower |
|-------------|---|---------------|
| ATEX | ⚠ 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. | |

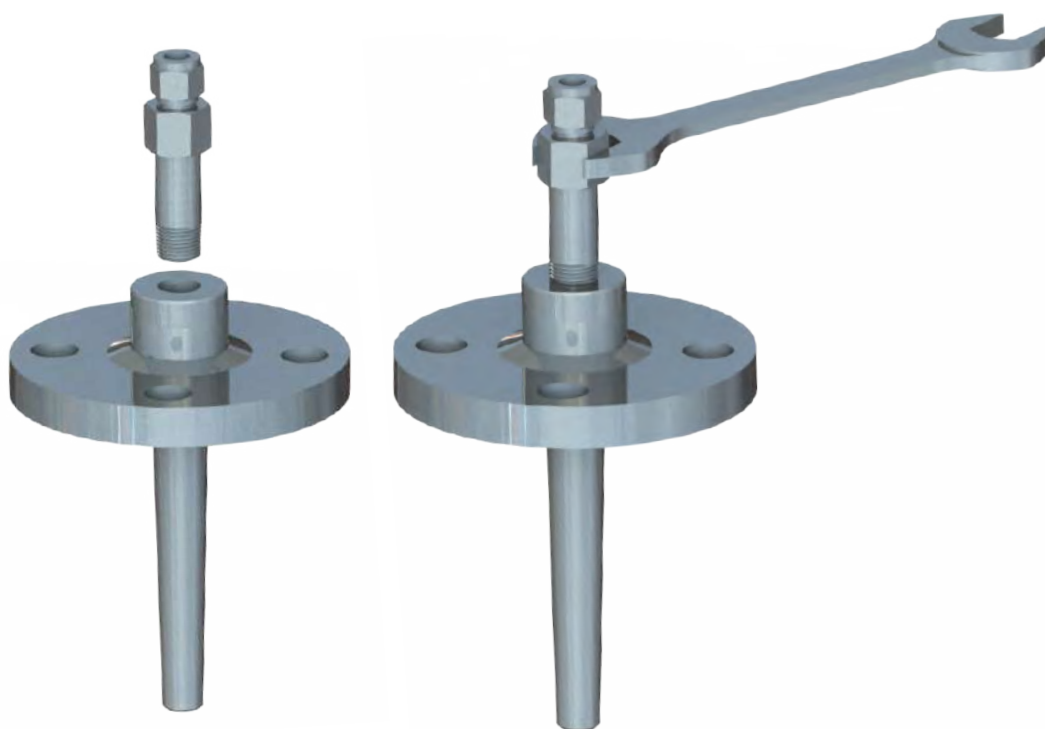
DESIGN YOUR SENSOR ID50



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
SAFETYCLASS
1SINGLE
OR
DUPLEXIEC
584-1

DESCRIPTION

Thermocouple measuring elements for the id50 system.

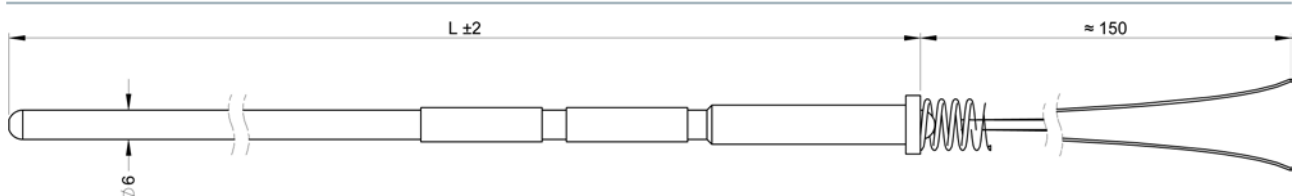
SPECIFICATIONS

| | | | |
|----------------------------|--|------|-------------|
| Model | IDG50 | | |
| Compliance with standards | IEC 61515 / IEC 584-1 / EN 60079-0 | | |
| ATEX | ⚡ II 2 G / Ex db IIC T6 Gb / ⚡ 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 |
| | Max | 1100 | 1100 |
| Output | Wires 150 mm long with end-pieces | | |
| Vibration withstand | 60g | | |

DESIGN YOUR SENSOR ID50

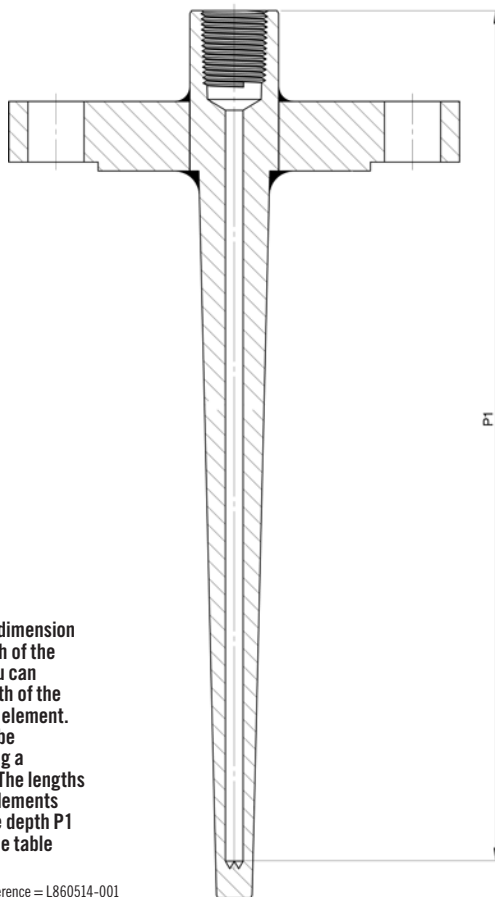


DIAGRAM (MM)



DETERMINATION OF THE LENGTH OF THE ID50 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

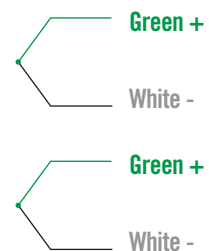
| K THERMOCOUPLE | Single reference | Duplex reference |
|----------------|------------------|------------------|
| Length 200 mm | L810430-200 | L810431-200 |
| Length 250 mm | L810430-250 | L810431-250 |
| Length 300 mm | L810430-300 | L810431-300 |
| Length 350 mm | L810430-350 | L810431-350 |
| Length 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



DESCRIPTION

Pt100 measuring elements for the id50 system

SPECIFICATIONS

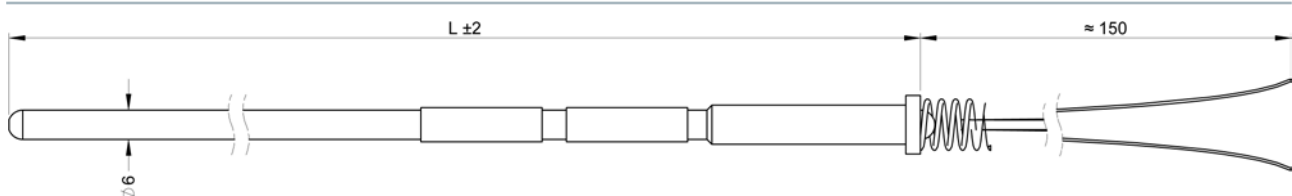
| | | | | |
|--------------------------------|--|-----------|-----------|-----------|
| Model | IDG50 | | | |
| Compliance with standards | IEC 60751 / EN 60079-0 | | | |
| ATEX | ⚠ II 2 G / Ex db IIC T6 Gb / ⚠ II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da | | | |
| Type | Pt100 | | | |
| Material | 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

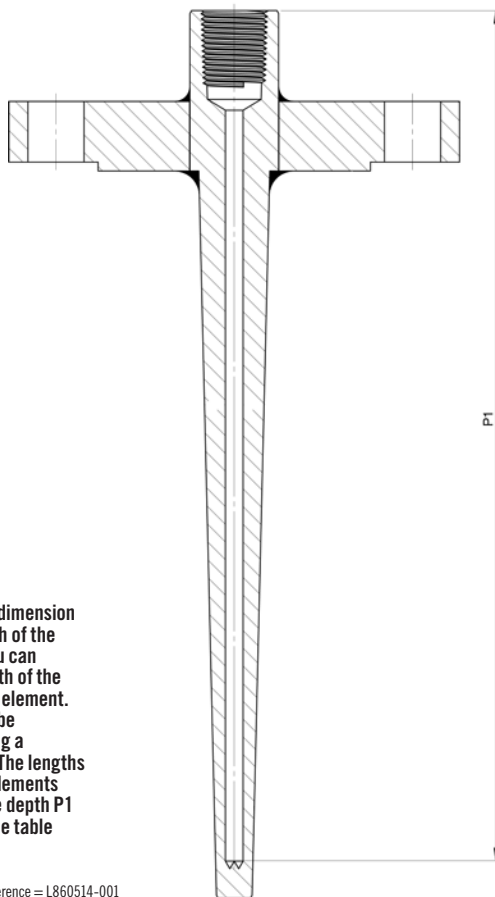


DIAGRAM (MM)



DETERMINATION OF THE LENGTH OF THE ID50 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.

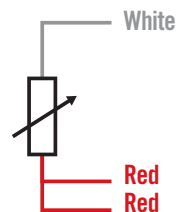
*measuring rod = Reference = L860514-001

TO ORDER

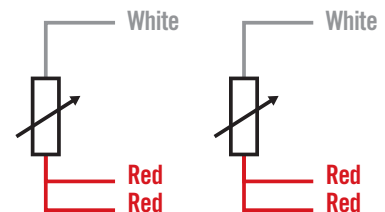
| 3-wire Pt100, Withstand 10g | Single reference | Duplex reference |
|-----------------------------|------------------|------------------|
| Length 200 mm | L810432-200 | L810433-200 |
| Length 250 mm | L810432-250 | L810433-250 |
| Length 300 mm | L810432-300 | L810433-300 |
| Length 350 mm | L810432-350 | 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
54/65CLASS
1INTRINSIC
SAFETYIEC
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: ☹ II 1G / Ex ia IIC T4...T6 Ga With DAN Vi head: ☹ 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:

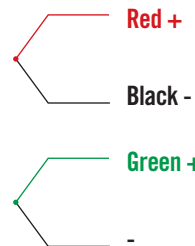
| MODEL | HEAD | TC | SHEATH TYPE | Ø SHEATH (mm) | LENGTH L1 (mm) | EXTENSION | OPTION | |
|--------------------------------|---------------------------|----------------------------------|--|---------------|------------------|---|----------------------------------|-------------------|
| TA1G | DNI | 1T | AC | 8 | 1,000 | M | TRANSMITTER | TRANSMITTER SCALE |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| Reference in table and diagram | | | | | | | | |
| 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

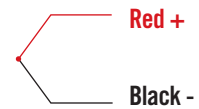
| Class 1 TC | Sheath diameter (mm) | |
|-------------|----------------------|------------|
| | 6 | 8 |
| T (CLASS 2) | 316L | 316L |
| J | 316L | 316L |
| K | INCONEL600 | INCONEL600 |
| N | INCONEL600 | - |
| | PYROSIL | PYROSIL |
| 2J | 316L | 316L |
| 2K | INCONEL600 | INCONEL600 |

CONNECTIONS

Duplex thermocouple



Single thermocouple

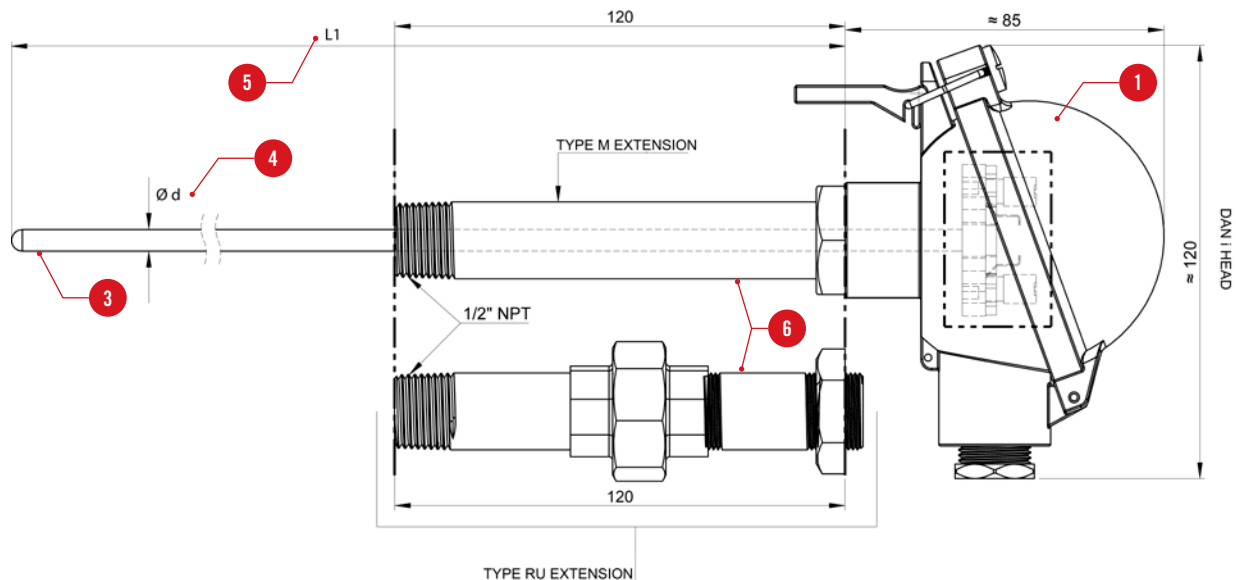


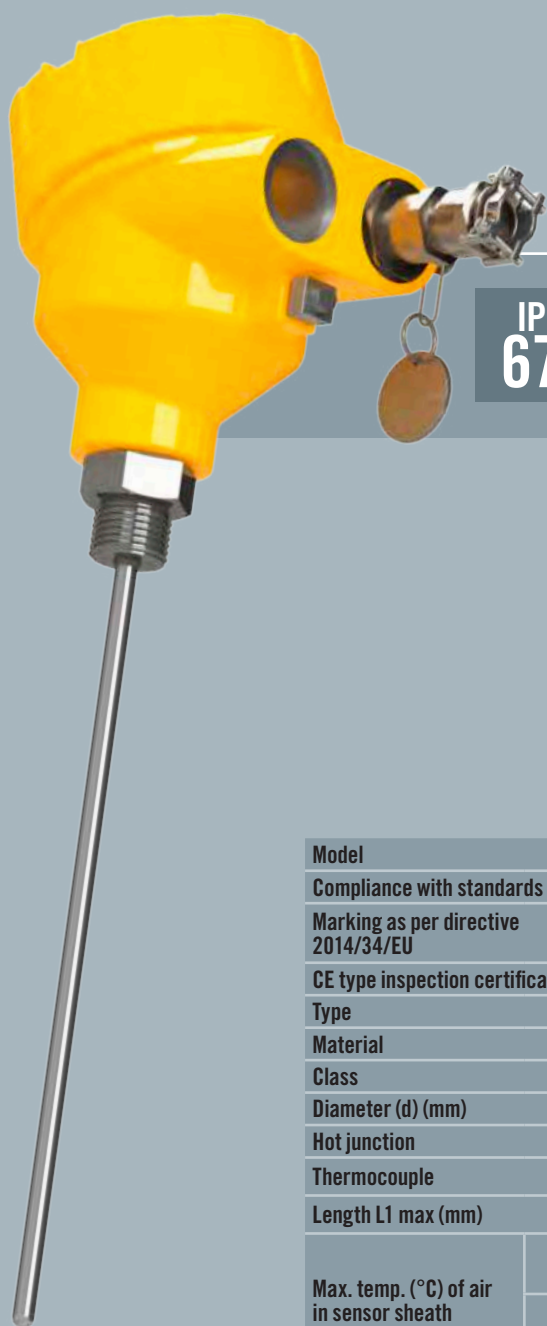
TRANSMITTER INFORMATION (1 TC ONLY)

| 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
67CLASS
1INTRINSIC
SAFETYIEC
584-1

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 | | ⚠ 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

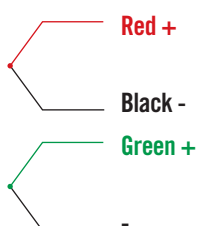
| Class 1 TC | Sheath diameter (mm) | | |
|--------------------|----------------------|------------|------------|
| | 4.5 | 6 | 8 |
| T (CLASS 2) | 316L | 316L | 316L |
| J | 316L | 316L | 316L |
| K | INCONEL600 | INCONEL600 | INCONEL600 |
| N | INCONEL600 | INCONEL600 | - |
| | PYROSIL | PYROSIL |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

TRANSMITTER INFORMATION (1 TC ONLY)

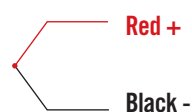
| Transmitter | | | | |
|-------------------|---------------|---------------------|------|-------------|
| Input | Output | Galvanic insulation | ATEX | Reference |
| TC + Pt100 | 4-20mA | 1,5kV | ia | LC5331B-321 |
| TC + Pt100 | 4-20mA + HART | 1,5kV | ia | LC5335B-100 |
| TC + Pt100 | 4-20mA + HART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

CONNECTIONS

Duplex thermocouple

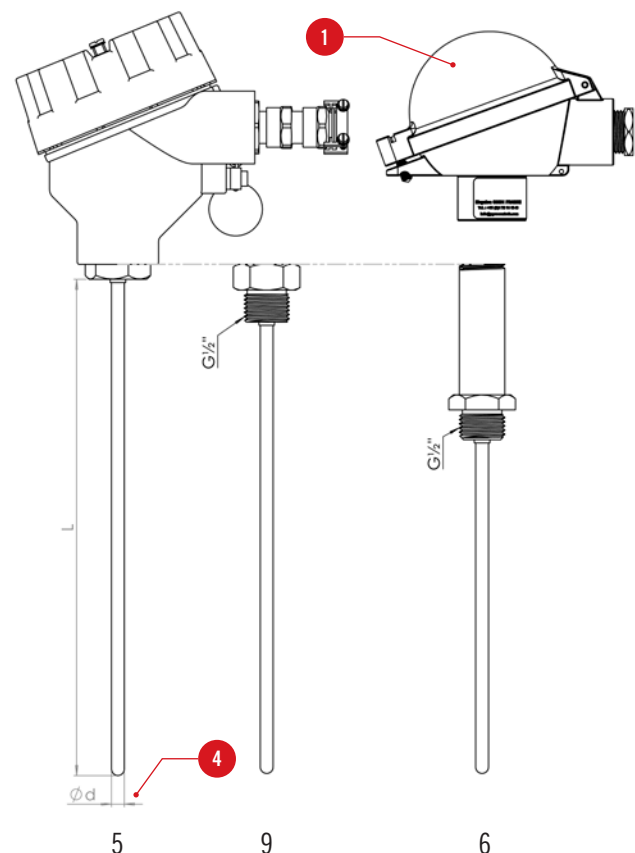


Single thermocouple



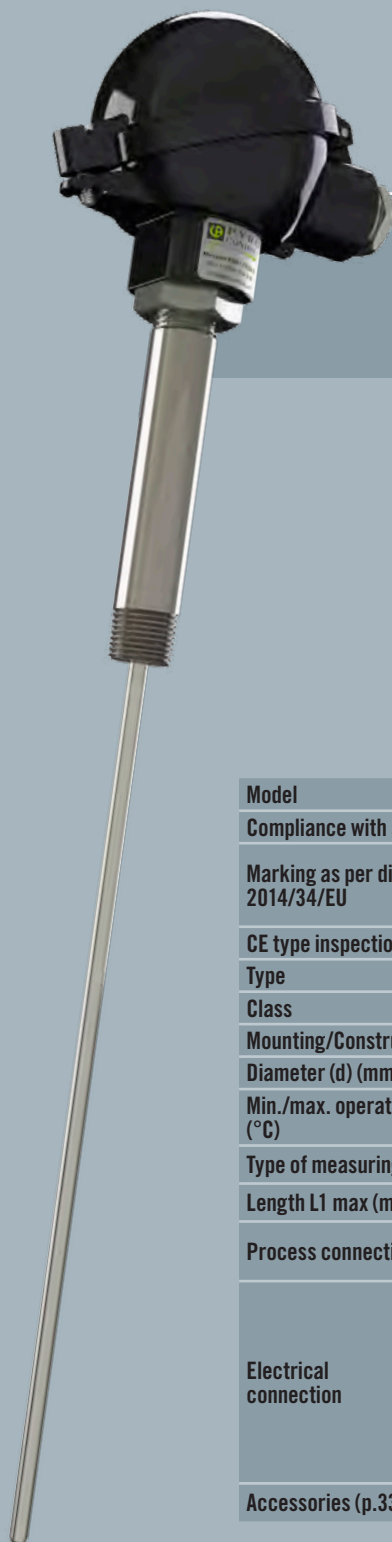
For any other configuration, please contact us.

DIAGRAM (MM)



PROCESS CONNECTION

6



SA1G

Pt100

IP
54/65

CLASS
A

IEC
60751

INTRINSIC
SAFETY

up to
450°C

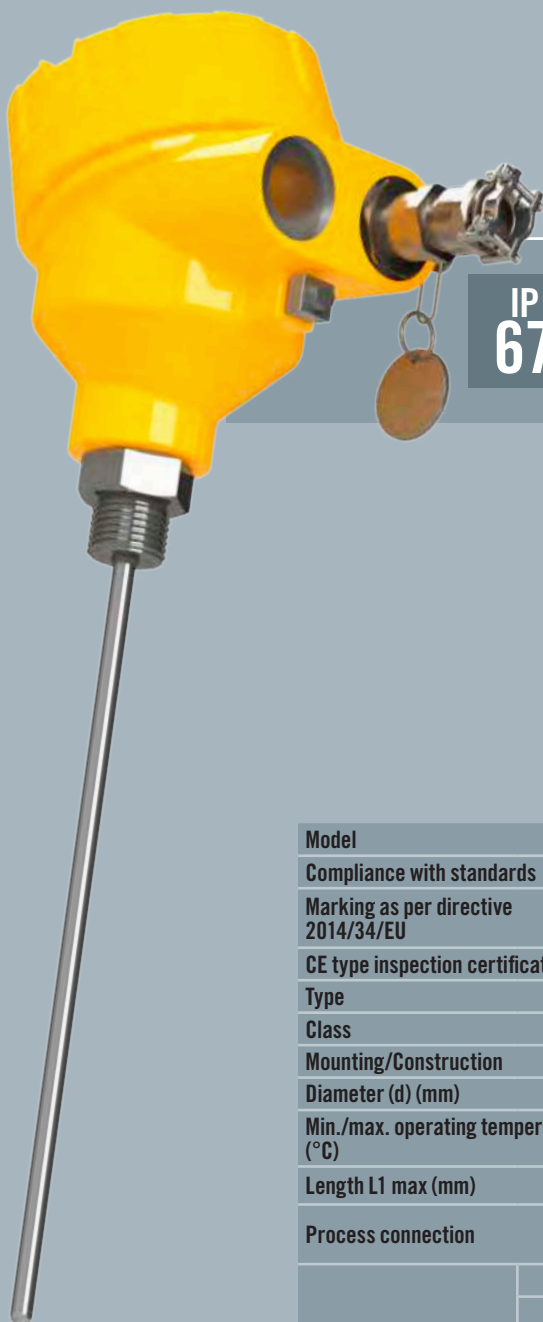
DESCRIPTION

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: ⚡ II 1G / Ex ia IIC T4...T6 Ga With DAN Vi head: ⚡ 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 | | 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 | |
| | | IP54 | IP65 |
| Accessories (p.338) | | Measuring element, thermowell, cable gland | |

For any other configuration, please contact us.



SAX41G

Pt100

IP
67CLASS
AIEC
60751INTRINSIC
SAFETY

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

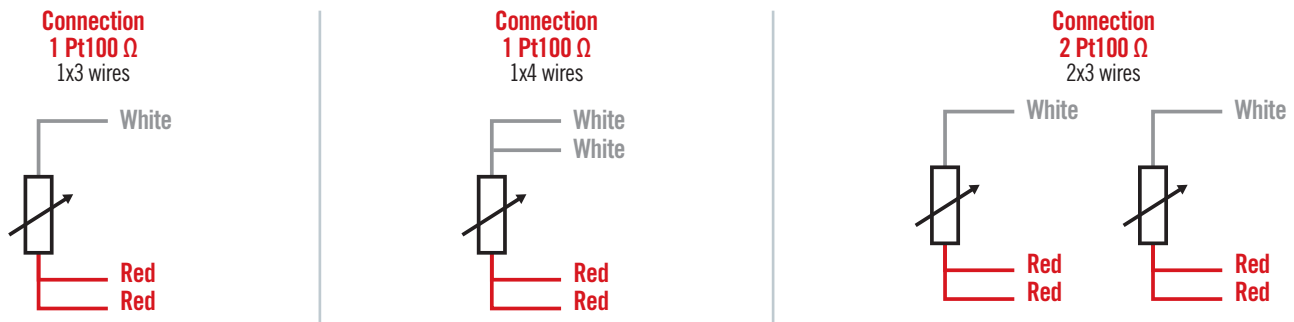
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | HEAD | Ø SHEATH (mm) | LENGTH L1 (MM) | MONTAGE | RACCORD PROCESS | CABLE GLAND | TRANSMITTER | TRANSMITTER SCALE | 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 1/2": 6 Connection hunder head G 1/2": 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

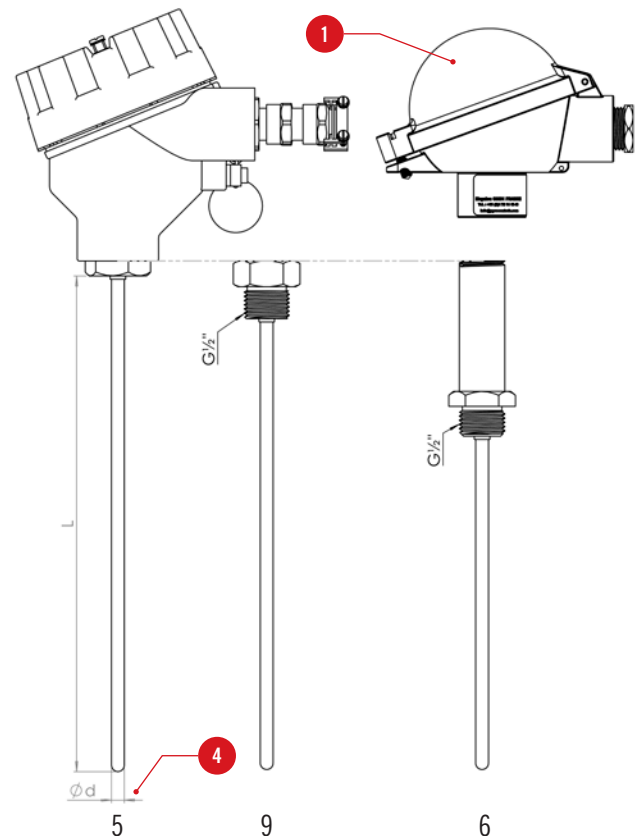


TRANSMITTER INFORMATION (1 TC ONLY)

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
OUTPUTINTRINSIC
SAFETYCLASS
1IEC
584-1

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 | | ⚡ 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 mm ² , 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)

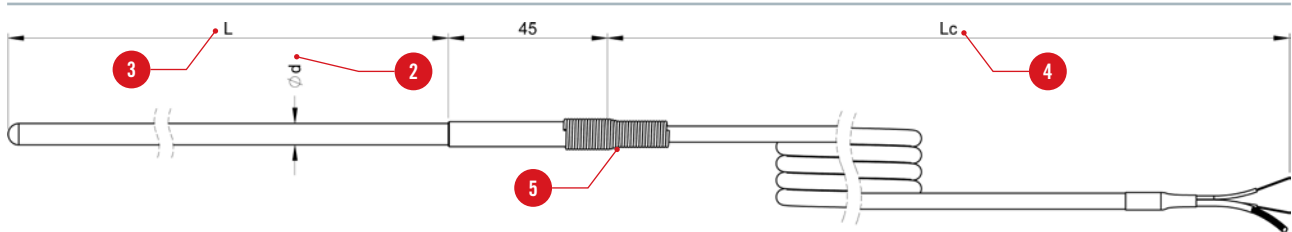
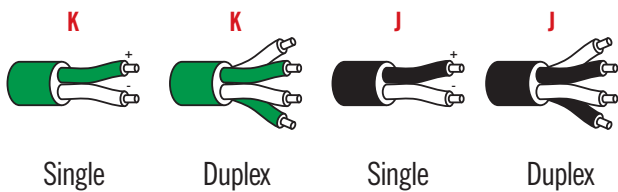


TABLE OF THERMOCOUPLE INFORMATION

| Model | Cable | TC Class 1 | Sheath diameter (mm) | | | | | | |
|-------|------------|------------|----------------------|------------|------------|------------|------------|------------|------------|
| | | | 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
OUTPUTCLASS
1INTRINSIC
SAFETYIEC
584-1

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 | | ⚠ 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 mm ² , 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)

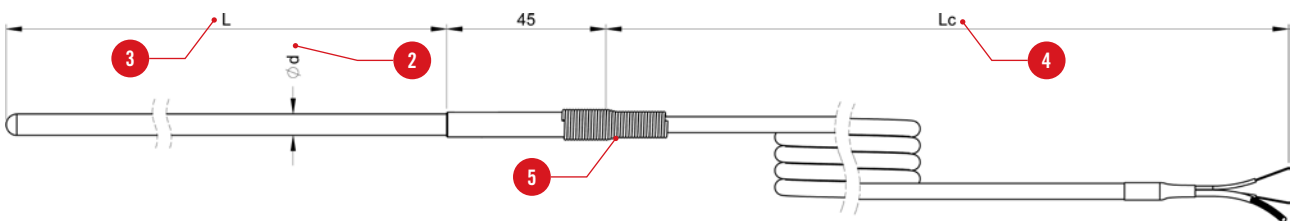
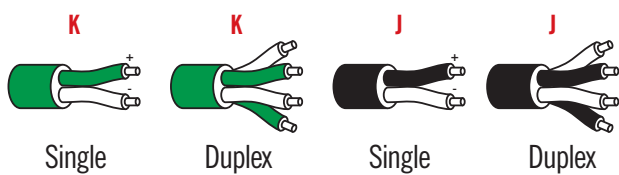


TABLE OF THERMOCOUPLE INFORMATION

| Model | Cable | Class 1 TC | Sheath diameter (mm) | | | | | | |
|--------|------------|------------|----------------------|------------|------------|------------|------------|------------|------------|
| | | | 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 CABLE
OUTPUT
OU FEP OU
SILICONE

CLASS
A

INTRINSIC
SAFETY

IEC
60751



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 | | ⚠ 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 |
|--------------------------------|--------------|--|---------------------------|--------------------|--------------------------------------|------------------|----------------------------------|
| Sli | 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)

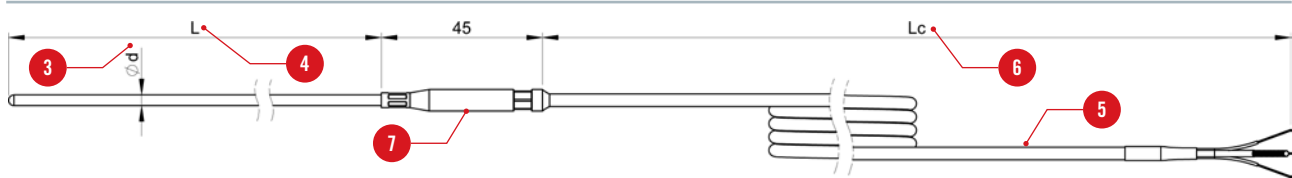
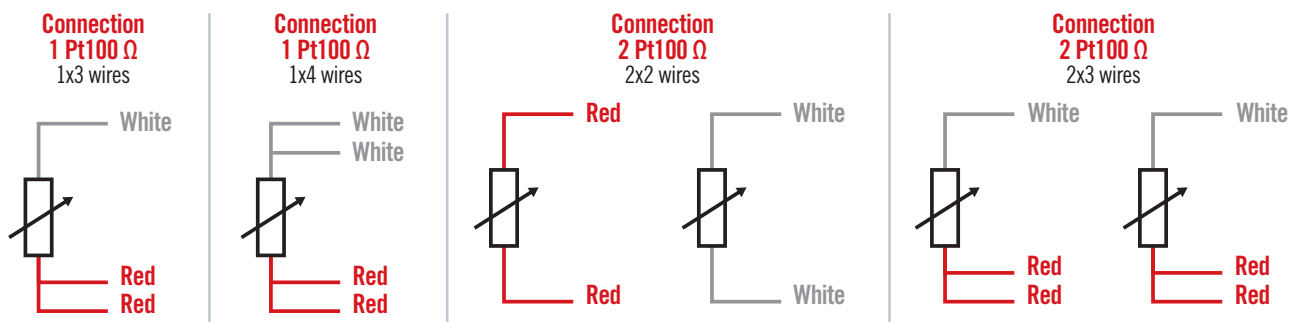


TABLE OF POSSIBLE ASSOCIATIONS

| 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 | 4 |
| | 1x4 wires | 50 / 250 | 50 / 1500 | 50 / 1500 | 50 / 1500 | 50 / 1500 | |
| 2 | 2x2 wires | - | - | 50 / 250 | 50 / 250 | 50 / 250 | 4 |
| | 2x3 wires | - | - | 50 / 1500 | 50 / 1500 | 50 / 1500 | |

CONNECTIONS



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 | 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



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



DISPLAY

Type A LCD indicator



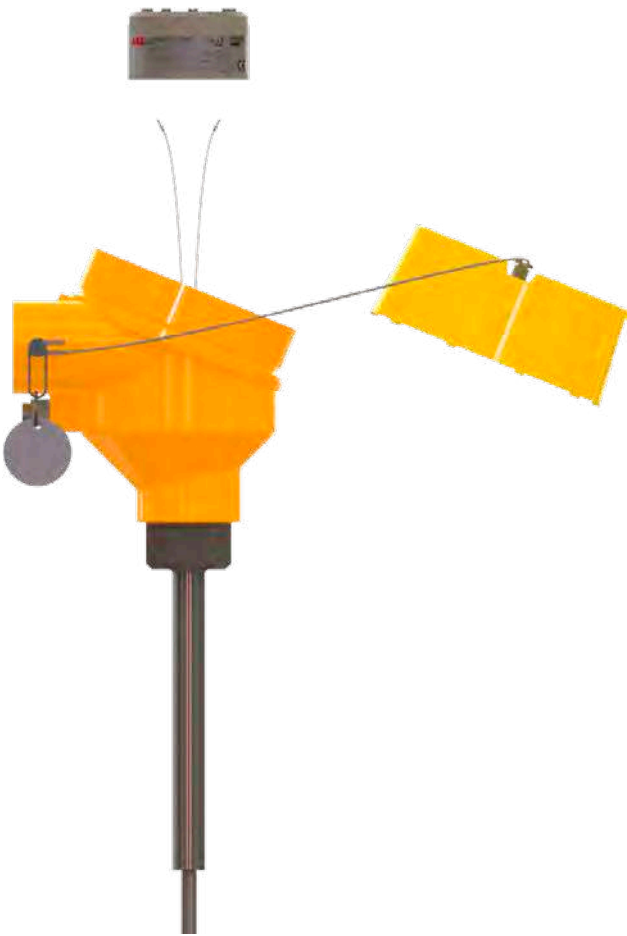
- 1 Quit / Cancel
- 2 Scroll back
- 3 Scroll forward
- 4 Confirm

Type AS LCD indicator



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.



TO ORDER

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

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 |

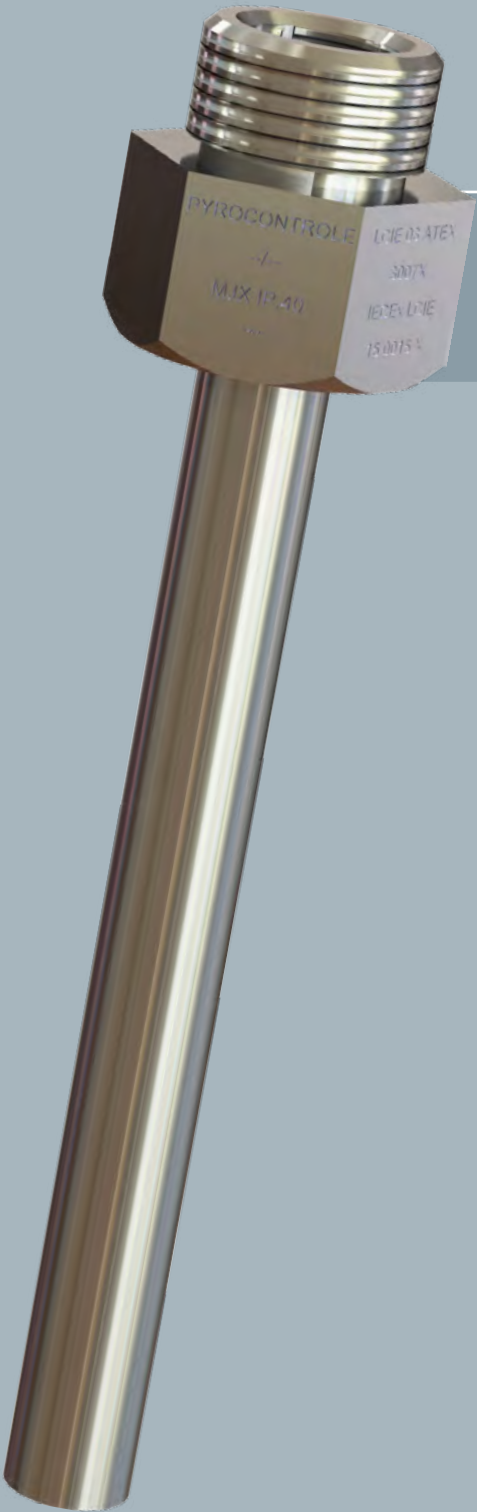
TERMINAL STRIP SPECIFICATIONS

| 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 |



ID50 SENSOR

EXTENSIONS FOR ID50



ADJUSTABLE
FROM 120
TO 200 mm

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

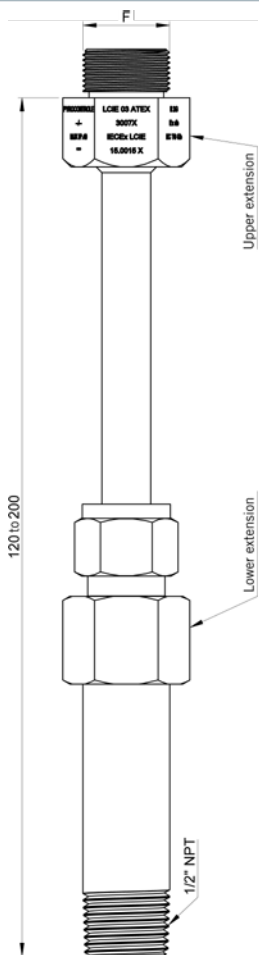
| Part | Upper | Lower |
|-------------|--|---------------|
| ATEX | Ex II 2G - Ex db IIC T6 Gb | N/A |
| Material | 316L | |
| Mounting | On head | On thermowell |
| Threading | As per table opposite | ½ NPT |
| Accessories | Screw for locking the measuring element for any head other than the LSX model.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

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

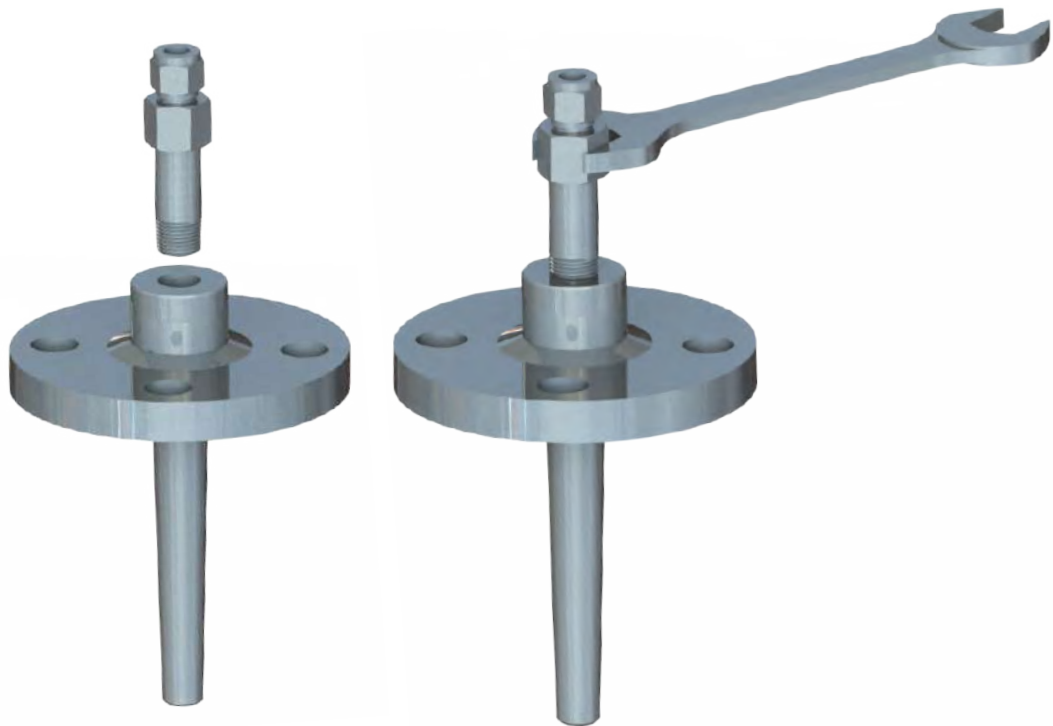
DESIGN YOUR SENSOR ID50



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
1SINGLE
OR
DUPLEXIEC
584-1

DESCRIPTION

Thermocouple measuring elements for the id50 system

SPECIFICATIONS

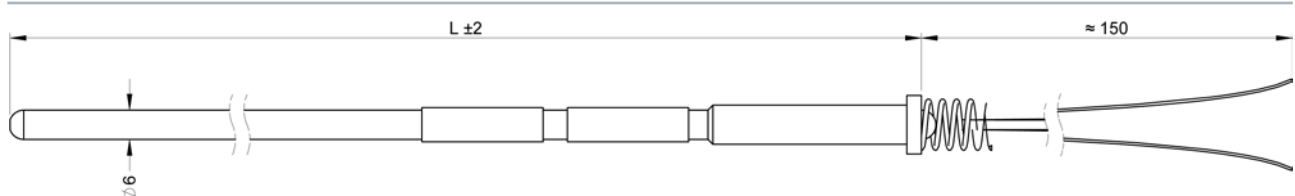
| | | | |
|----------------------------|--|------|-------------|
| Model | IDG50 | | |
| Compliance with standards | IEC 61515 / IEC 584-1 / EN 60079-0 | | |
| ATEX | ⚡ II 2 G / Ex db IIC T6 Gb / ⚡ II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da | | |
| Type | K | J | N |
| Material | Inconel 600 | 316L | 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 |
| | Max | 1100 | 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

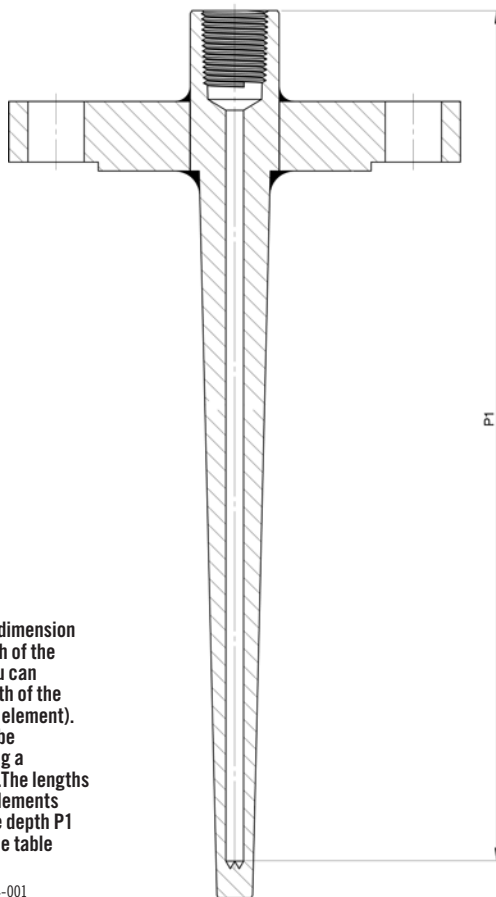


DIAGRAM (MM)



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

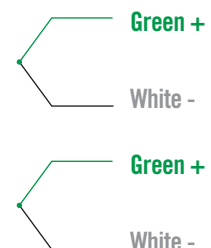
| K THERMOCOUPLE | Single reference | Duplex reference |
|----------------|------------------|------------------|
| Length 200 mm | L810430-200 | L810431-200 |
| Length 250 mm | L810430-250 | L810431-250 |
| Length 300 mm | L810430-300 | L810431-300 |
| Length 350 mm | L810430-350 | L810431-350 |
| Length 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
ASINGLE
OR
DUPLEXIEC
60751

DESCRIPTION

Pt100 measuring elements for the id50 system

SPECIFICATIONS

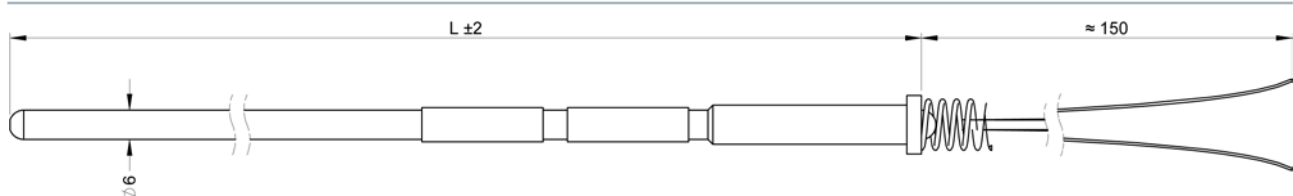
| | | | | |
|--------------------------------|--|-----------|-----------|-----------|
| Model | IDG50 | | | |
| Compliance with standards | IEC 60751 / EN 60079-0 | | | |
| ATEX | ⚠ II 2 G / Ex db IIC T6 Gb / ⚠ II 1 GD / Ex ia IIC T6 Ga / Ex ia IIIC T85°C Da | | | |
| Type | Pt100 | | | |
| Material | 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

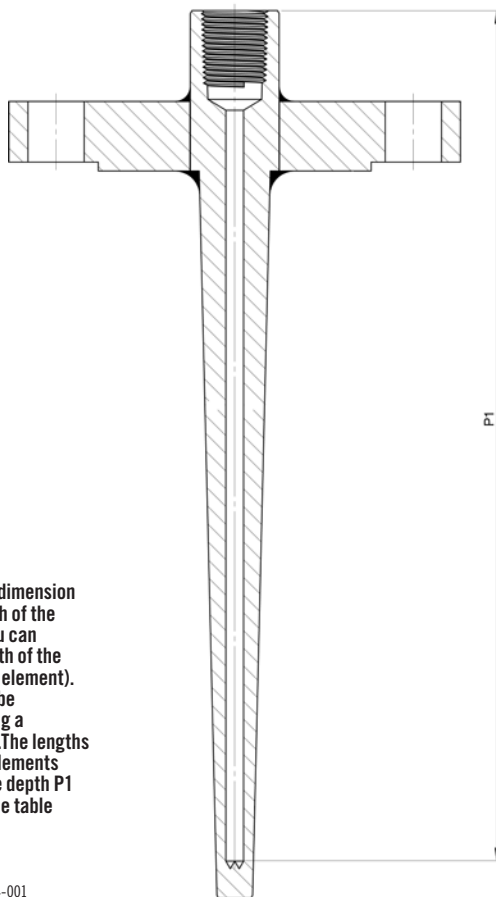


DIAGRAM (MM)



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.

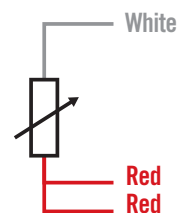
*Reference = L860514-001

TO ORDER

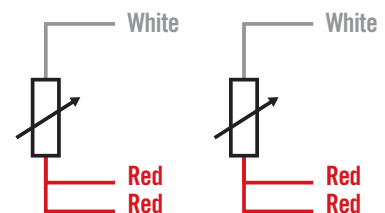
| 3-wire Pt100, Withstand 10g | Single reference | Duplex reference |
|-----------------------------|------------------|------------------|
| Length 200 mm | L810432-200 | L810433-200 |
| Length 250 mm | L810432-250 | L810433-250 |
| Length 300 mm | L810432-300 | L810433-300 |
| Length 350 mm | L810432-350 | 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
67CLASS
1ANTI
EXPLOSIONIEC
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 | |  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 under head G ½": 9 | Insulated: I Earthed: M |

| 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

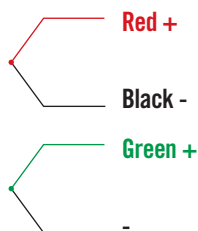
*compatible with the TTH200/TTH300 transmitters (see page 228)

THERMOCOUPLE INFORMATION

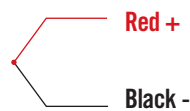
| Class 1 TC | Sheath diameter (mm) | | |
|--------------------|-----------------------|-----------------------|--------------|
| | 4.5 | 6 | 8 |
| T (CLASS 2) | 316L | 316L | 316L |
| J | 316L | 316L | 316L |
| K | INCONEL600 | INCONEL600 | INCONEL600 |
| N | INCONEL600 PYROSIL | INCONEL600 PYROSIL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

CONNECTIONS

Duplex thermocouple



Single thermocouple

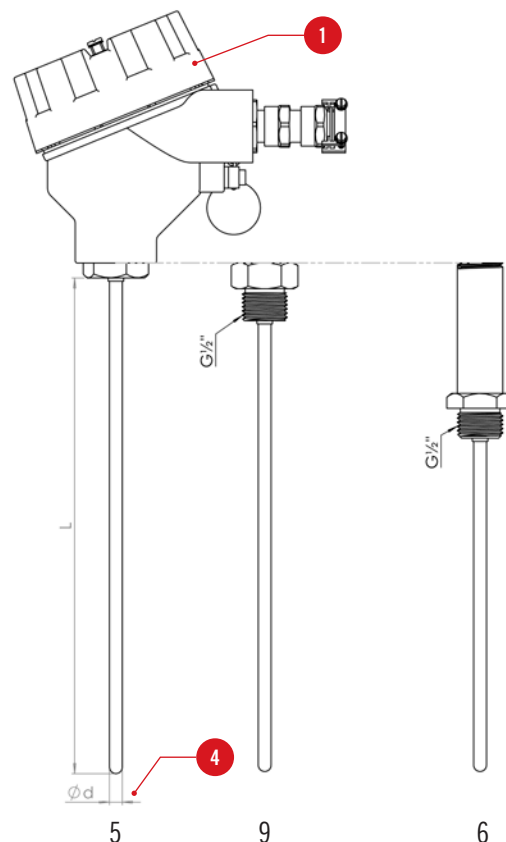


TRANSMITTER INFORMATION (1 TC ONLY)

| 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: sheathed PT100 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 | ⚠ II 2 GD / Ex db IIC T6 Gb / Ex tb IIIC T85°C Db IP6X 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 |

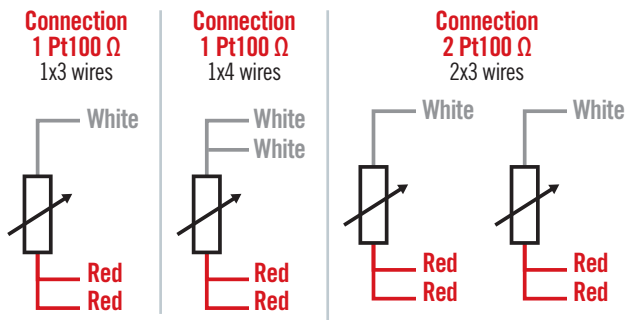
| OPTION | | |
|-------------|-------------------|-------|
| TRANSMITTER | TRANSMITTER SCALE | DIAL* |
| B | 0/250 | AA |
| 6 | | |

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)

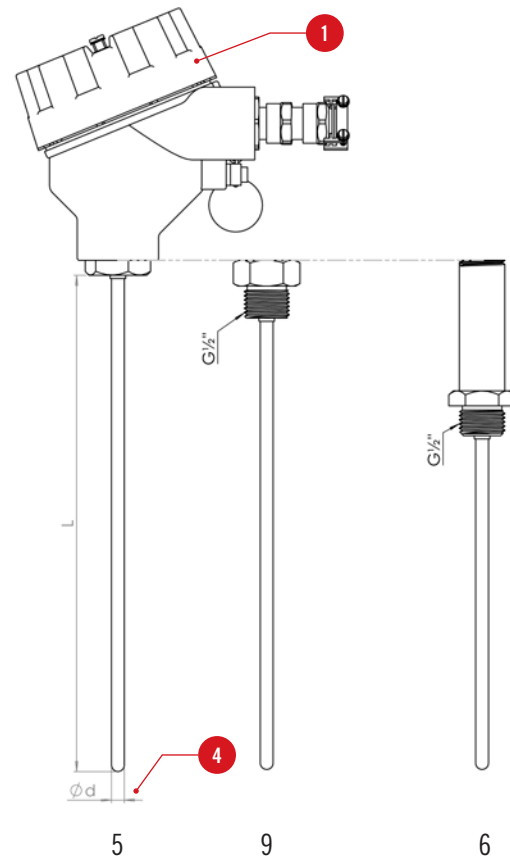
CONNECTIONS



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 |

3 DIAGRAM (MM)

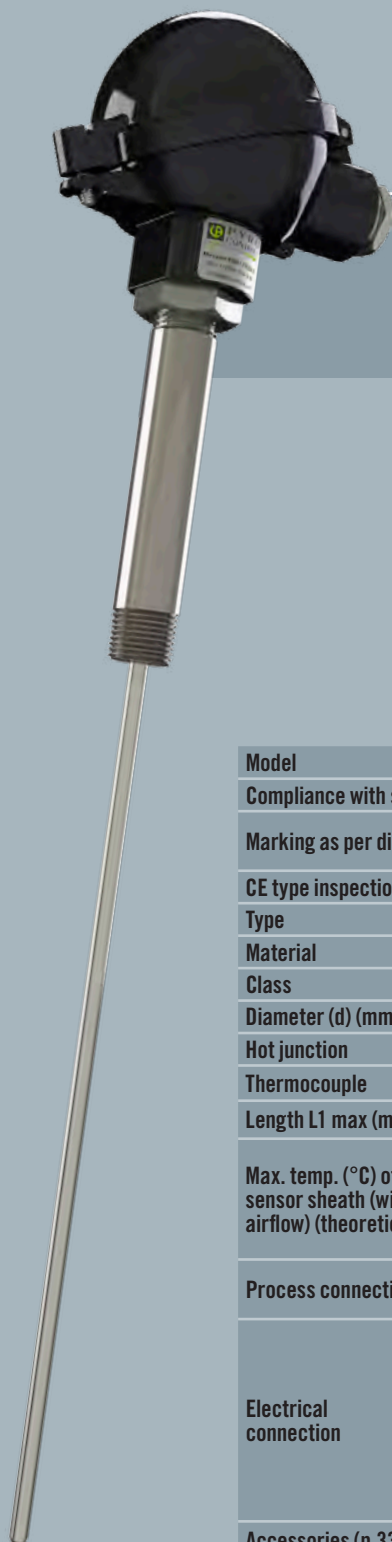


PROCESS CONNECTION

5

DUST ENVIRONMENT

ZONES 20, 21, 22 ATEX ia



TA1D


THERMOCOUPLE

IP
65CLASS
1IEC
584-1INTRINSIC
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 | |  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 | | | | |
| | | IP65 | | | | |
| Accessories (p.338) | | Thermowell, cable gland | | | | |

DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

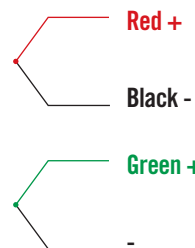
| MODEL | HEAD | TC TYPE | SHEATH TYPE | Ø SHEATH (mm) | LENGTH L1 (mm) | EXTENSION | OPTION | |
|--------------------------------|-------------|----------------------------------|--|---------------|------------------|---|----------------------------------|-------|
| TA1D | DVI | 1N | CM | 6 | 800 | 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

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

CONNECTIONS

Duplex thermocouple



Single thermocouple

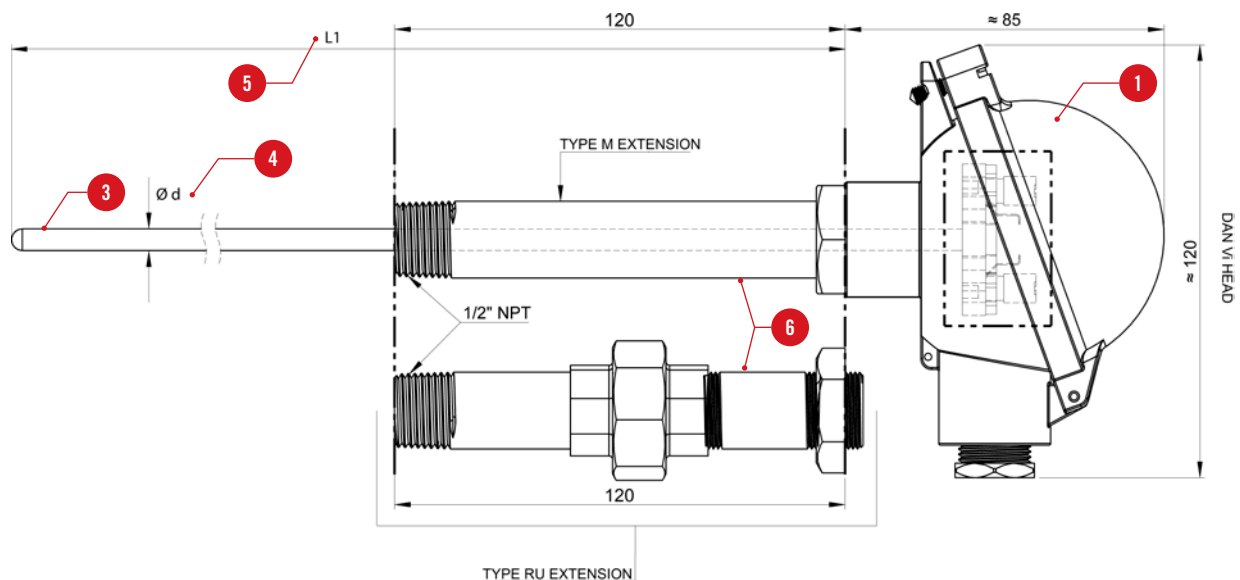


TRANSMITTER INFORMATION (1 TC ONLY)

| 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
67CLASS
1INTRINSIC
SAFETYIEC
584-1

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 | | ⚡ II 1GD / Ex ia IIC T4...T6 Ga Ex ia IIC 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 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 |
|--------------------------------|---------------------------|----------------------------------|---|---------------|----------------|--|----------------------------|
| 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

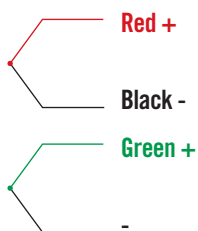
* compatible with the TTH200/TTH300 transmitters (see page 200)

THERMOCOUPLE INFORMATION

| Class 1 TC | 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 |

CONNECTIONS

Duplex thermocouple



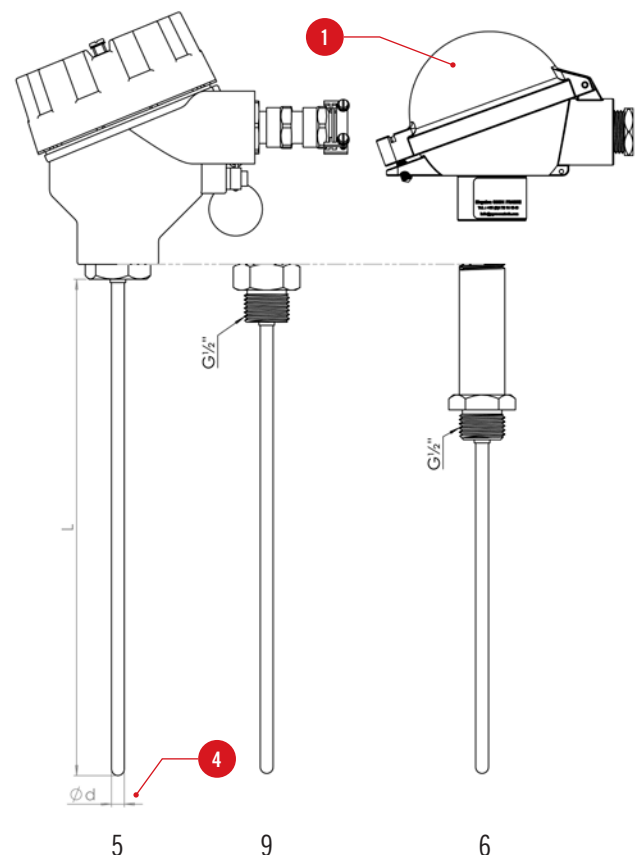
Single thermocouple



TRANSMITTER INFORMATION (1 TC ONLY)

| 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 |

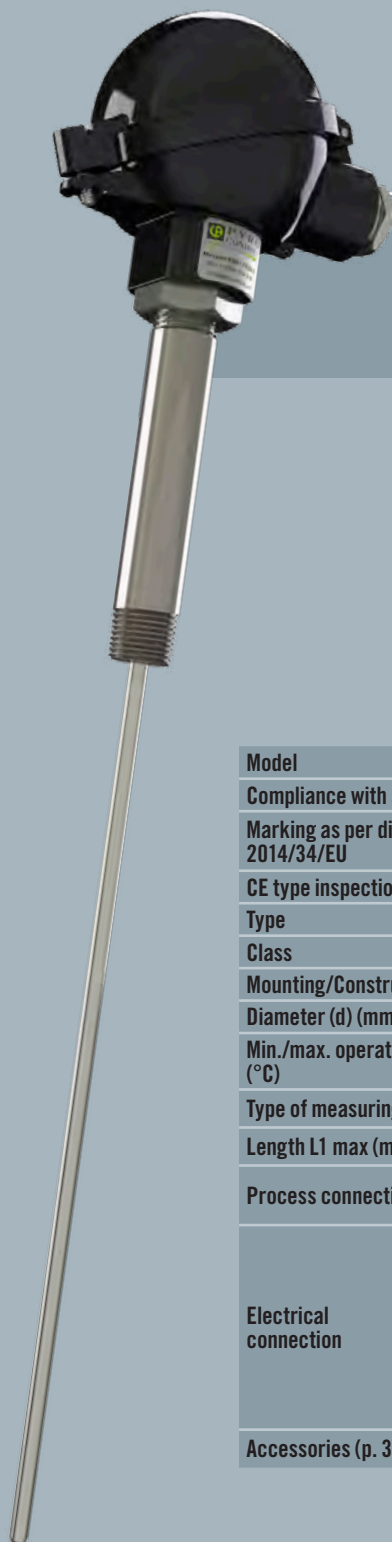
DIAGRAM (MM)



PROCESS CONNECTION

6

Pour toute autre configuration, nous consulter.



SA1D

Pt100

IP
65CLASS
AIEC
60751INTRINSIC
SAFETY

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 |
| | | IP65 |
| Accessories (p. 338) | | Measuring element, thermowell, cable gland |

For any other configuration, please contact us.

DESIGN YOUR SENSOR

CONFIGURATOR CODE

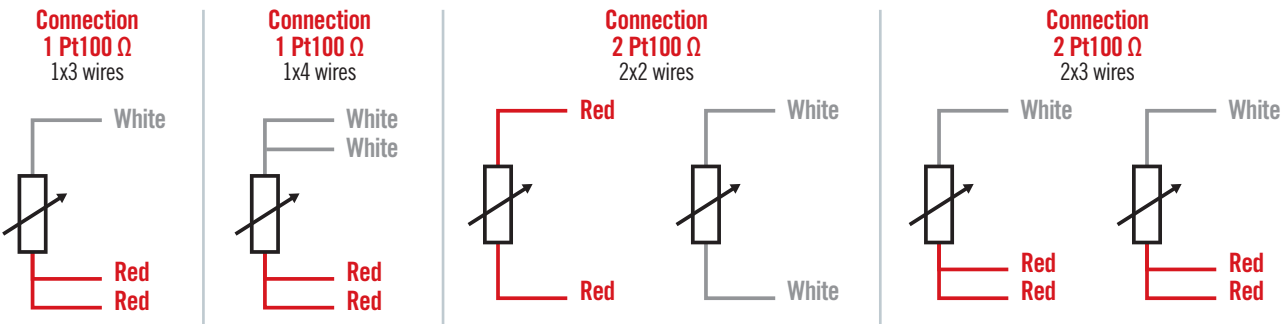
Parameters to be indicated when ordering. Example:

| MODEL | HEAD | DIAM (mm) | MOUNTING | LENGTH L1 (mm) | EXTENSION | 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 | |

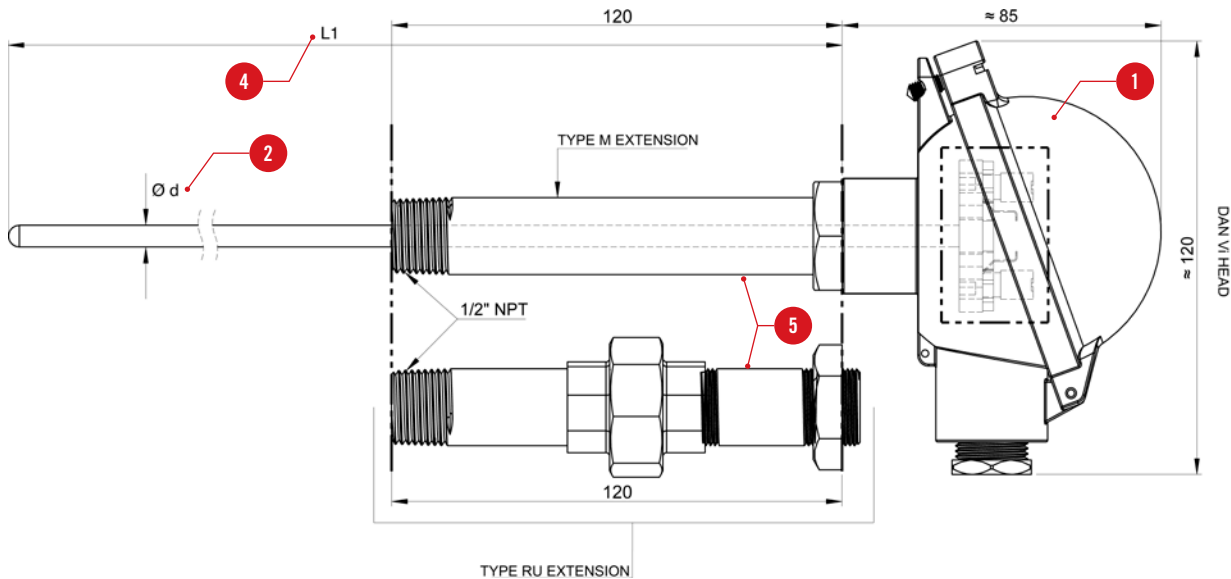
TRANSMITTER INFORMATION (1 PT100 ONLY)

| 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



DIAGRAM





SAX41D

Pt100

IP
67CLASS
AIEC
60751INTRINSIC
SAFETY

DESCRIPTION

Capteur Process pour une utilisation en zone explosive avec un environnement poussière. Élément 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 | | 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.

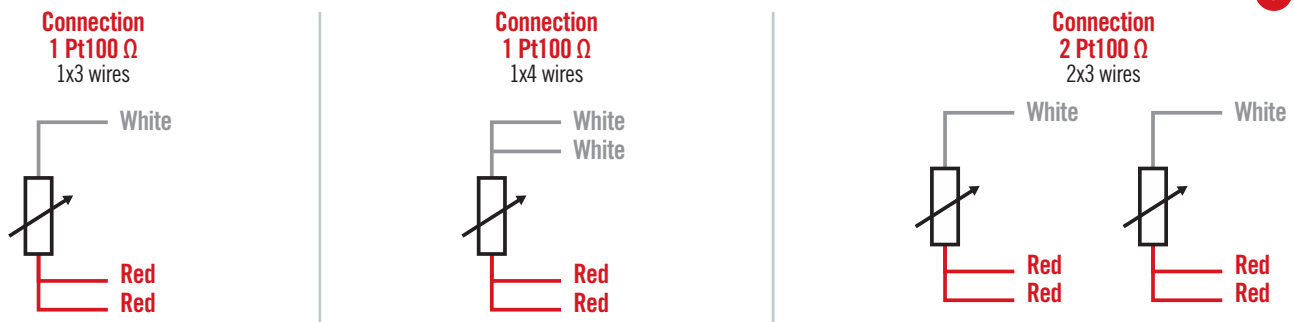
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | HEAD | Ø SHEATH (mm) | LENGTH L1 (MM) | MONTAGE | RACCORD PROCESS | CABLE GLAND | TRANSMITTER | TRANSMITTER SCALE | 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) |

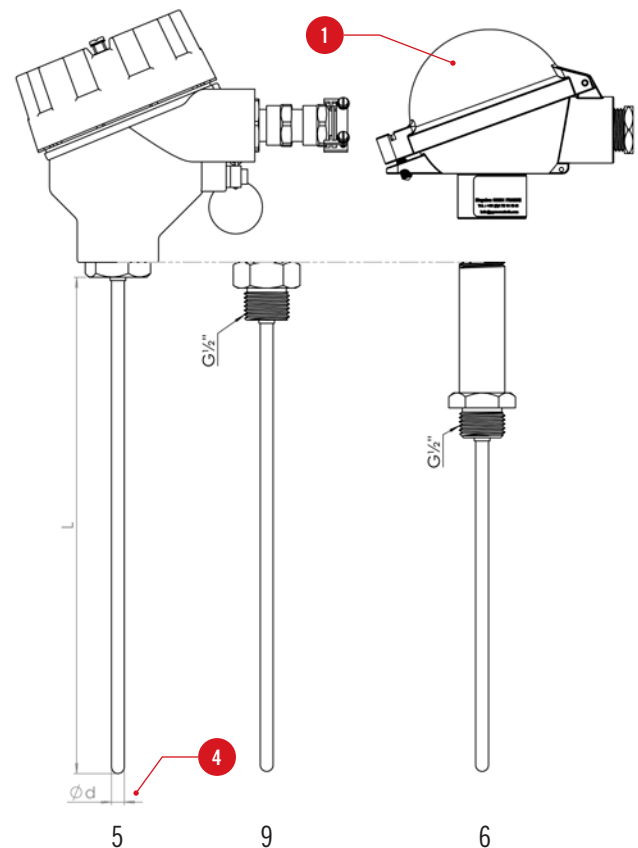
CONNECTIONS



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

TCG3i

THERMOCOUPLE

INTRINSIC
SAFETYCLASS
1IEC
584-1PVC
CABLE
OUTPUT

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 | | ☹ 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 | |

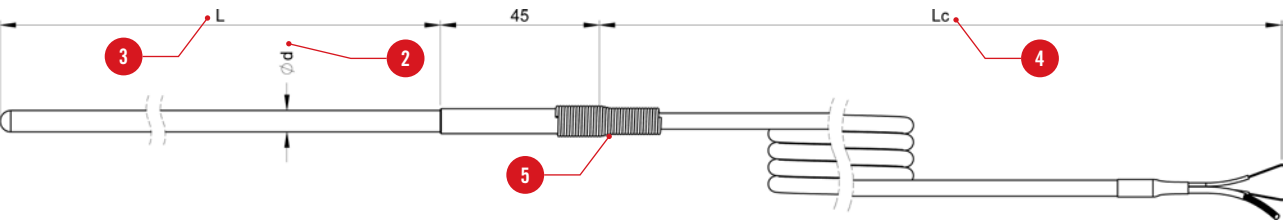
DESIGN YOUR SENSOR

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) |

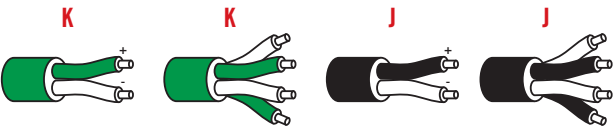
DIAGRAM (MM)



THERMOCOUPLE INFORMATION

| Model | Cable | Class 1 TC | Sheath diameter (m Class 1 TC m) | | | | | | |
|-------|------------|------------|----------------------------------|------------|------------|------------|------------|------------|------------|
| | | | 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
OUTPUTCLASS
1IEC
584-1INTRINSIC
SAFETY

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 | | ☹ 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 | |

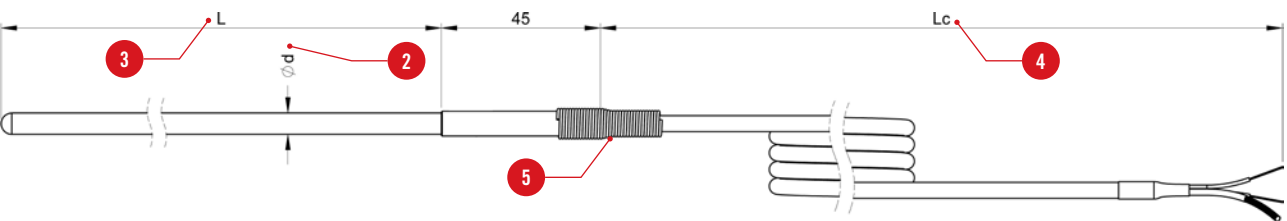
DESIGN YOUR SENSOR

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) |

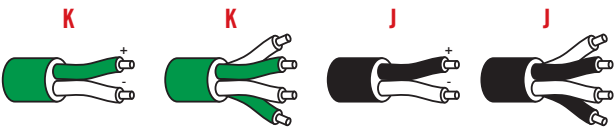
DIAGRAM (MM)



THERMOCOUPLE INFORMATION

| Model | Cable | Class 1 TC | Sheath diameter (mm) | | | | | | |
|--------|------------|------------|----------------------|------------|------------|------------|------------|------------|------------|
| | | | 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 |

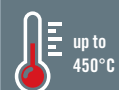
CONNECTIONS



For any other configuration, please contact us.

S1i

Pt100

PVC OR FEP
OR SILICONE
CABLE
OUTPUTCLASS
AINTRINSIC
SAFETYIEC
60751

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 | ⚡ 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 |
|--------------------------------|--------------|--|---------------------------|--------------------|---------------------------------------|------------------|----------------------------------|
| Sli | 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)

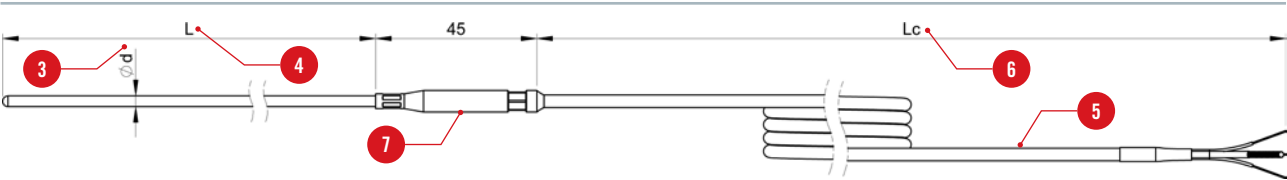
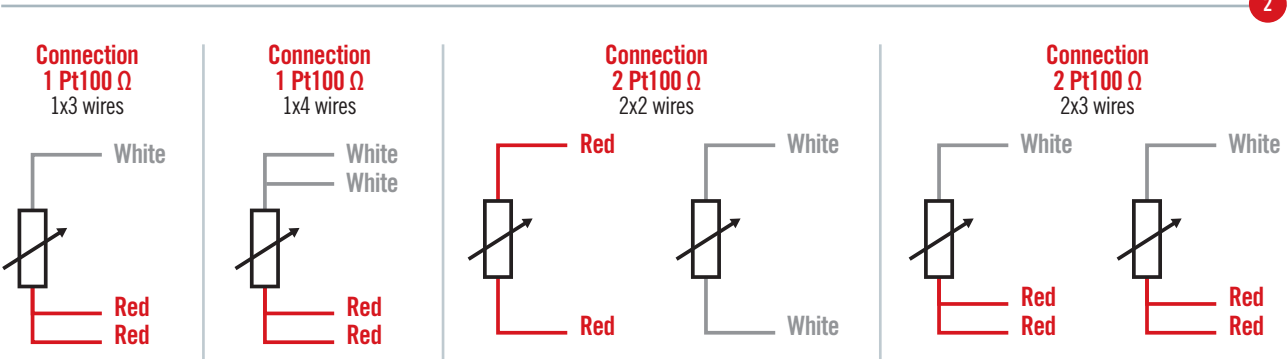


TABLE OF POSSIBLE ASSOCIATIONS

| 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 | |

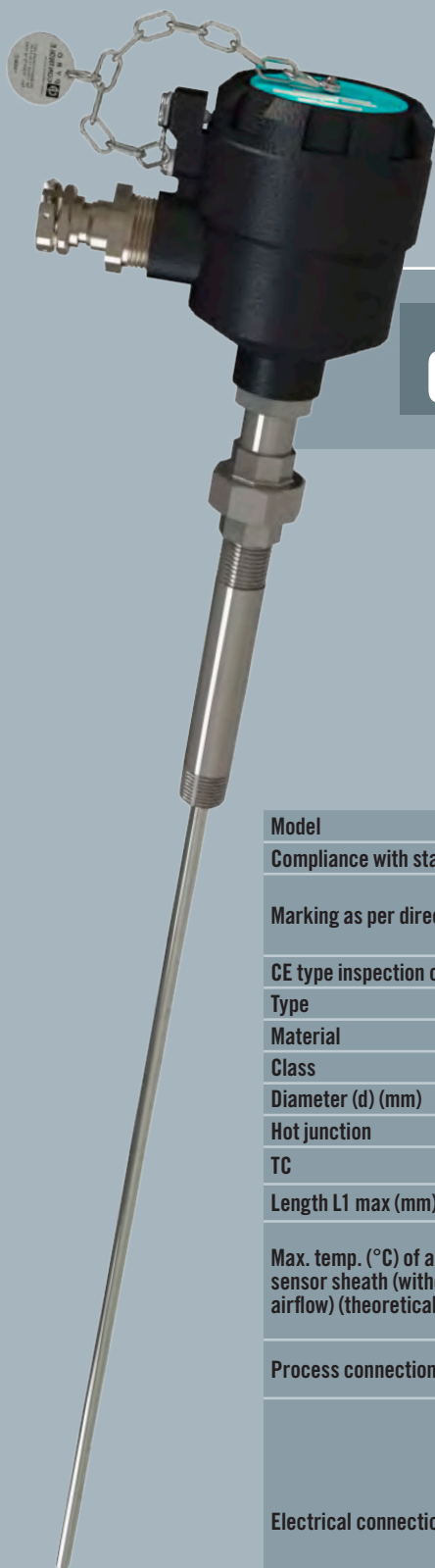
CONNECTIONS



For any other configuration, please contact us.

DUST ENVIRONMENT

ZONES 21, 22 ATEX d



TA2D

THERMOCOUPLE

IP
65CLASS
1IEC
584-1


ANTI-EXPLOSION



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 | |  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:

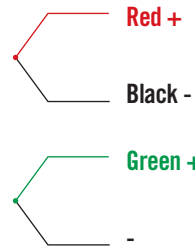
| MODEL | HEAD | TC TYPE | SHEATH TYPE | Ø SHEATH (mm) | LENGTH L1 (mm) | HOT JUNCTION | EXTENSION | CABLE GLAND | EN OPTION | |
|--------------------------------|------|----------------------------------|---|---------------|------------------|--|---|---|---|-------------------|
| TA2D | PSX | 1T | AC | 6 | 1,400 | M | M | N | TRANSMITTER | TRANSMITTER SCALE |
| | 1 | 2 | 3 | 4 | 5 | 8 | 6 | | 7 | |
| Reference in table and diagram | | | | | | | | | | |
| 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

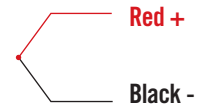
| Class 1 TC | Sheath diameter (mm) | |
|--------------------|----------------------|------------|
| | 6 | 8 |
| T (CLASS 2) | 316L | 316L |
| J | 316L | 316L |
| K | INCONEL600 | INCONEL600 |
| N | INCONEL600 | - |
| | PYROSIL | PYROSIL |
| 2J | 316L | 316L |
| 2K | INCONEL600 | INCONEL600 |

ASSOCIATED CONNECTIONS ON TERMINAL STRIP

Duplex thermocouple



Single thermocouple

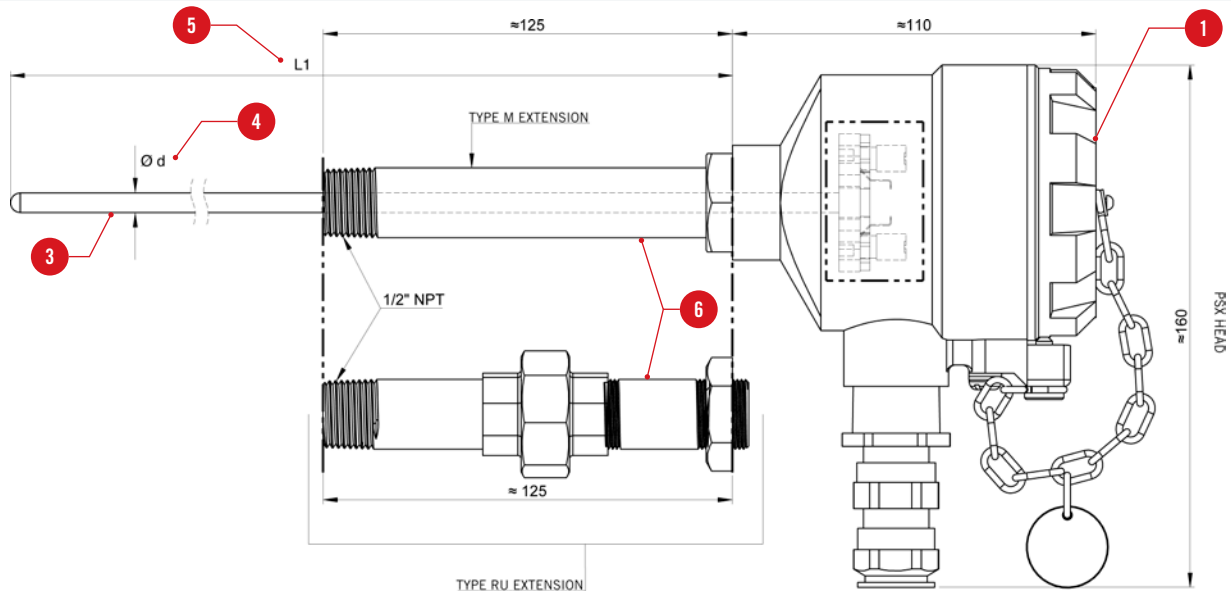


TRANSMITTER INFORMATION (1 TC ONLY)

| 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 |

For any other configuration, please contact us

DIAGRAM (MM)





DGM/TGM

THERMOCOUPLE

CLASS
1

IEC
584-1

SIMPLE
OR
DUPLEX

 up to
1150°C

DESCRIPTION

Élément 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 |

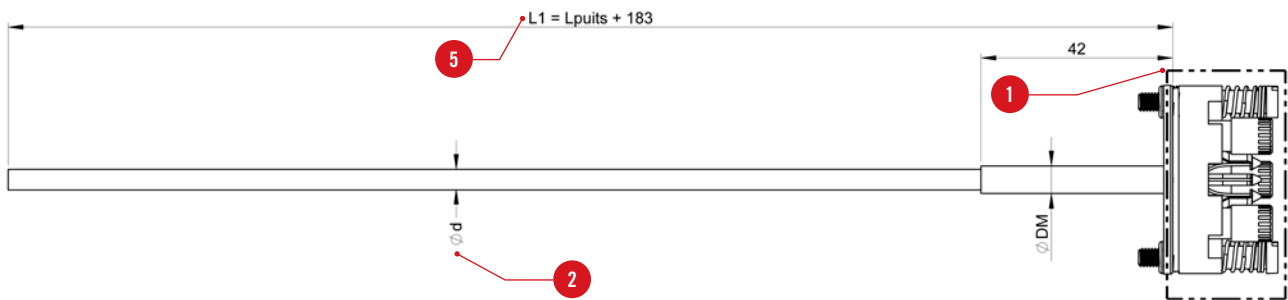
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| Reference in table and diagram | TYPE OF TERMINAL STRIP | ELEMENT TYPE | DIAMETER (mm) | TC TYPE | SHEATH TYPE | LENGTH L1 (MM) | HOT JUNCTION | OPTION | |
|--------------------------------------|--|--|------------------|------------------|--|--------------------|--|---|----------------------|
| | T | GM1 | 6 | K | AC | 800 | I | TRANSMITTER | TRANSMITTER SCALE |
| | 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 transmetteur | |

SCHÉMA (MM)



TABEAU DES ASSOCIATIONS POSSIBLES

| 3 Type thermocouple Classe 1 | Diamètre de la gaine (mm) | |
|---------------------------------|---------------------------|------------|
| | 6 | 8 |
| T (classe2) | 316L | 316L |
| J | 316L | 316L |
| K | INCONEL600 | INCONEL600 |
| N | INCONEL600 | - |
| | PYROSIL | PYROSIL |
| 2J | 316L | 316L |
| 2K | INCONEL600 | INCONEL600 |

INFORMATIONS TRANSMETTEUR

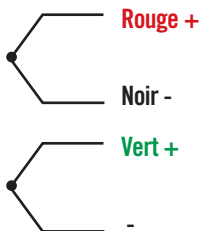
| 6 Transmetteur | | | |
|----------------|---------------|-------------------------|-------------|
| Entrée | Sortie | Isolation galvanique | Référence |
| TC | 4-20mA | 1,5kV | LC5334A-100 |
| TC + Pt100 | 4-20mA | 1,5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1,5kV | LC5335A-100 |

Non compatible avec version duplex

Pour toute autre configuration, nous consulter.

BRANCHEMENT

Thermocouple duplex



Thermocouple simple





TAX42D

THERMOCOUPLE


IP
67CLASS
1ANTI
EXPLOSIONIEC
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 | |  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 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 |
|-----------------------------|-----------|----------------------------------|--|---------------|----------------|--|----------------------------|
| 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 1/2": 6 Connection hunder head G 1/2": 9 | Insulated: I Earthed: M |

| 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

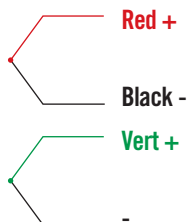
*compatible with the TTH200/TTH300 transmitters (see page 228)

THERMOCOUPLE INFORMATION

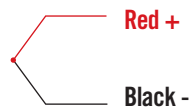
| Class 1 TC | Sheath diameter (mm) | | |
|--------------------|----------------------|------------|------------|
| | 4.5 | 6 | 8 |
| T (CLASS 2) | 316L | 316L | 316L |
| J | 316L | 316L | 316L |
| K | INCONEL600 | INCONEL600 | INCONEL600 |
| N | INCONEL600 | INCONEL600 | - |
| | PYROSIL | PYROSIL |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

CONNECTIONS

Duplex thermocouple



Single thermocouple

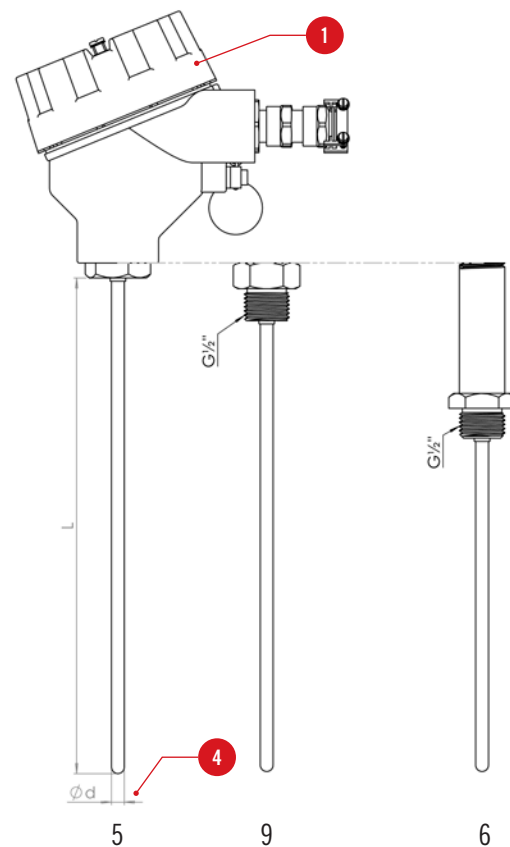


TRANSMITTER INFORMATION (1 TC ONLY)

| 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 |

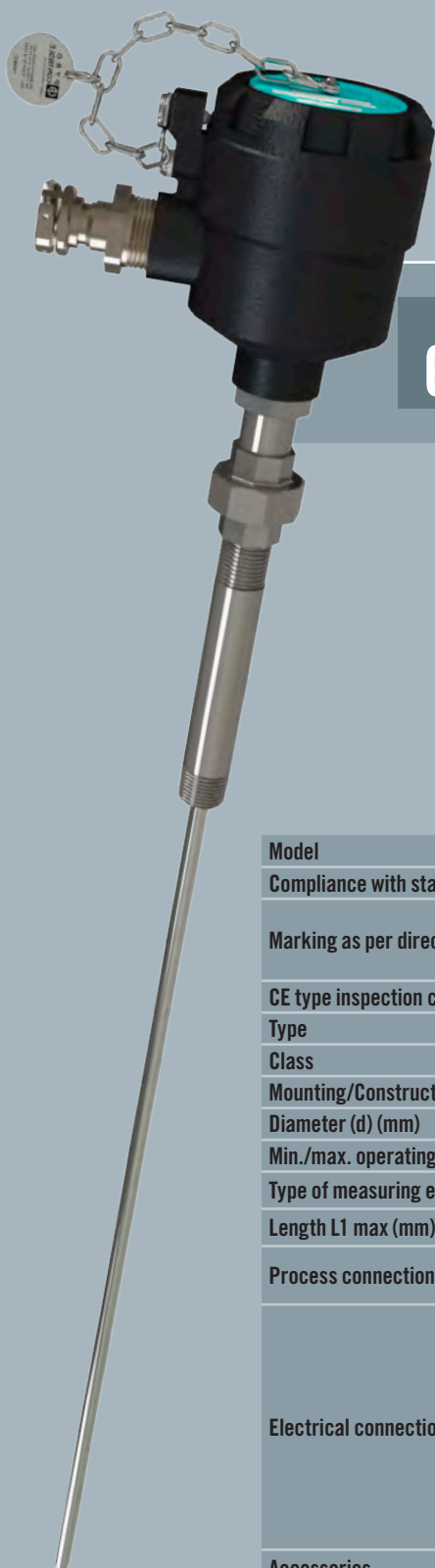
For any other configuration, please contact us.

DIAGRAM (MM)



PROCESS CONNECTION

6



SA2D

Pt100

IP
65CLASS
AIEC
60751

ANTI-EXPLOSION



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:

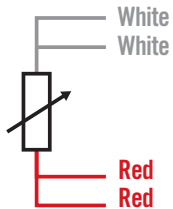
| MODEL | HEAD | Ø (mm) | MOUNTING | LENGTH L1 (mm) | EXTENSION | CABLE GLAND | OPTION | |
|-----------------------------|------|----------|--|---|---|--|---|-------------------|
| SA2D | PSX | 6 | D | 1,250 | M | N | TRANSMITTER | TRANSMITTER SCALE |
| | | | | | | | B | 0/200 |
| Référence tableau et 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)

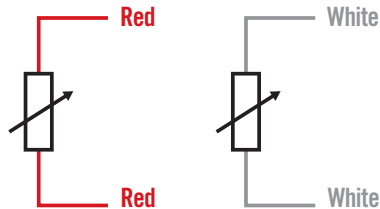
| Transmitter | | | |
|-------------|---------------|---------------------|-------------|
| Input | Output | Galvanic insulation | Reference |
| Pt100 | 4-20mA | NONE | LC5333A-100 |
| TC + Pt100 | 4-20mA | 1.5kV | LC5331A-321 |
| TC + Pt100 | 4-20mA + HART | 1.5kV | LC5335A-100 |

CONNECTIONS

Connection 1 Pt100 Ω
1x4 wires



Connection 2 Pt100 Ω
2x2 wires



Connection 2 Pt100 Ω
2x3 wires

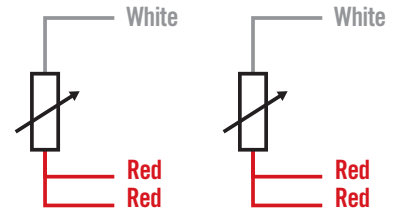
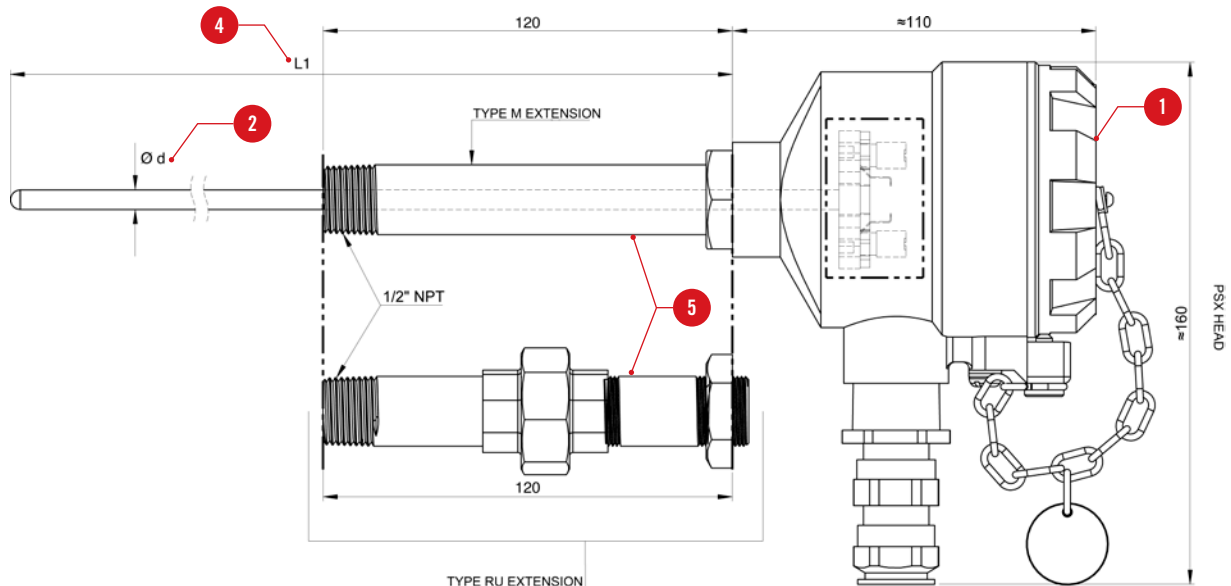


DIAGRAM (MM)





DSM/TSM

Pt100

CLASS
A

IEC
60751

SINGLE
OR
DUPLEX



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 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 |

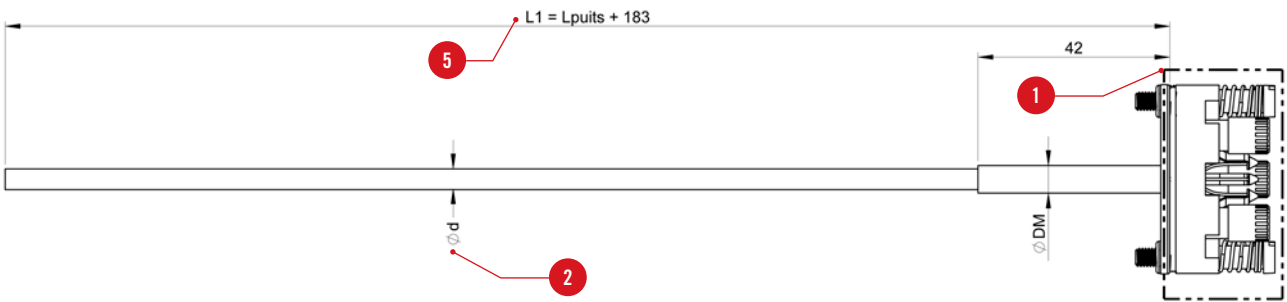
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering

| Reference in table and diagram | TYPE OF TERMINAL STRIP | ELEMENT TYPE | Ø (mm) | MOUNTING | LENGTH L1 (mm) | OPTION | |
|--------------------------------------|--|--------------------------------------|----------|--|-------------------|--|-------|
| | D | SM1 | 6 | 4 | 900 | A | 0/150 |
| 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 transmetteur | |

DIAGRAM

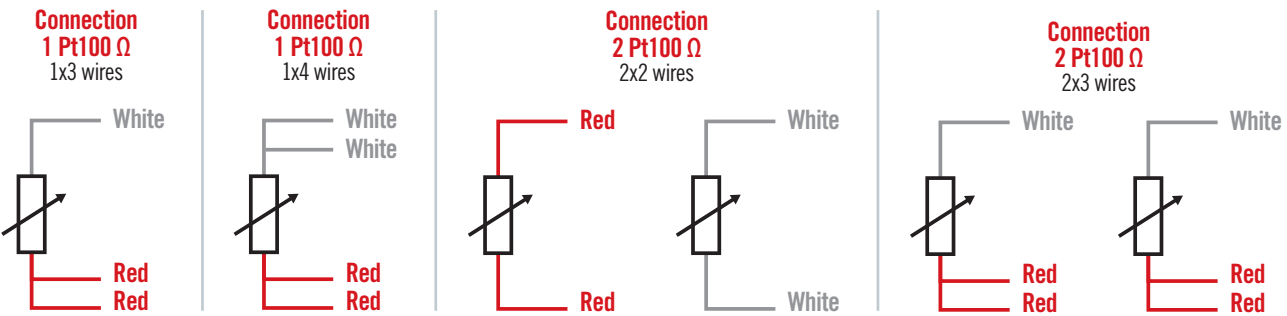


TRANSMITTER INFORMATION

| 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



For any other configuration, please contact us.



SAX42D


Pt100

IP
67CLASS
AIEC
60751ANTI
EXPLOSION
 jusqu'à
450°C

DESCRIPTION

Process sensor for use in explosive zones with gas environments. Measuring element: sheathed PT100 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 | |  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:

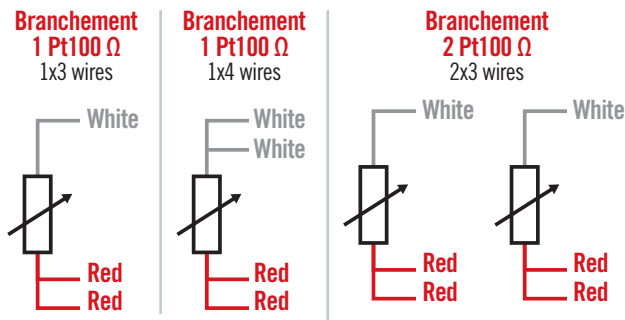
| MODEL | HEAD | Ø SHEATH (mm) | LENGTH L1 (mm) | MOUNTING | PROCESS CONNECTION | CABLE GLAND |
|--------------------------------|-----------|---------------|----------------|---|--|--|
| SAX42D | LSX | 8 | 1140 | B | 9 | PE1 |
| Reference in table and diagram | 1 | 2 | 3 | 4 | 5 | 5 |
| Possible choice | 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

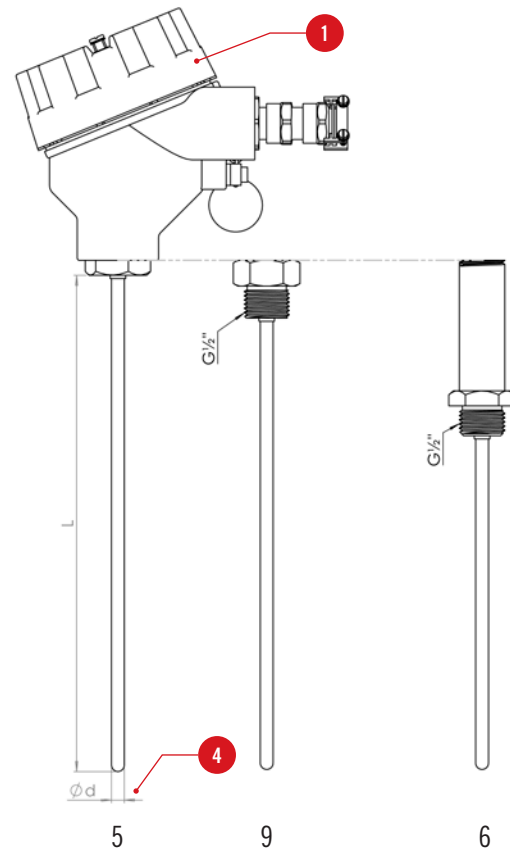


INFORMATIONS TRANSMETTEUR (1 PT100 UNIQUEMENT)

| 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 |

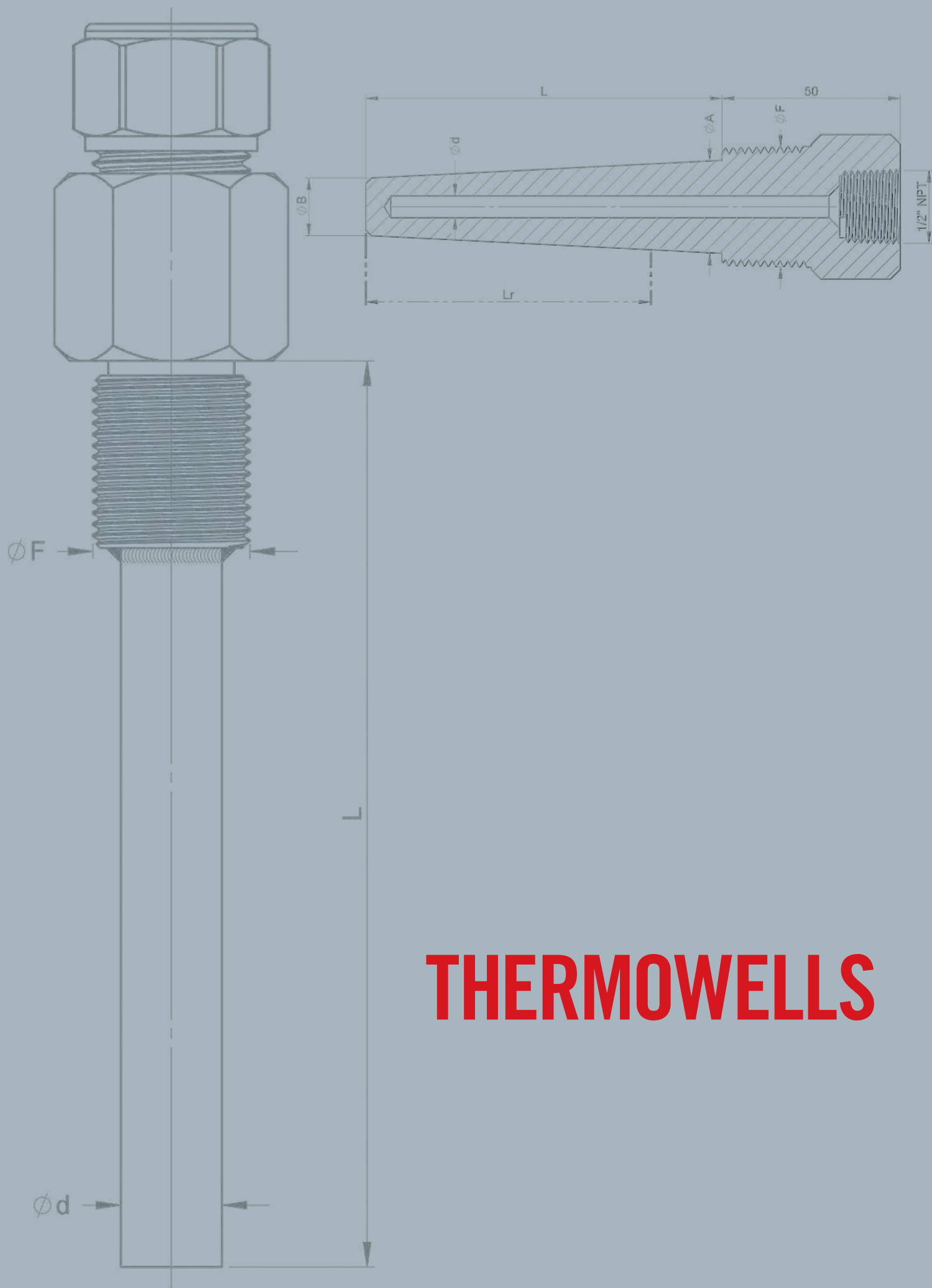
3

DIAGRAM (MM)

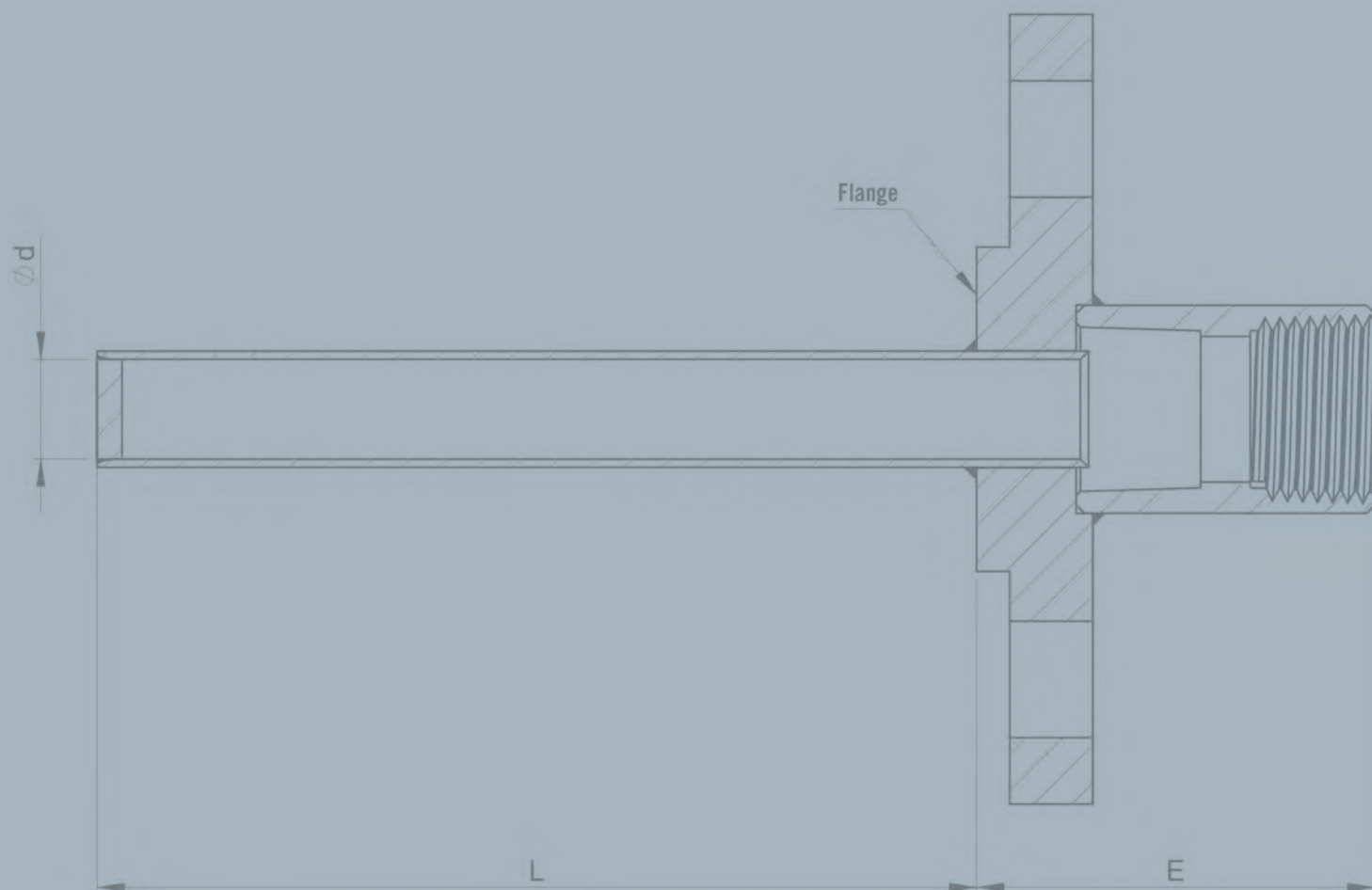


PROCESS CONNECTION

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 |
| | | | Flanged | 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 |

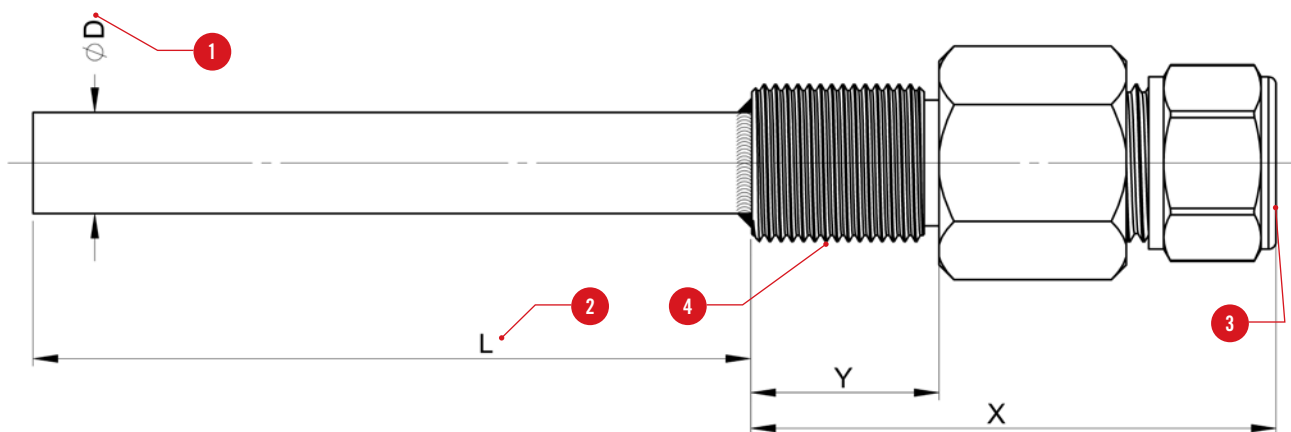
DESIGN YOUR THERMOWELL

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 G 1/4": G14 G 3/8": G38 G 1/2": G12 |

DIAGRAM (MM)



PROCESS CONNECTION DIMENSIONS (MM)

| Process connection | X (MM) | Y (MM) |
|--------------------|--------|--------|
| 1/8" NPT | 35 | 10 |
| 1/8" G | 35 | 10 |
| 1/4" NPT | 45 | 15 |
| 1/4" G | 40 | 10 |
| 3/8" NPT | 45 | 15 |
| 3/8" G | 40 | 15 |
| 1/2" NPT | 50 | 20 |
| 1/2" 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 | - |
| <div>Reference in table and diagram</div> <div>1 2 3</div> | | | | | | |
| Possible choice | | 316L : AC | 10 | See table below 50 - 2 000 mm | YES | Personalized customer reference |
| | | 321 : AR | 12 | | NO | |
| | | 20 | | | | |

DIAGRAM (MM)

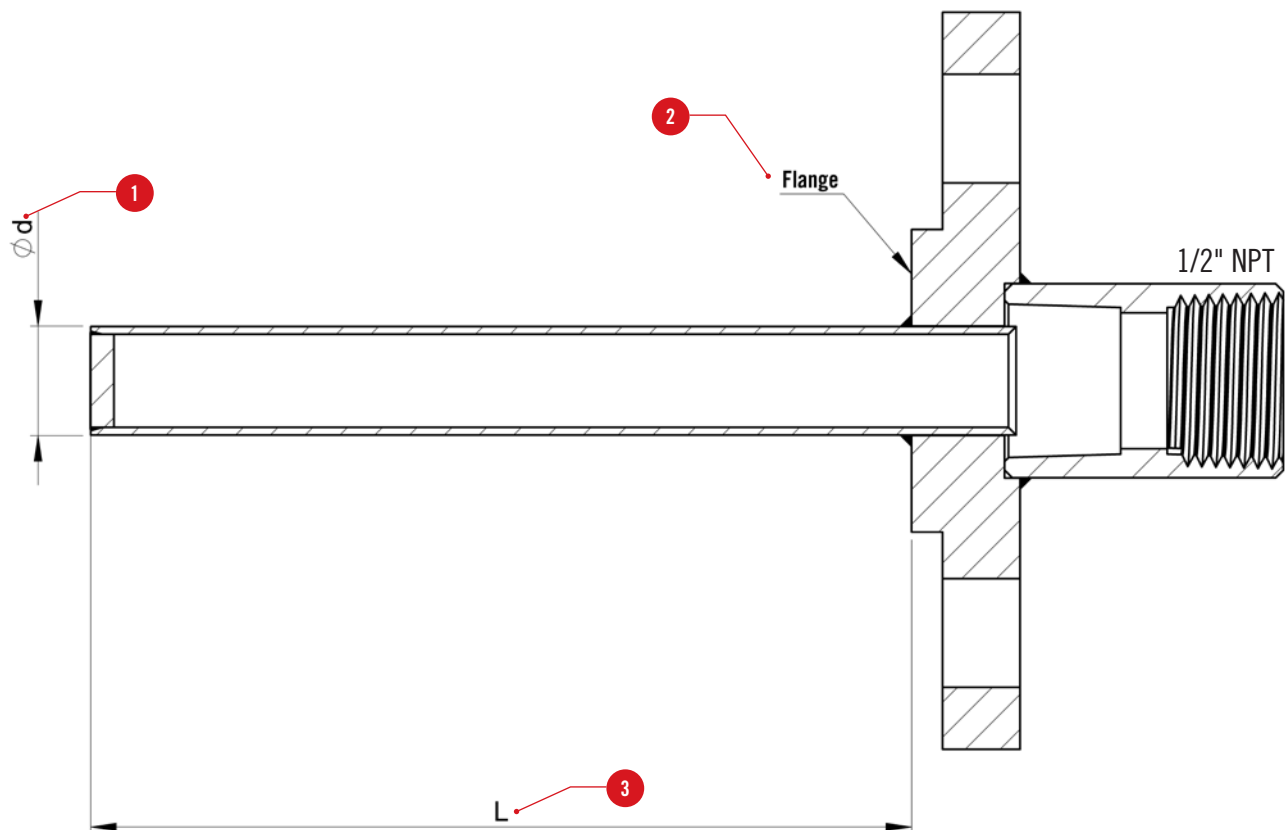


TABLE OF FLANGES

| 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

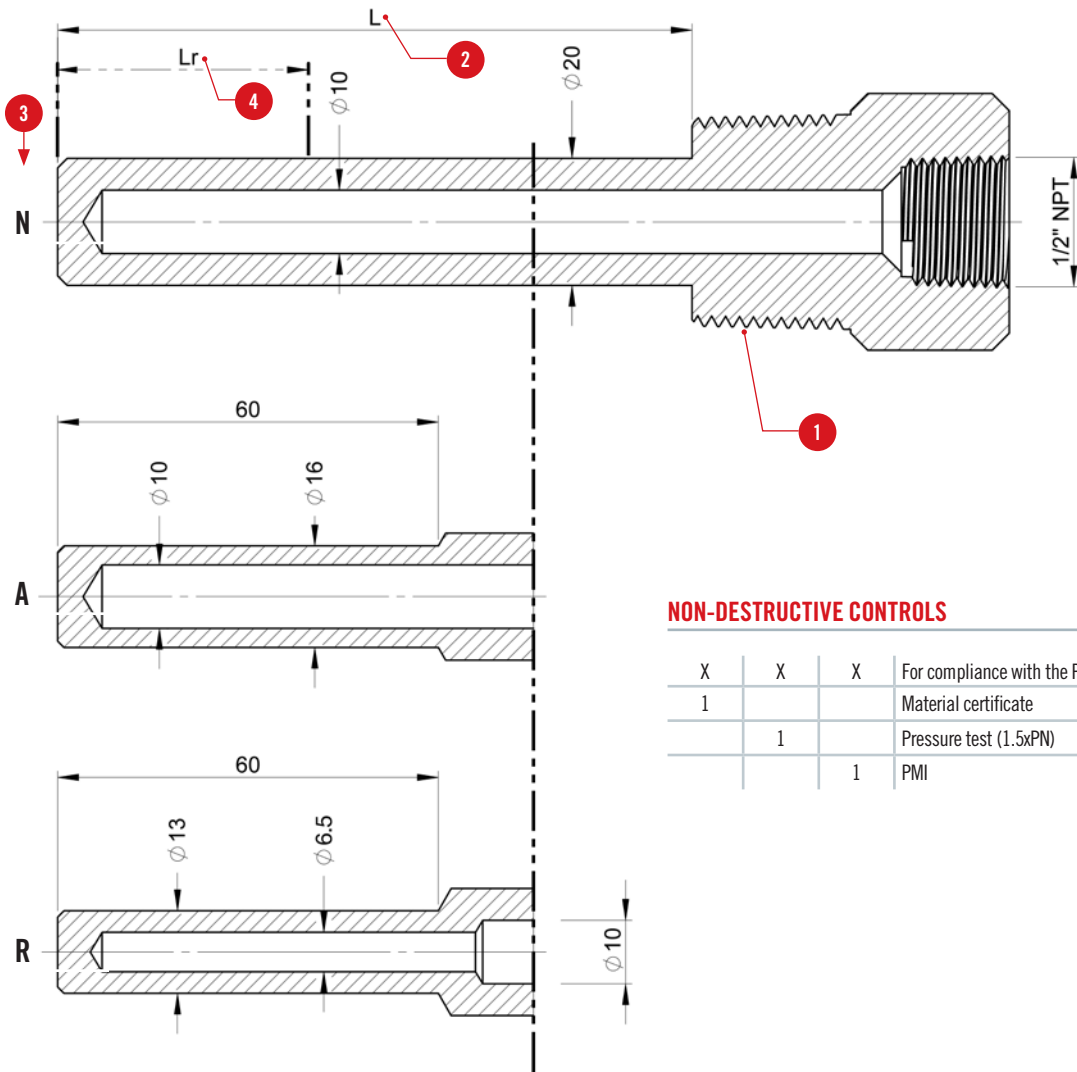
CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

Parameters to be indicated when ordering. Example:

| MODEL | PROCESS CONNECTION | MATERIAL | LENGTH L (mm) | TIP | OPTION | | | |
|--------------------------------|--|------------------------------------|---------------|---------------------------------------|--|--|--------------|---------------------------------|
| PDV | G10 | AR | 250 | A | REVÊTEMENT | NDC | PLUG + CHAIN | TAG |
| | | | | | 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 |

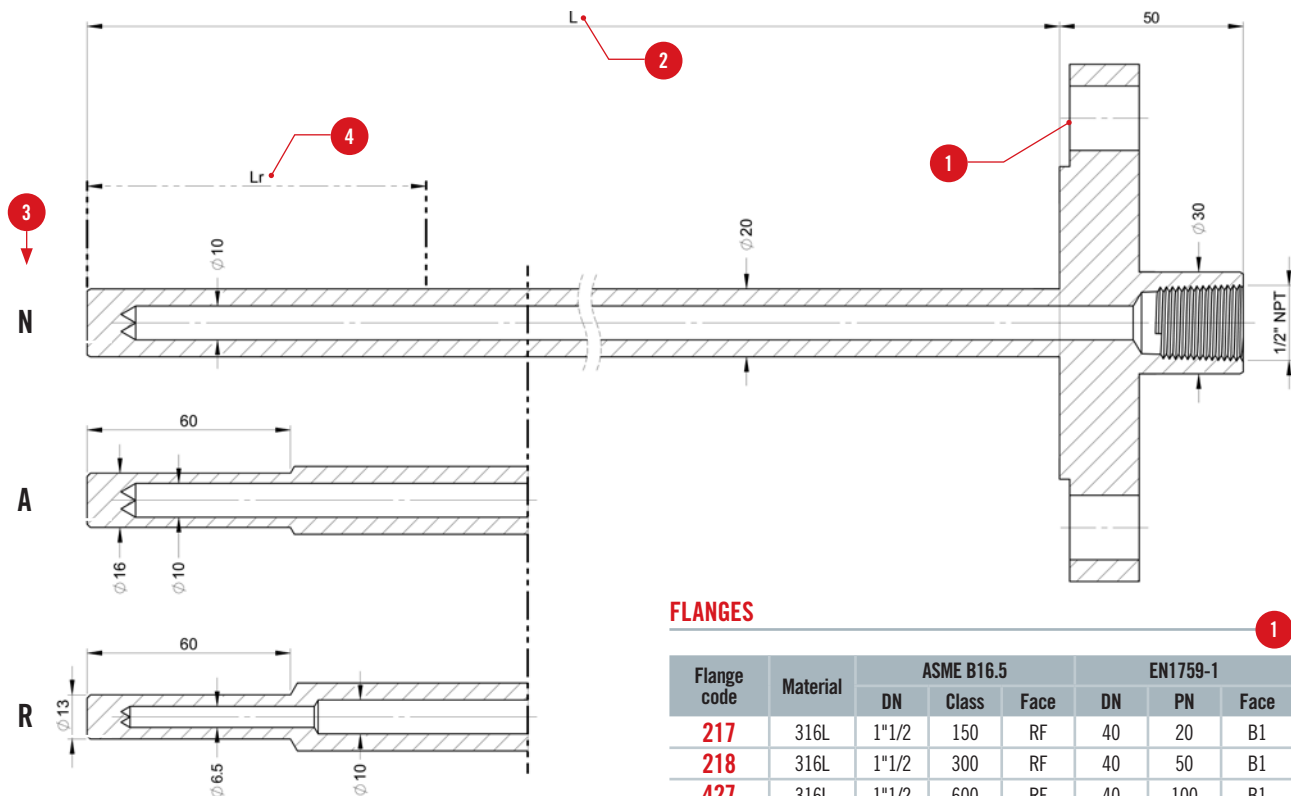
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | FLANGE | MATERIAL | LENGTH L (mm) | TIP | COATING | OPTION | PLUG + CHAIN | TAG |
|-----------------------------|--------------------|-----------------------|---------------|---------------------------------------|---|---|--------------|---------------------------------|
| PDB-VS | 217 | AC | 700 | N | M100 | NDC | 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

| | | | | |
|---|---|---|---|--|
| 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

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

FLANGES

| 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.



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 |

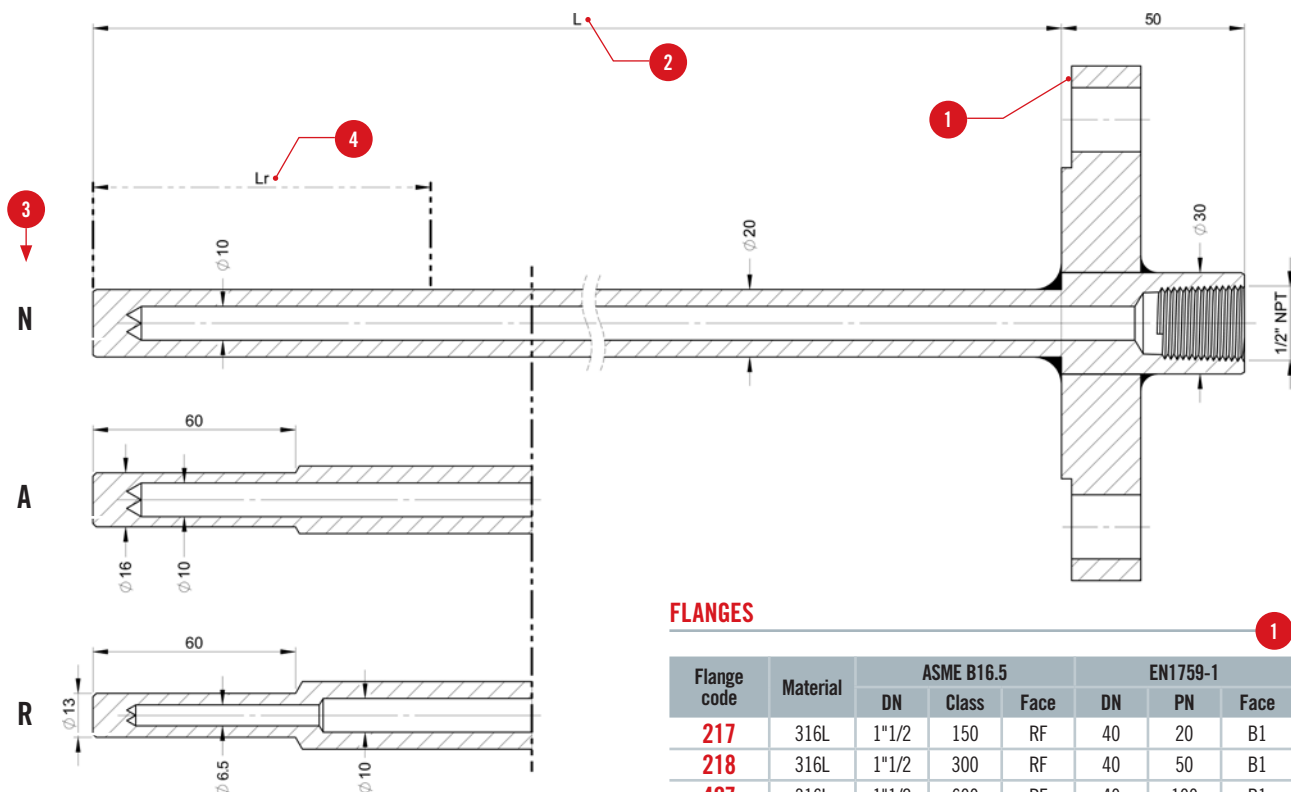
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | FLANGE | MATERIAL | LENGTH L (mm) | TIP | COATING | NDC | PLUG + CHAIN | 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

| | | | | |
|---|---|---|---|--|
| 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

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

FLANGES

| 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.



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 |

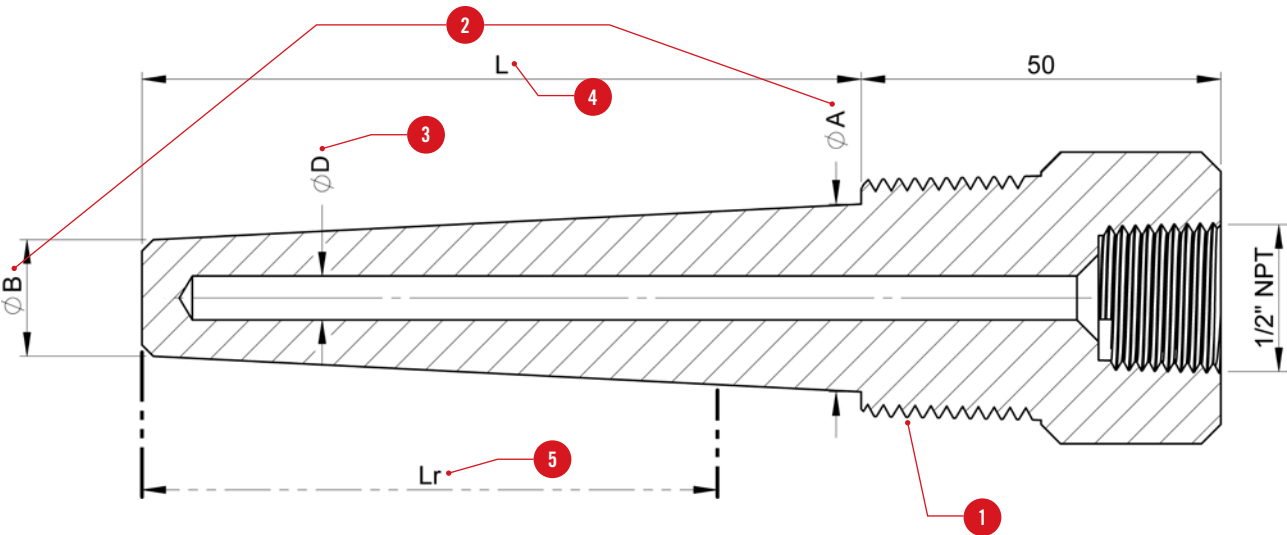
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | PROCESS CONNECTION | CONE AXB (mm) | Ø BORE | MATERIAL | LENGTH L (mm) | OPTION | | | |
|-----------------------------|--|--------------------------|----------------------|------------------------------------|---------------|---|--|--------------|---------------------------------|
| | | | | | | COATING | NDC | PLUG + CHAIN | 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 |

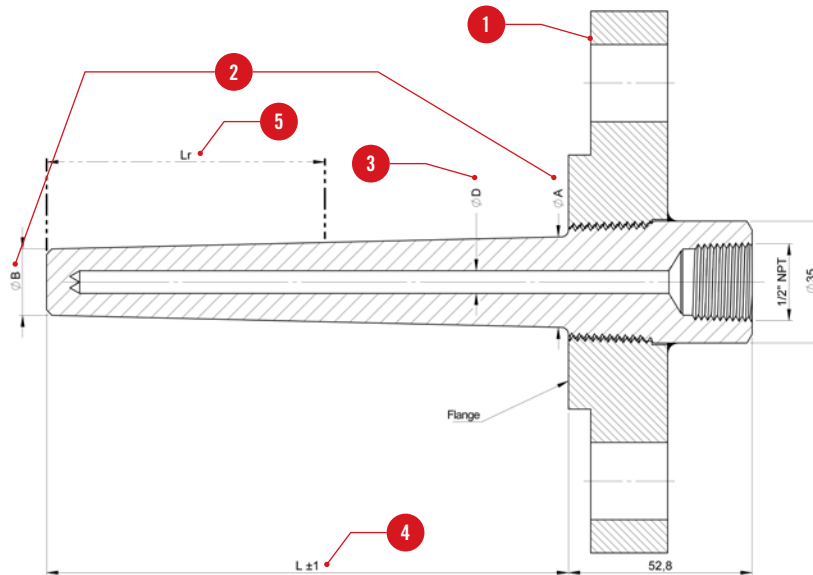
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | FLANGE | CONE AXB (mm) | Ø (mm) | MATERIAL | LENGTH L (mm) | COATING | 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

| | | | | |
|---|---|---|---|--|
| 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

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

FLANGES

| 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-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 |

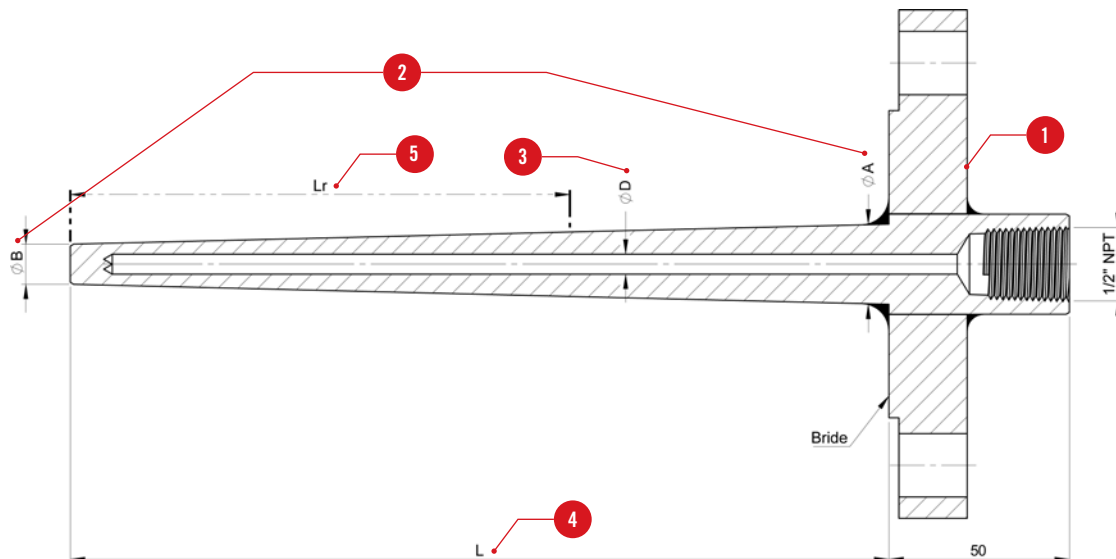
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | FLANGE | CONE AXB (mm) | Ø (mm) | MATERIAL | LENGTH L (mm) | COATING | OPTION NDC | PLUG + CHAIN | 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

| 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 | |

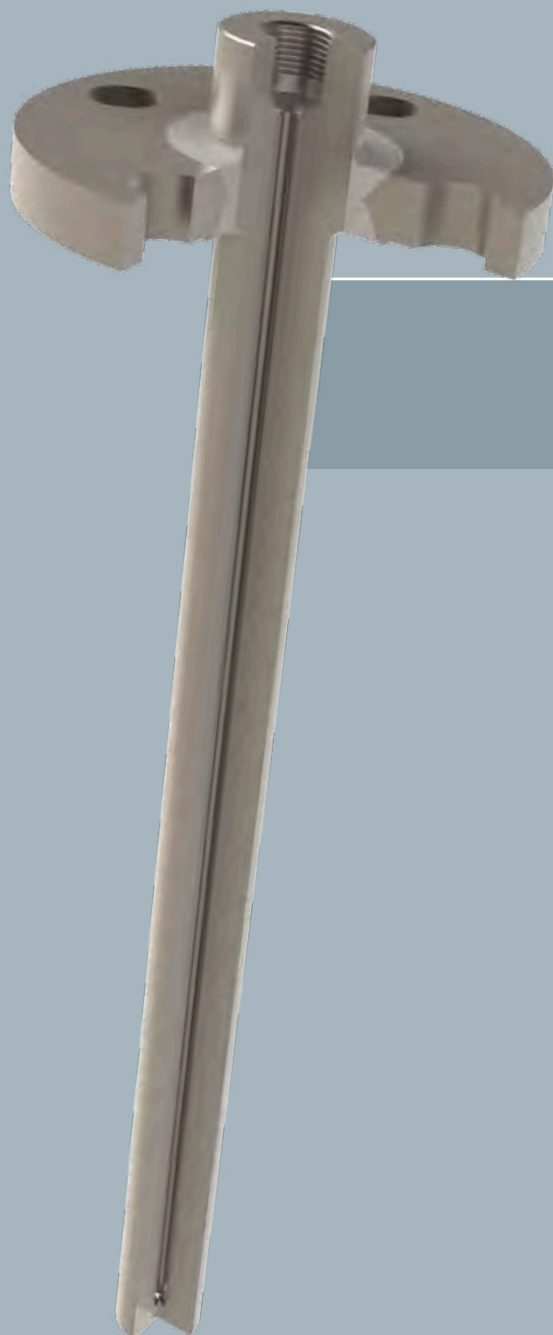
NON-DESTRUCTIVE CONTROLS

| | | | | | |
|---|---|---|---|---|--|
| 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

| 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 |

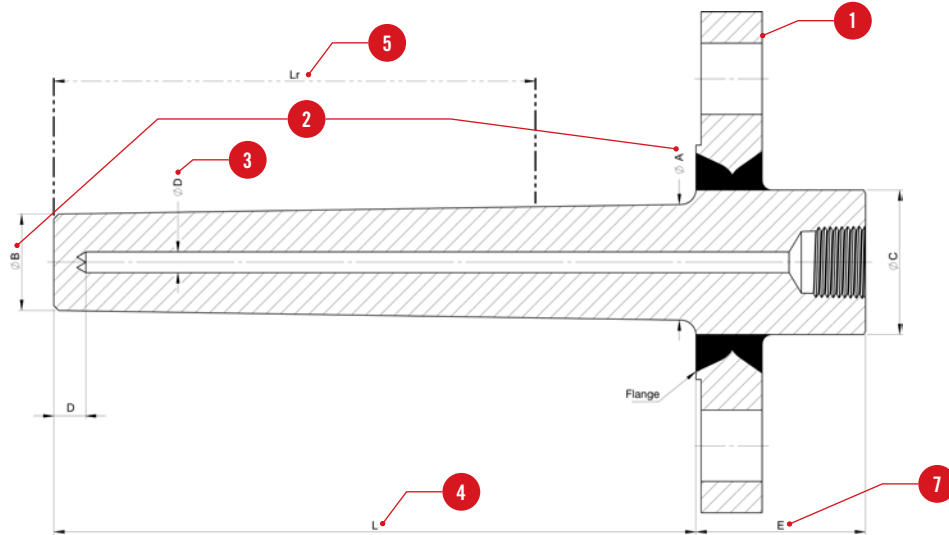
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | FLANGE | CONE AXB (mm) | Ø (mm) | MATERIAL | LENGTH L (mm) | COATING | 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

| | | | | | |
|---|---|---|---|---|--|
| 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

| Flange Class | E (mm) |
|--------------|--------|
| ≤ 600 | 52.8 |
| >600 | 80 |

FLANGES

| 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 |

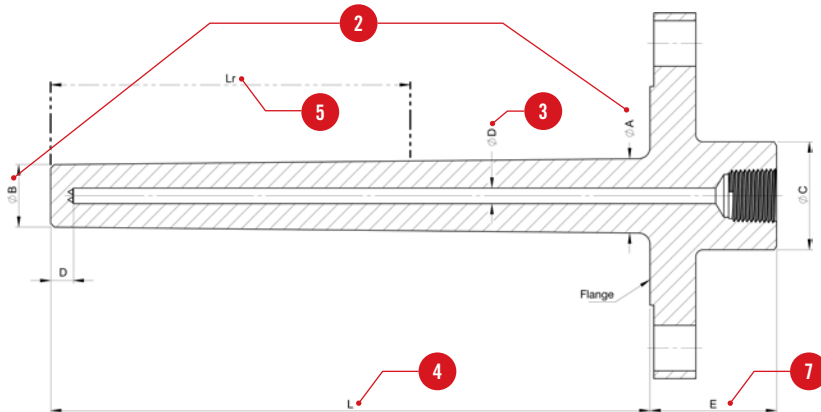
DESIGN YOUR THERMOWELL

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

| MODEL | FLANGE | CONE AxB (mm) | Ø (mm) | MATERIAL | LENGTH L (mm) | COATING | OPTION | NDC | PLUG + CHAIN | 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

| 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

| 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 |

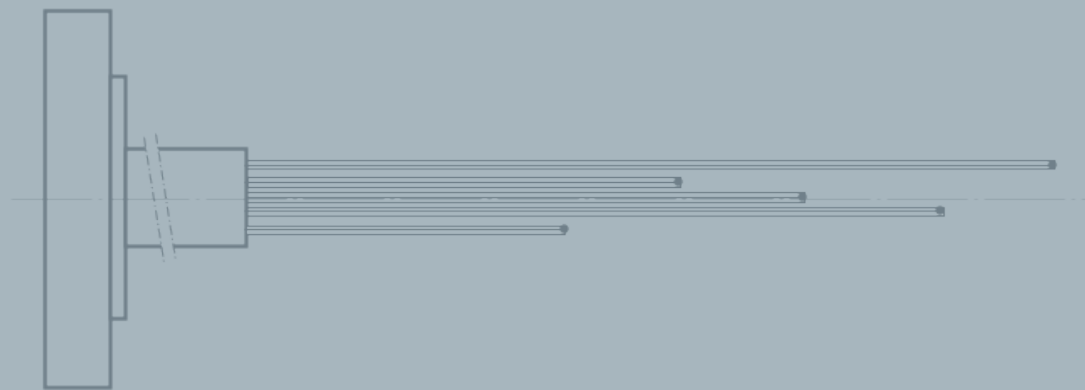
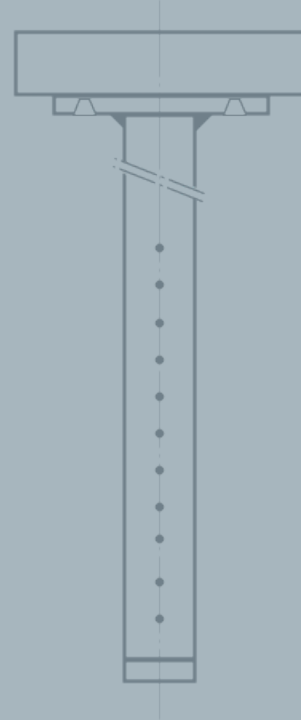
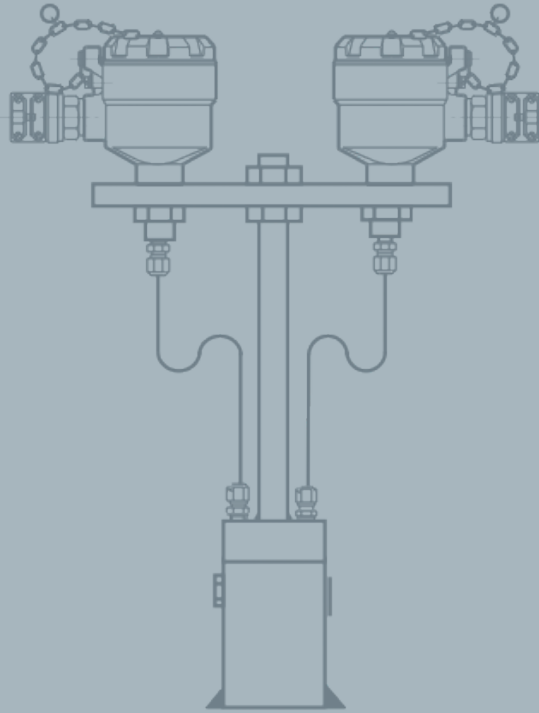
DIMENSION LINKED TO FLANGE

| Flange Class | E (mm) |
|--------------|--------|
| ≤ 600 | 52.8 |
| >600 | 80 |

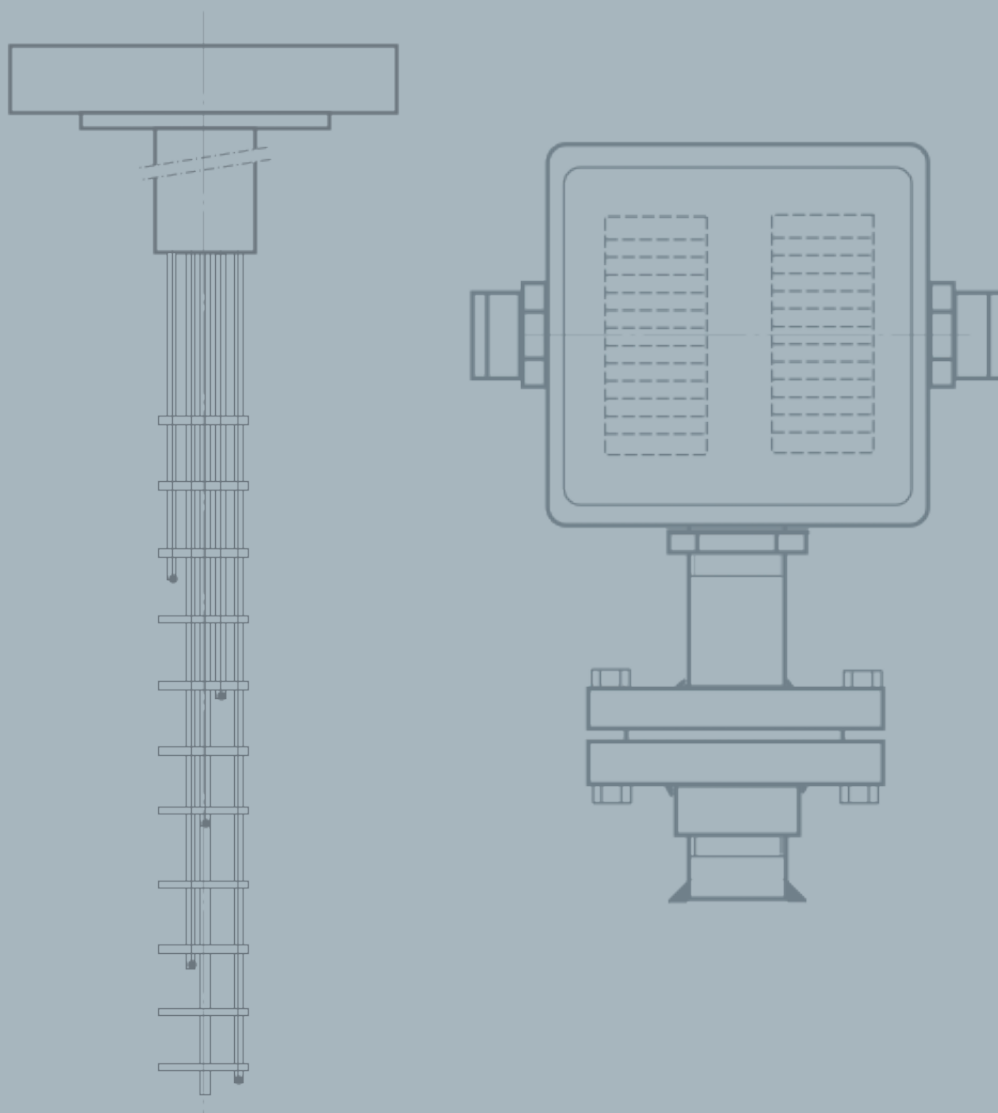
NON-DESTRUCTIVE CONTROLS

| | | | | |
|---|---|---|---|--|
| 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**

MULTIPOINT SENSORS FOR REACTORS **296**

SENSORS FOR HIGH-PRESSURE APPLICATIONS **302**

SENSORS COMPLIANT WITH AMS 2750 **306**

SENSORS FOR NON-FERROUS ALLOY FOUNDRIES **312**

ASPIRATED SENSORS **316**

MULTIPAL: BEARING SENSORS **322**

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 (SiO_2). 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 (O_2) (dry oxidation), or oxygen combined with water vapour (H_2O) (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.

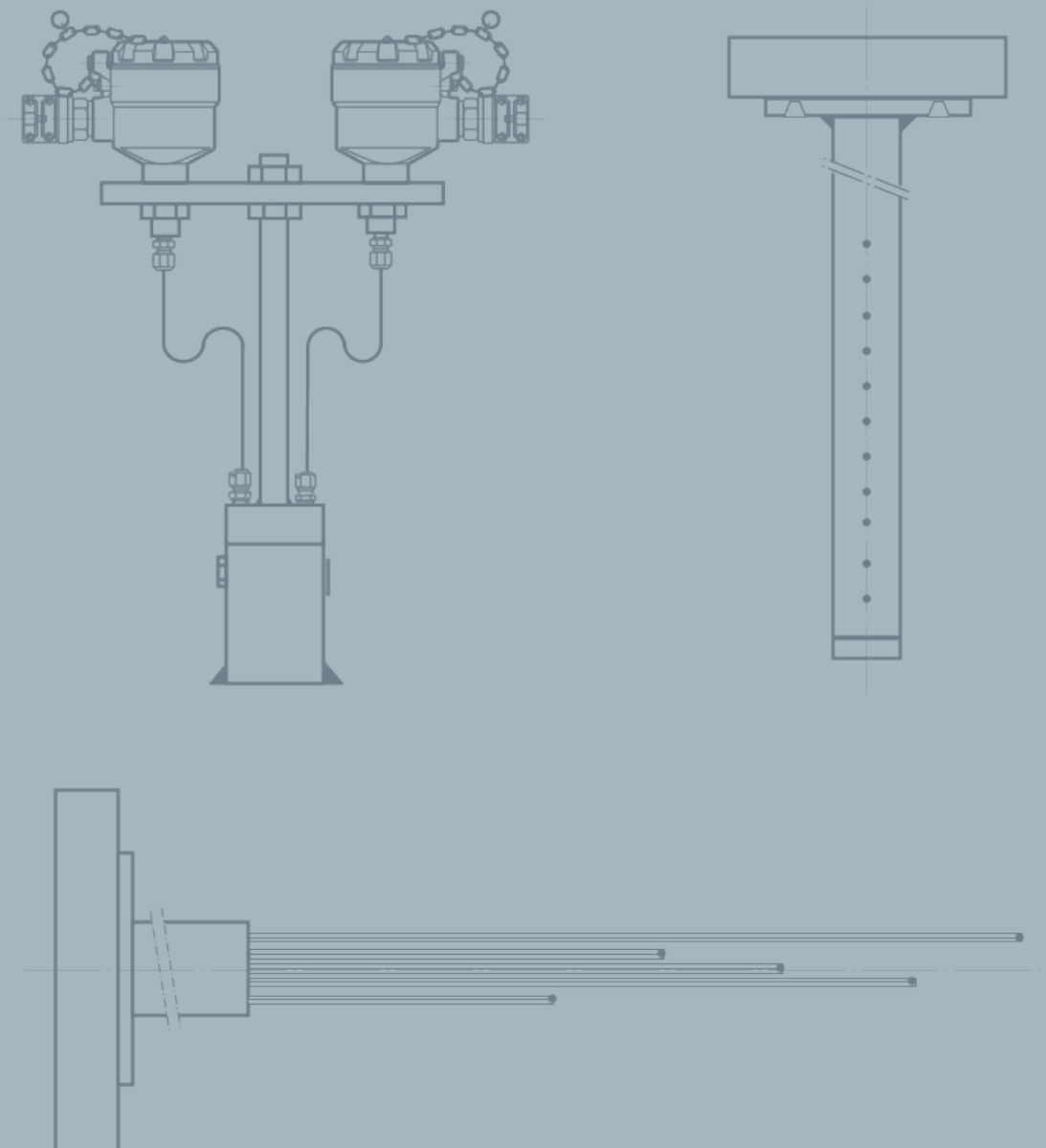
- For these applications, we develop and manufacture multipoint profile sensors and spikes.

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.

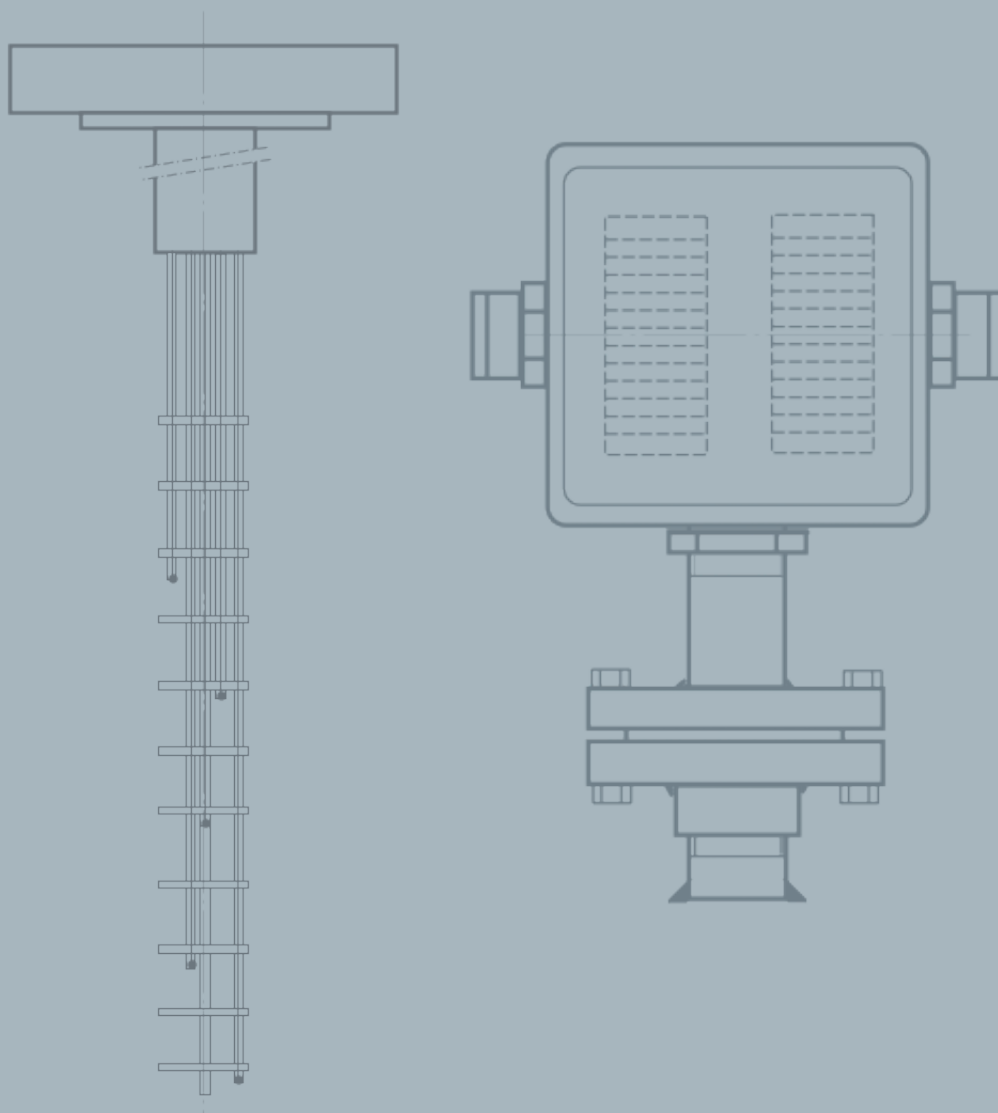
- **The spikes** may be single or duplex models.

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

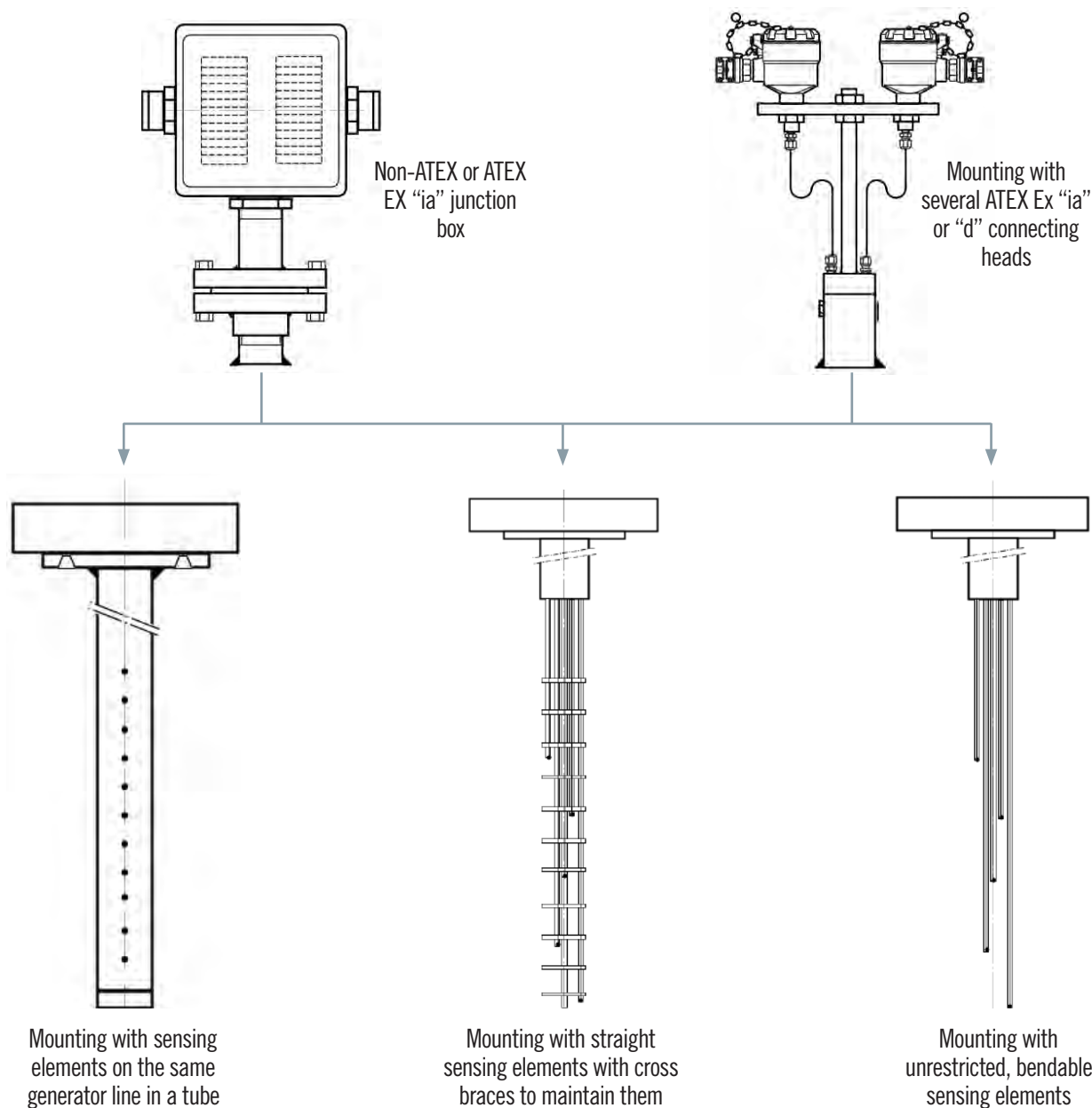
Our multipoint sensors are available in several configurations, depending on the customer's requirements. There may be from 3 to 40 measurement points depending on the sensor model.

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

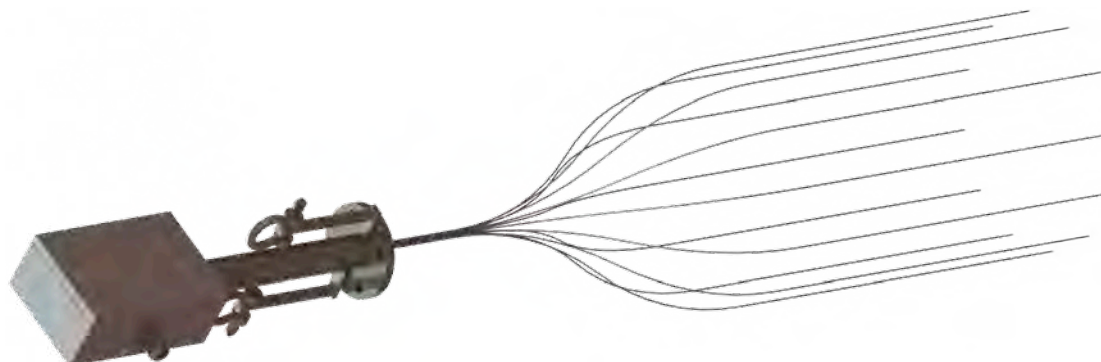


Non-contractual document - Please confirm specifications when ordering.

OUR STANDARDS

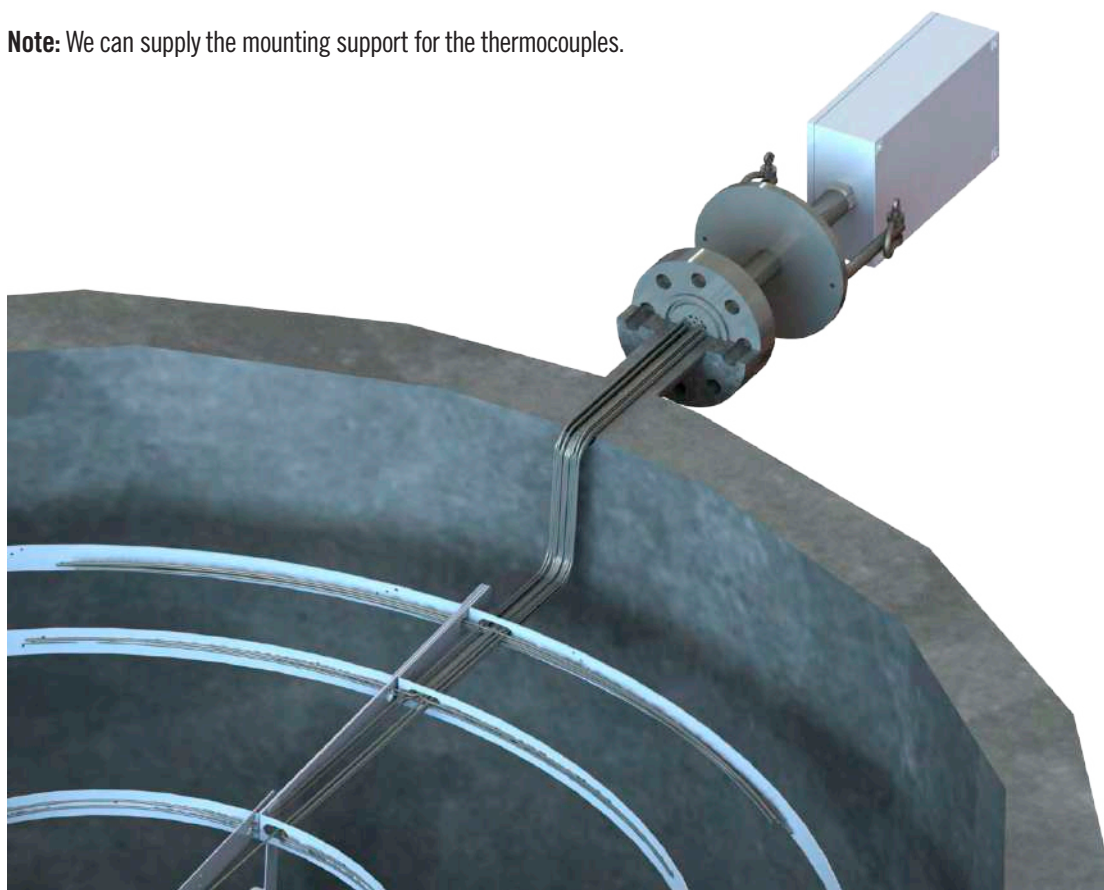
Temperature measurement assemblies with free, bendable elements:

| 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.



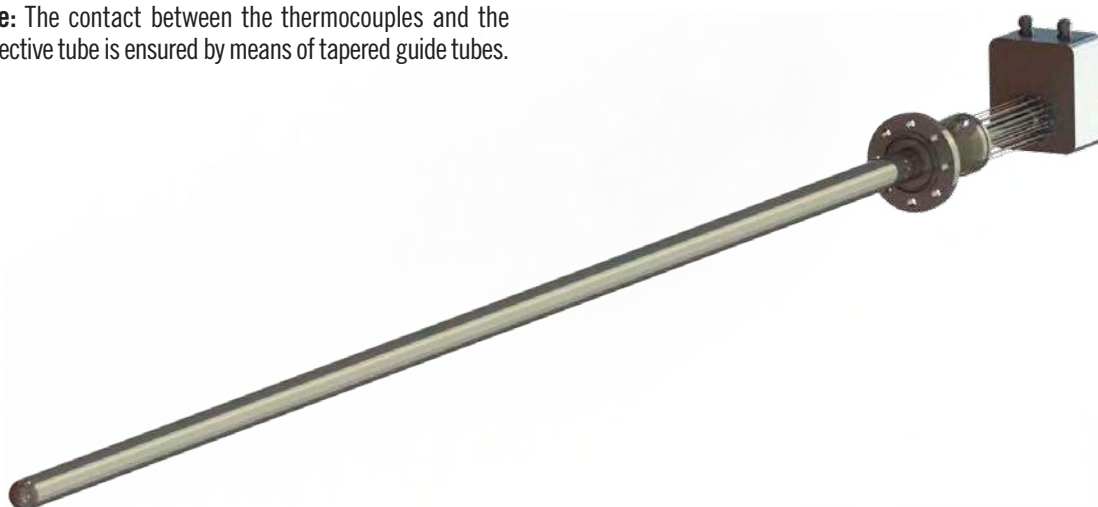
| Model: PiTD | | | | |
|----------------------------|----------------------------|-----------------|------------------------|--------------------|
| Thermocouple diameter (mm) | Number of measuring points | Max. length (m) | Max. temperature (C°)* | Max. pressure (b)* |
| 4.5 | 5 | 30 | 600 | 450 |
| 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 |

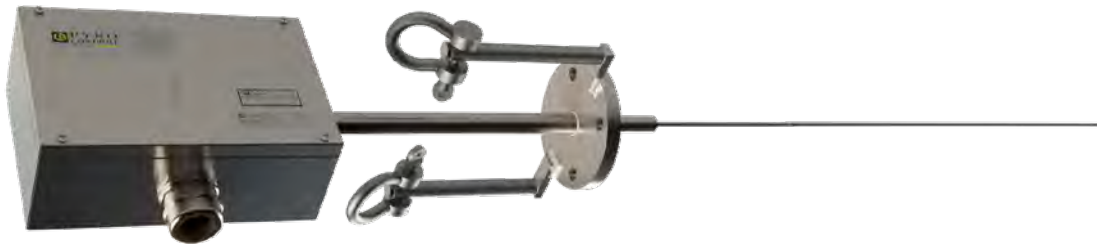
Note: The contact between the thermocouples and the protective tube is ensured by means of tapered guide tubes.



Assemblies with elements in small-diameter protective tube:

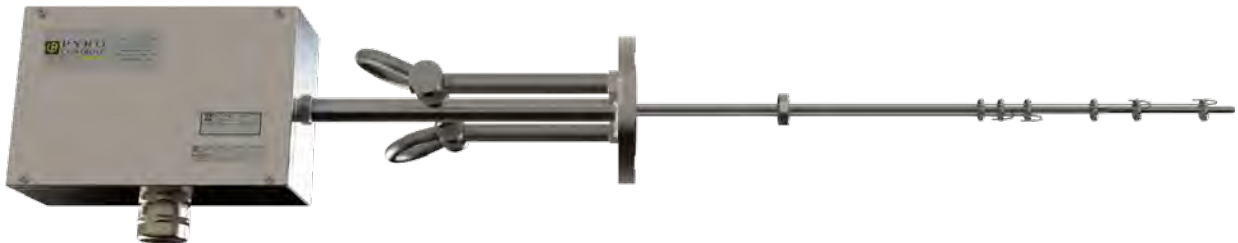
| Model: STPD | | | | | |
|----------------------------|----------------------------|---------------------------------|-----------------|------------------------|--------------------|
| Thermocouple diameter (mm) | Number of measuring points | Protective tube type (standard) | Max. length (m) | Max. 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.

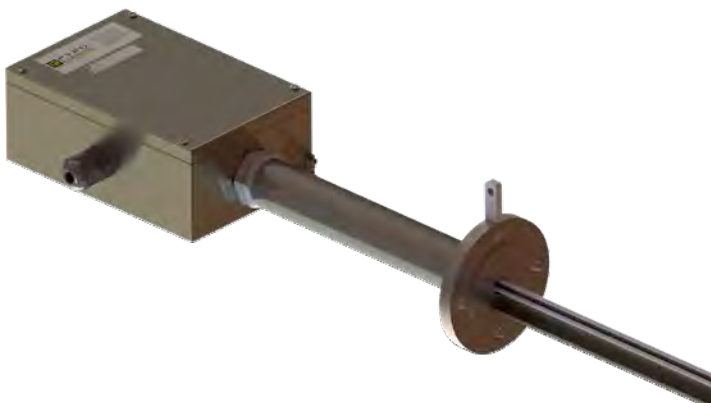
**Assemblies with positioning spacers:**

| 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 |

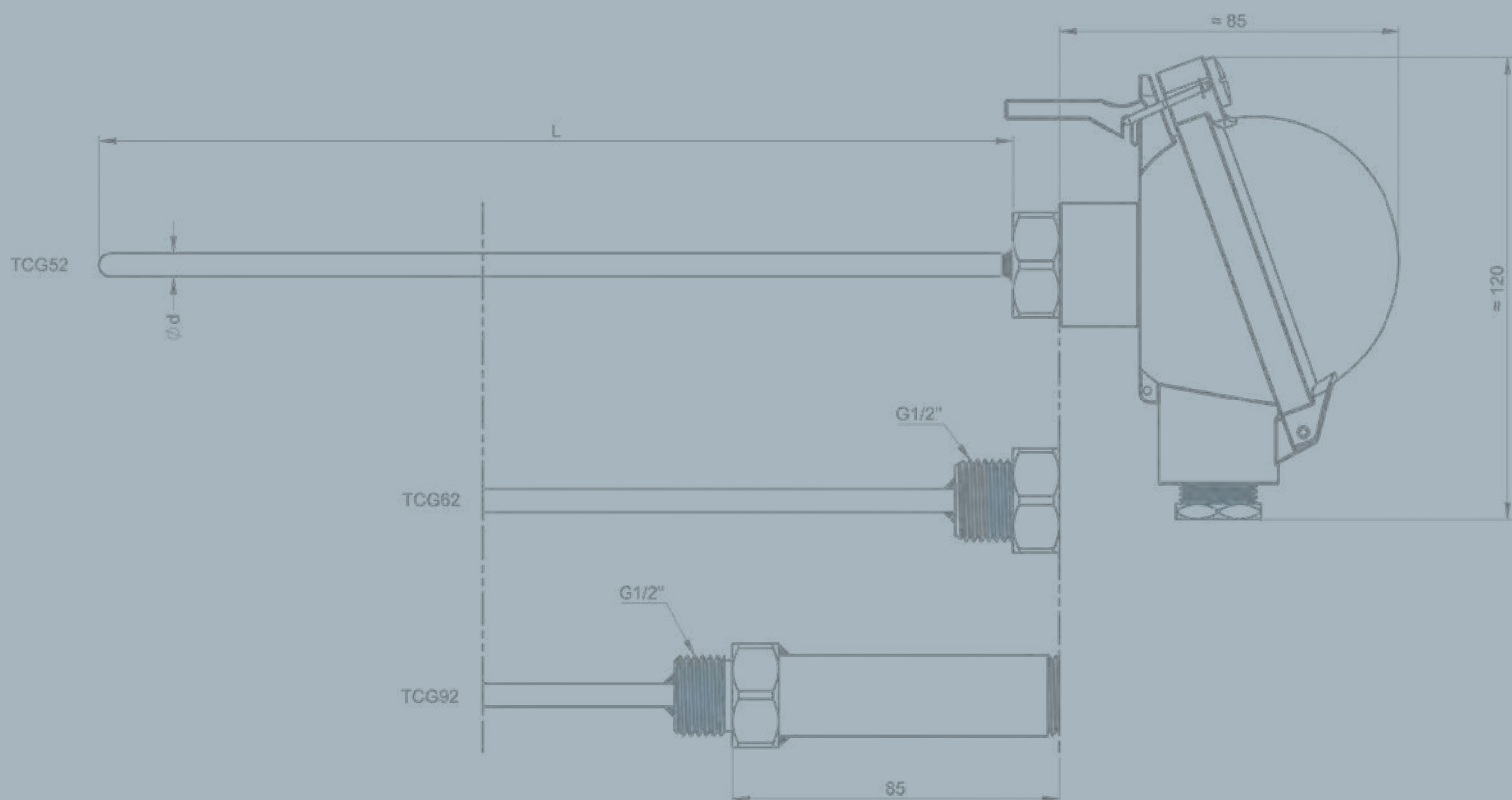
Note: Variant with cylindrical cover and compensation cable available.

**Teebar assemblies:**

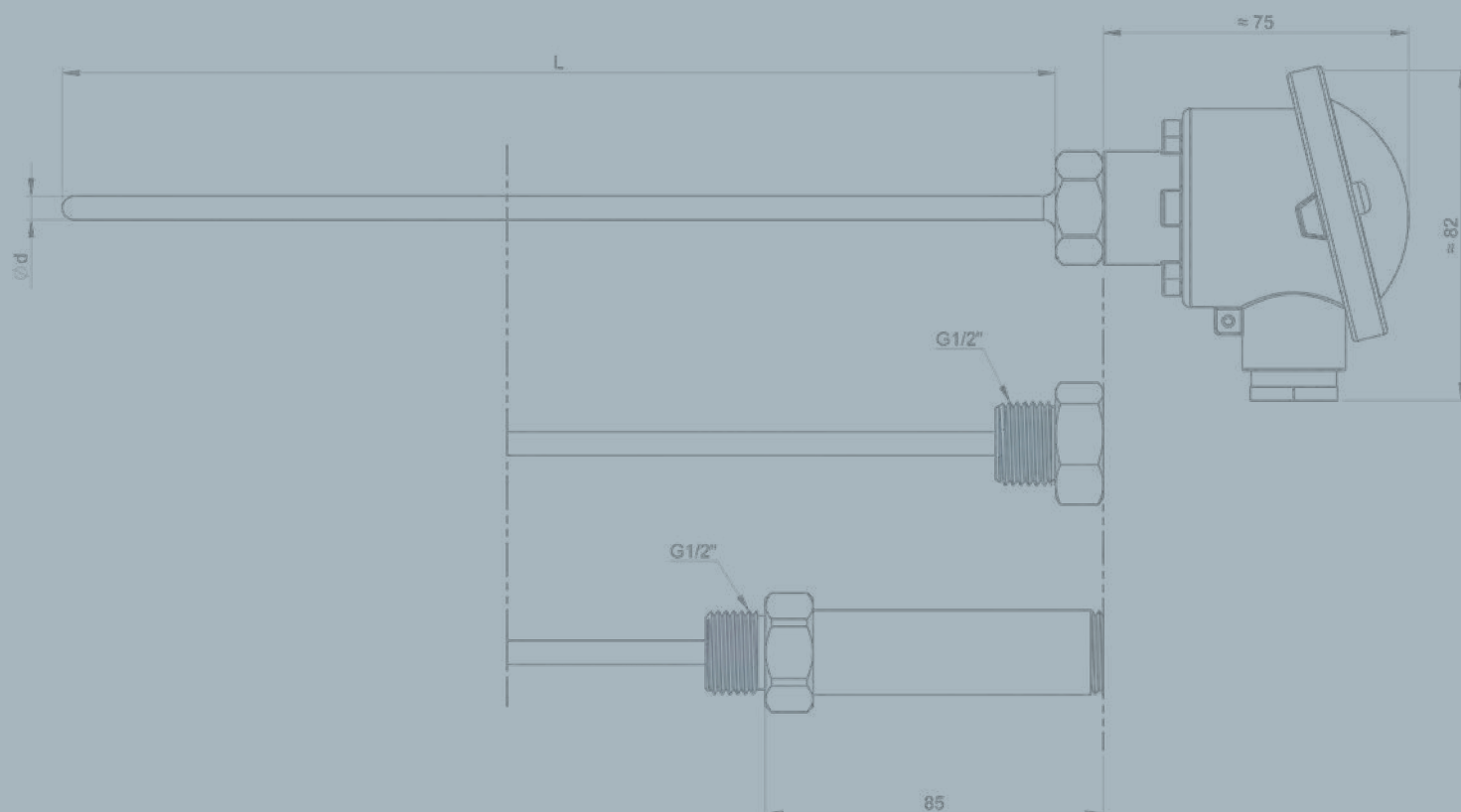
| Model: TTPD | | | | | |
|----------------------------|----------------------------|---------------------------------|-----------------|------------------------|--------------------|
| Thermocouple diameter (mm) | Number of measuring points | Protective tube type (standard) | Max. length (m) | Max. 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

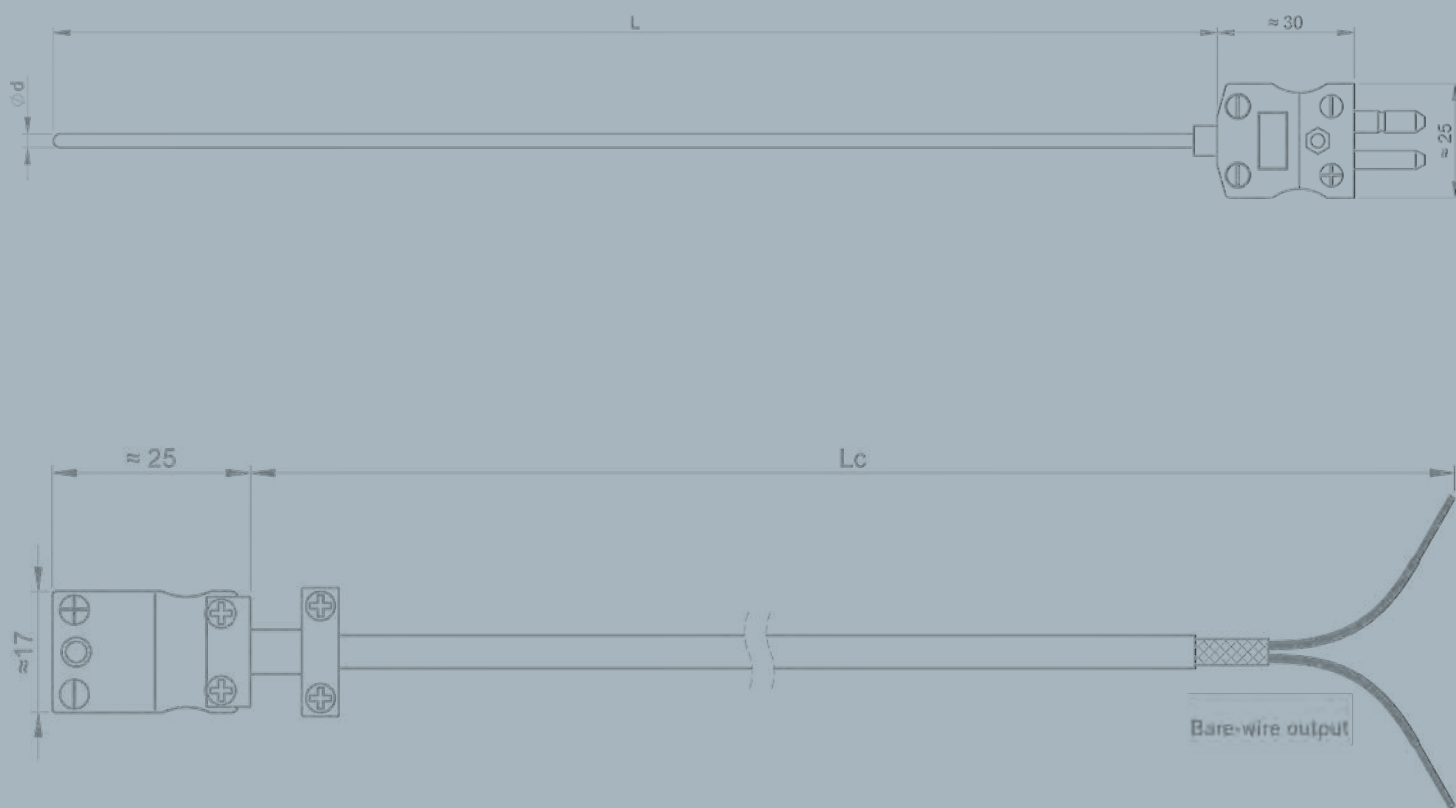
| | |
|-----------------------|---|
| Operating temperature | Up to 350°C |
| Response time | 0.6 s |
| Maximum pressure | 3,600 bars |
| Test pressure | 5,150 bars |
| Fluid speed supported | 100 m/s |
| Measuring element | Duplex K thermocouple |
| Protective sheath | Diameter from 1.5 to 6 mm Metal, 316L |
| | Fastening by screwed fitting Double socket taper for tightness |

STRENGTHS

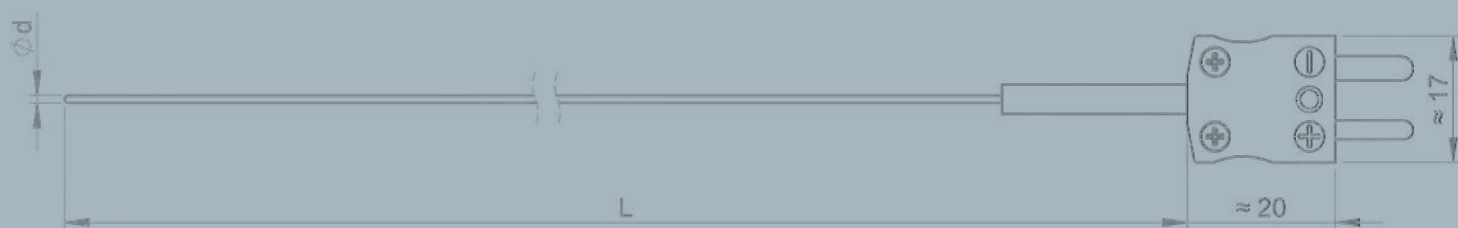
- Pressure range up to 4,700 bars
- Very short response time: less than one second
- Withstands shocks and vibrations
- ATEX/ IECEx-compliant
- Particularly compact: from 1.5 to 6 mm diameter

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: $\pm 1.1^{\circ}\text{C}$ or 0.4 % of ITI; whichever is larger.
- § 3.1.2.6.3: maximum difference tolerated between the couples: $\pm 1.1^{\circ}\text{C}$

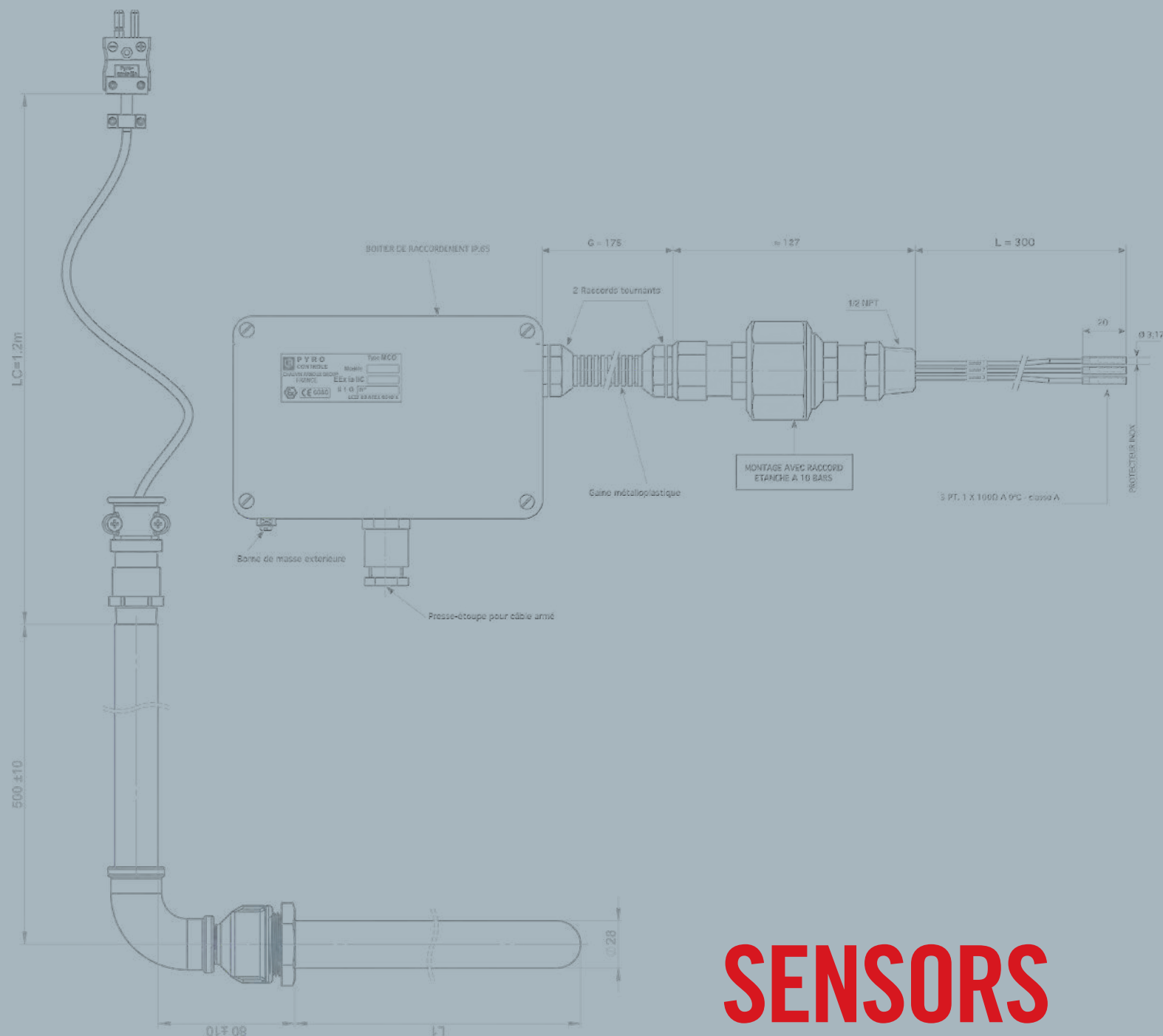
OUR CALIBRATION SERVICES

Equipped with its own COFRAC-accredited metrology laboratory, Pyrocontrole can supply COFRAC-accredited calibration certificates and specific reports concerning the requirements mentioned above:

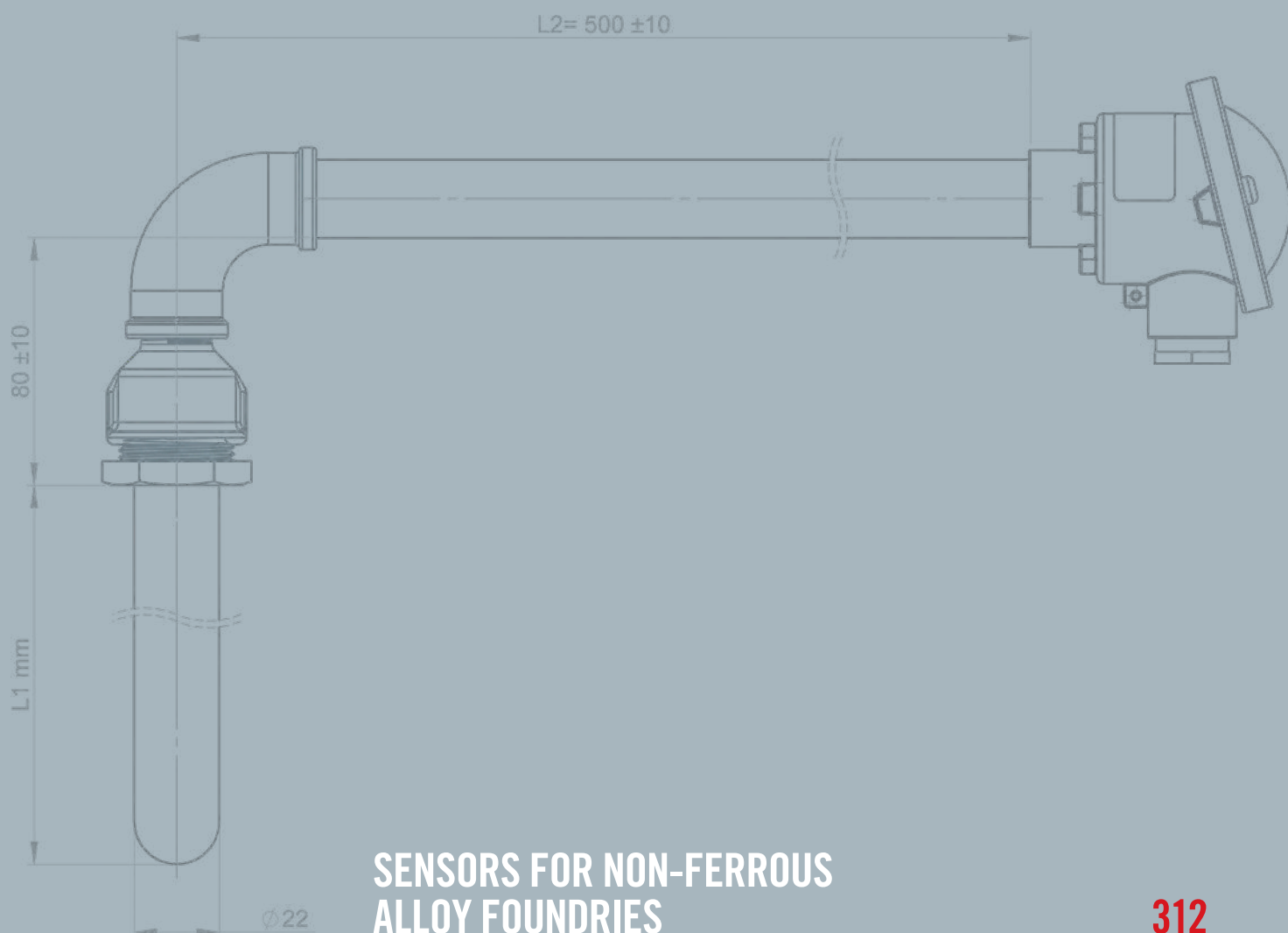
- Calibration of the beginning and end of the coil of sheathed cables used to manufacture the sensors.
- Calibration every 140°C across the sensor's operating range.
- See page 24

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 |
| | | | ± 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
54CLASS
1IEC
584-1up 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 |

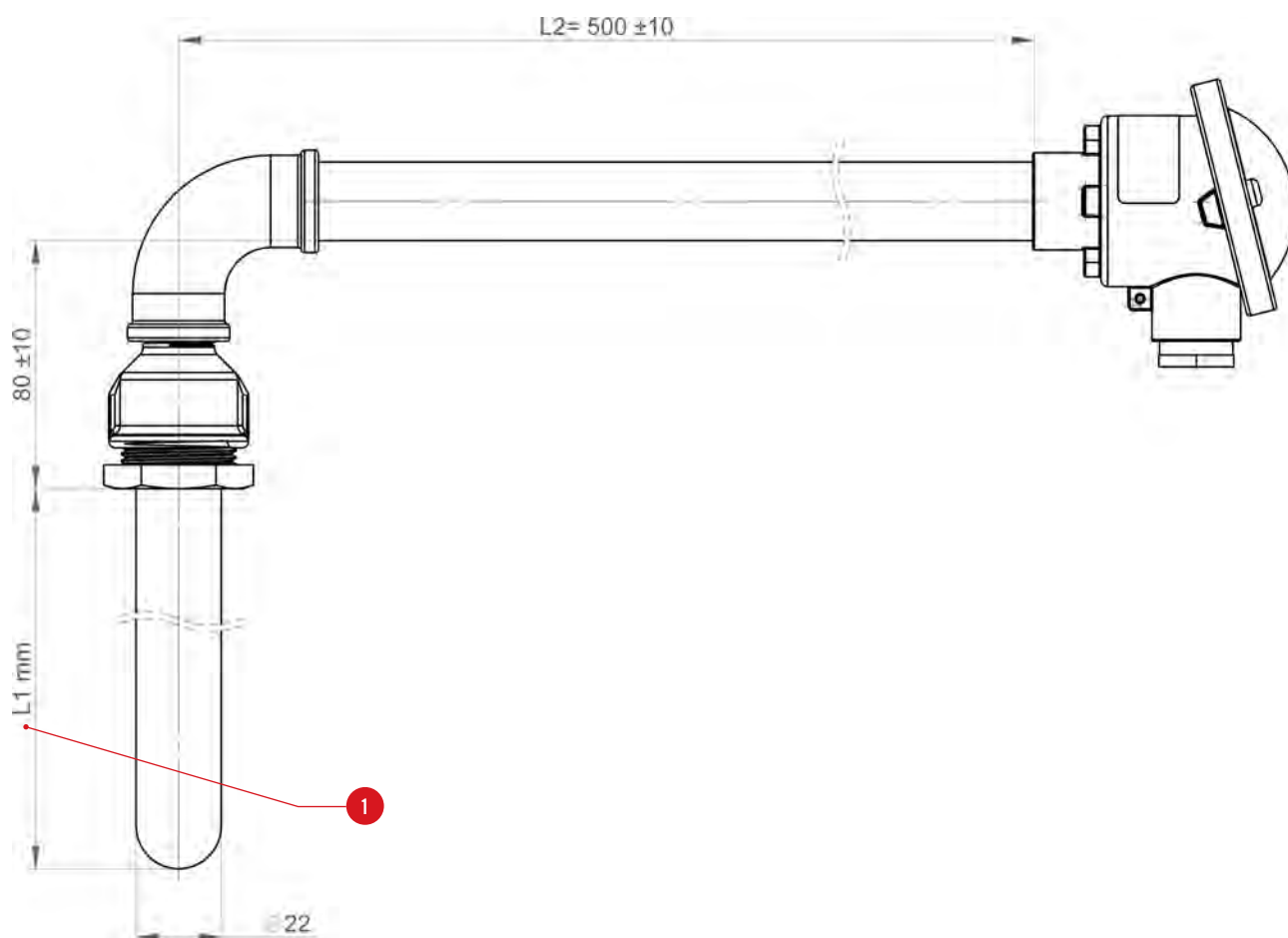
DESIGN YOUR SENSOR

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

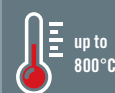
| Conductor type | | Temperature °C | | Tolerance values |
|----------------|------------------------------|----------------|--------|--------------------|
| | | Min. | Max. | |
| K | Nickel chrome / Nickel alloy | 0 | +1,000 | 1.5°C or 0.4% of t |

PYROJET

THERMOCOUPLE

CLASS
1

IEC
584-1

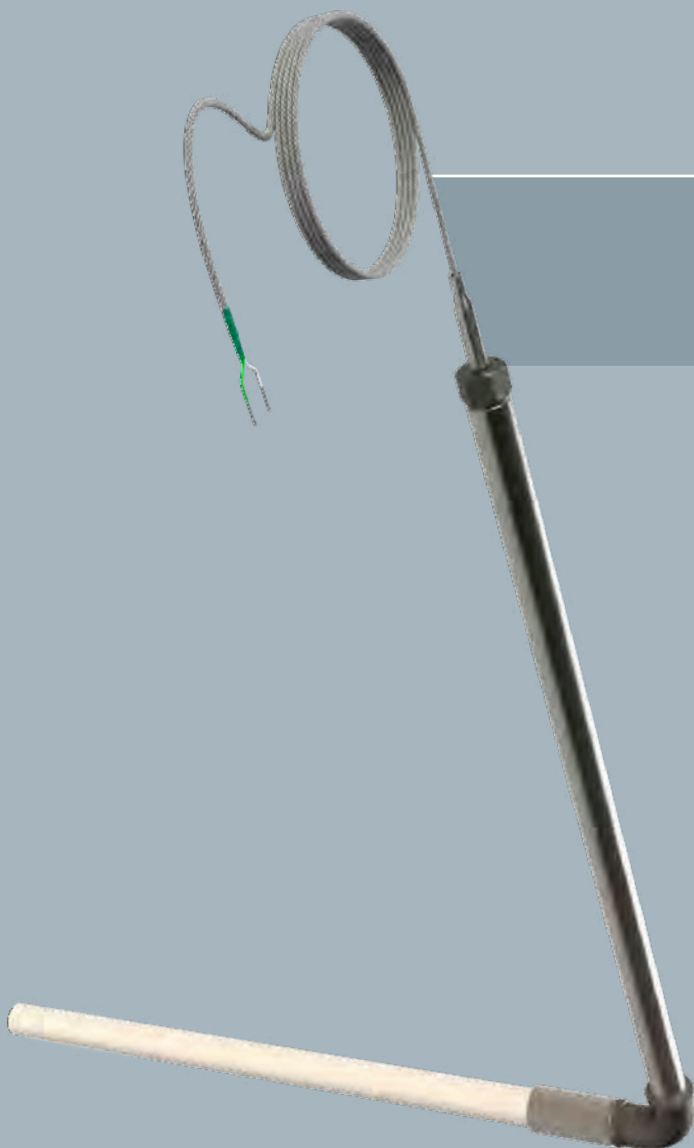
CABLE
OUTPUT


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 Si ₃ N ₄ |
| | 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 |



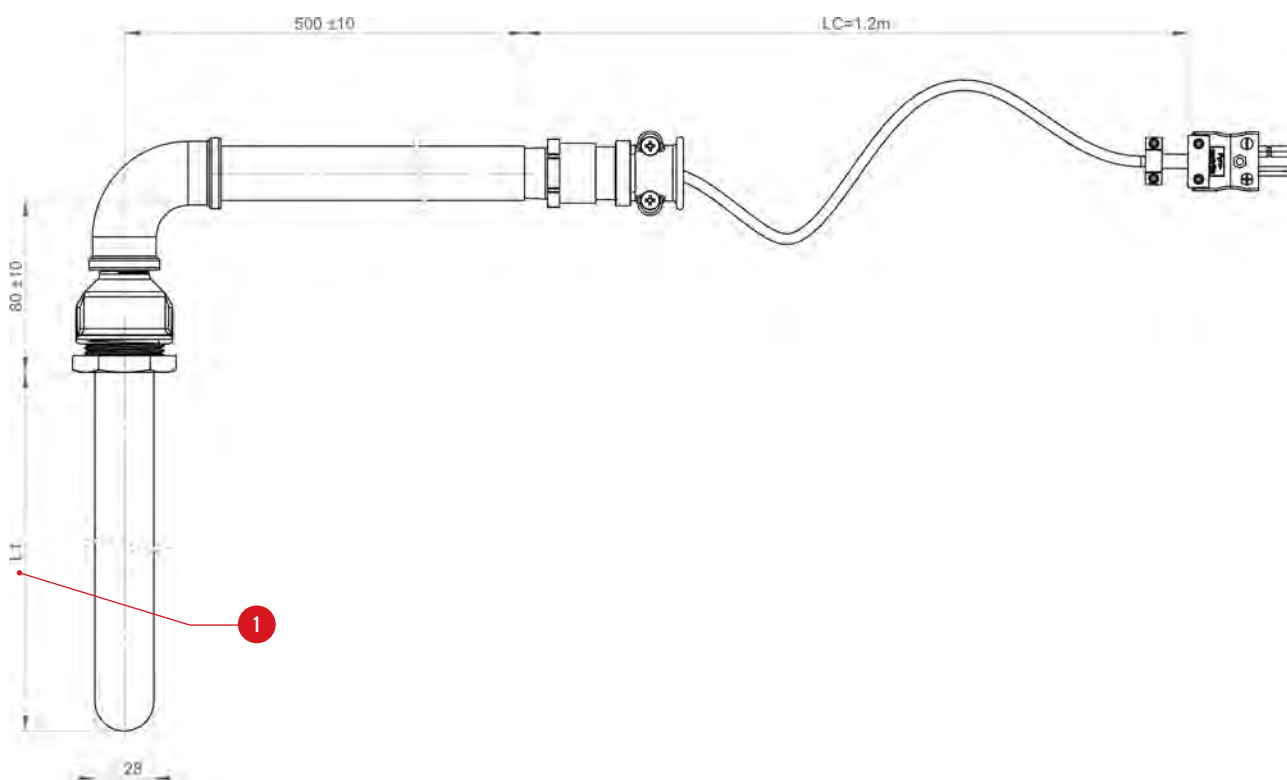
DESIGN YOUR SENSOR

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.

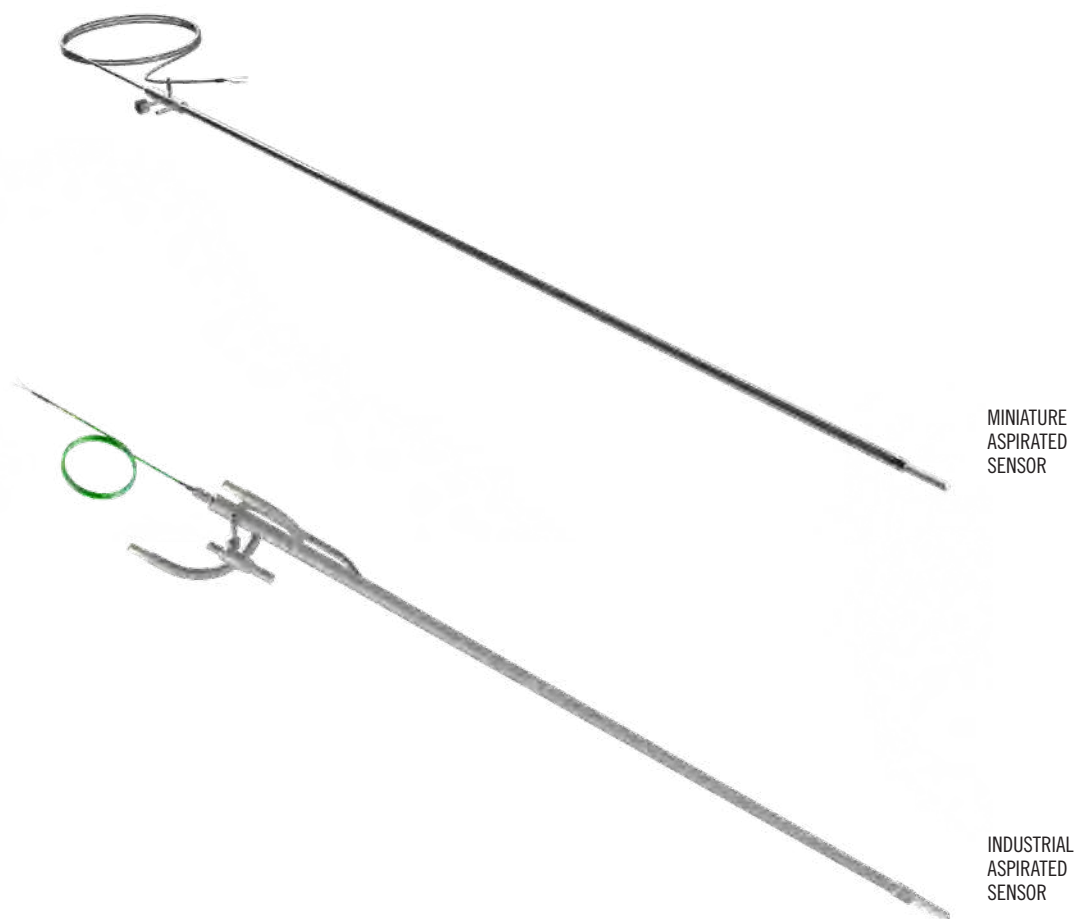
The temperature indicated by a thermocouple plunged into a gas is usually different from the gas's actual temperature. This indication is rendered false at the thermocouple's hot junction by:

- 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.

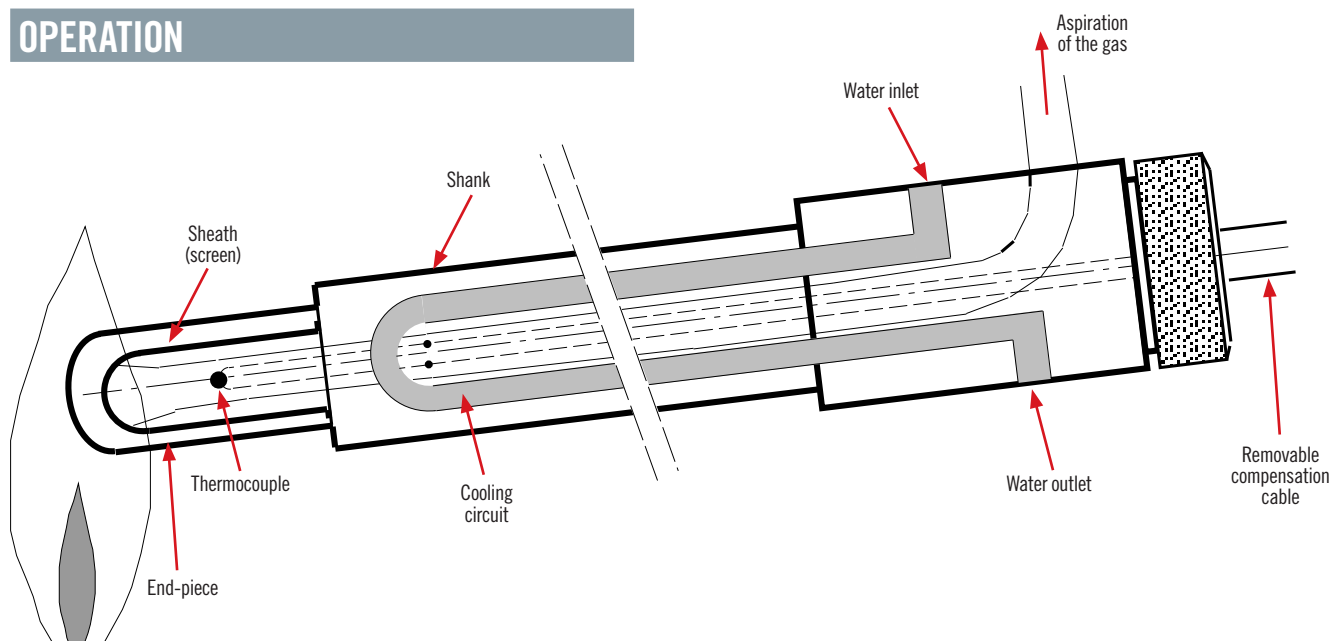
CA PYROCONTROLE proposes three types of sensors whose purpose is to:

- 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.



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
- **T0.25**: Temperature reading with aspiration at 1/4 of its nominal value
- **Tg**: Actual gas temperature
- **E%**: Efficiency coefficient

$$E\% = 100 \frac{T_n - T_o}{T_g - T_o} \quad F = \frac{T_n - T_o}{T_n - T_{0.25}} \quad F' = \frac{\Delta t_o}{\Delta t_n}$$

- **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 T_o, T_n and T_{0.25}

$$F = \frac{T_n - T_o}{T_n - T_{0.25}}$$

- If you choose to determine F', measure Δt_o and Δt_n

$$F' = \frac{\Delta t_o}{\Delta t_n}$$

- use one of the attached calculation charts to determine E%

Note the values which you have determined for: E%, T_n, T_o, T_{0.25}, Δt_o and Δt_n

The value of E% can be used to determine T_g by means of the following equation:

$$T_g = 100 \frac{T_n - T_o}{E\%} + T_o$$

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.

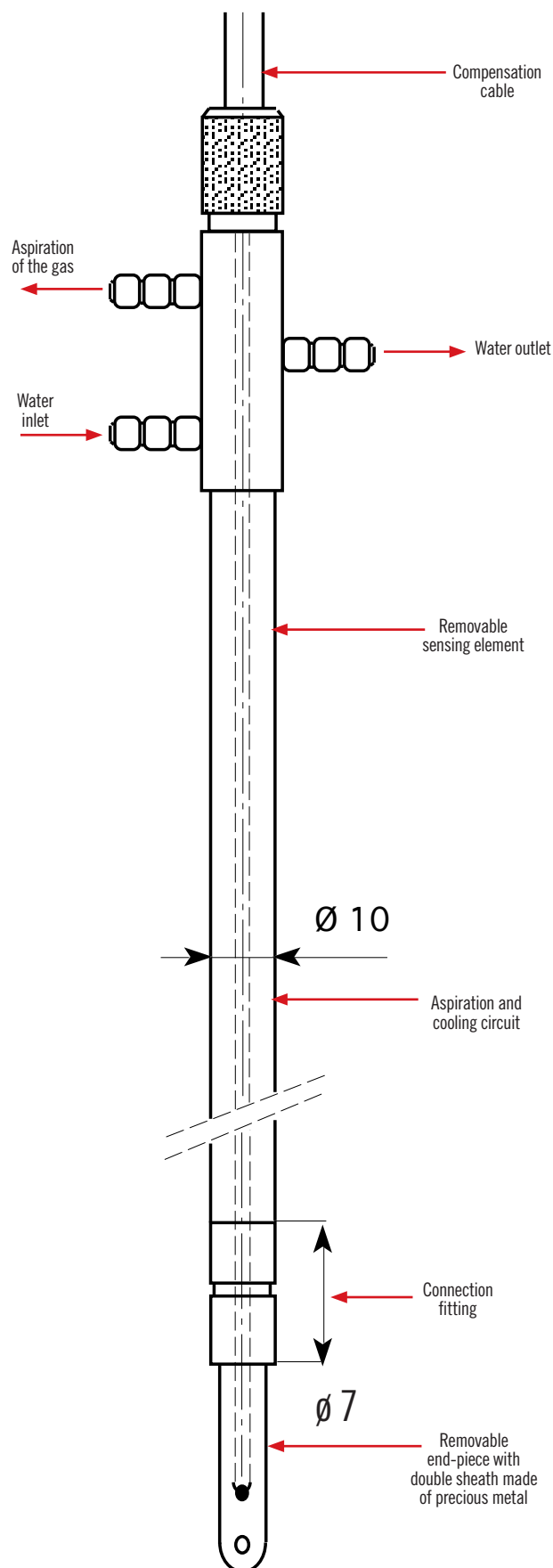
THE SENSING ELEMENT

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

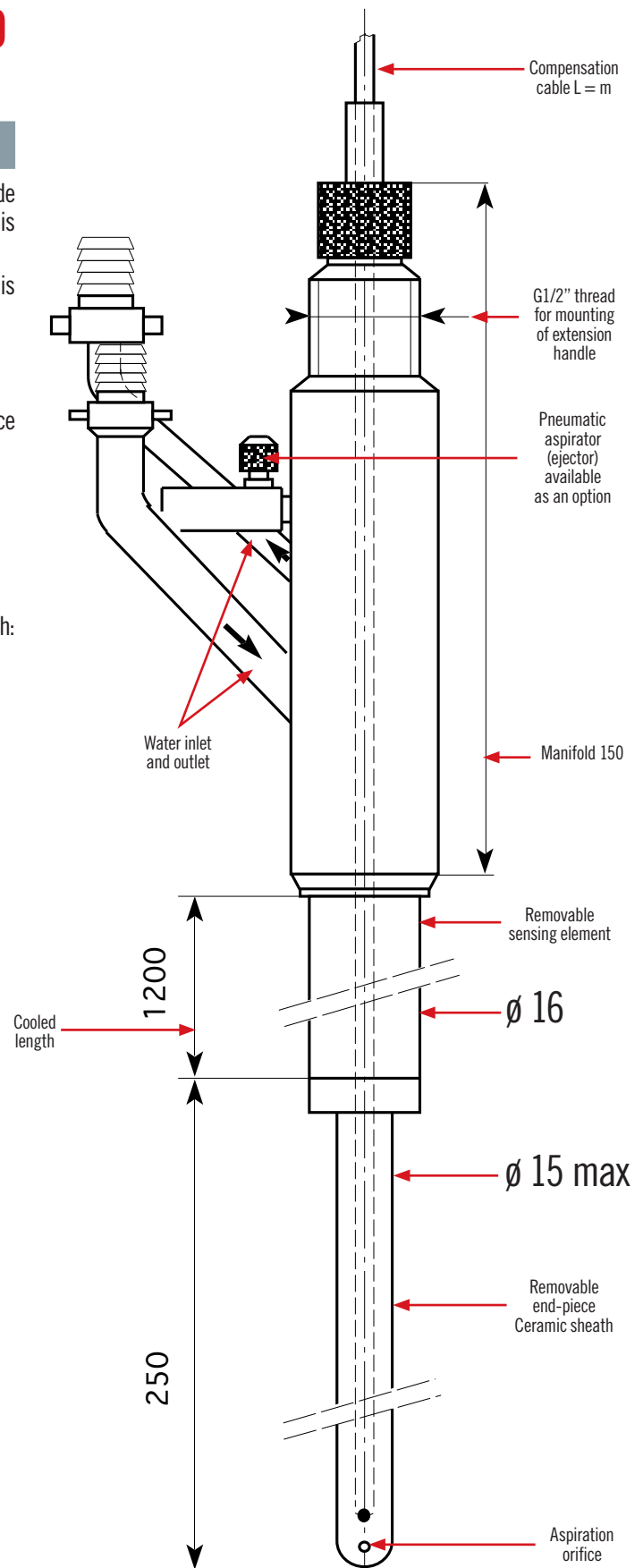
This comprises 2 ceramic sheaths which act as screens to reduce losses by radiation.

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.

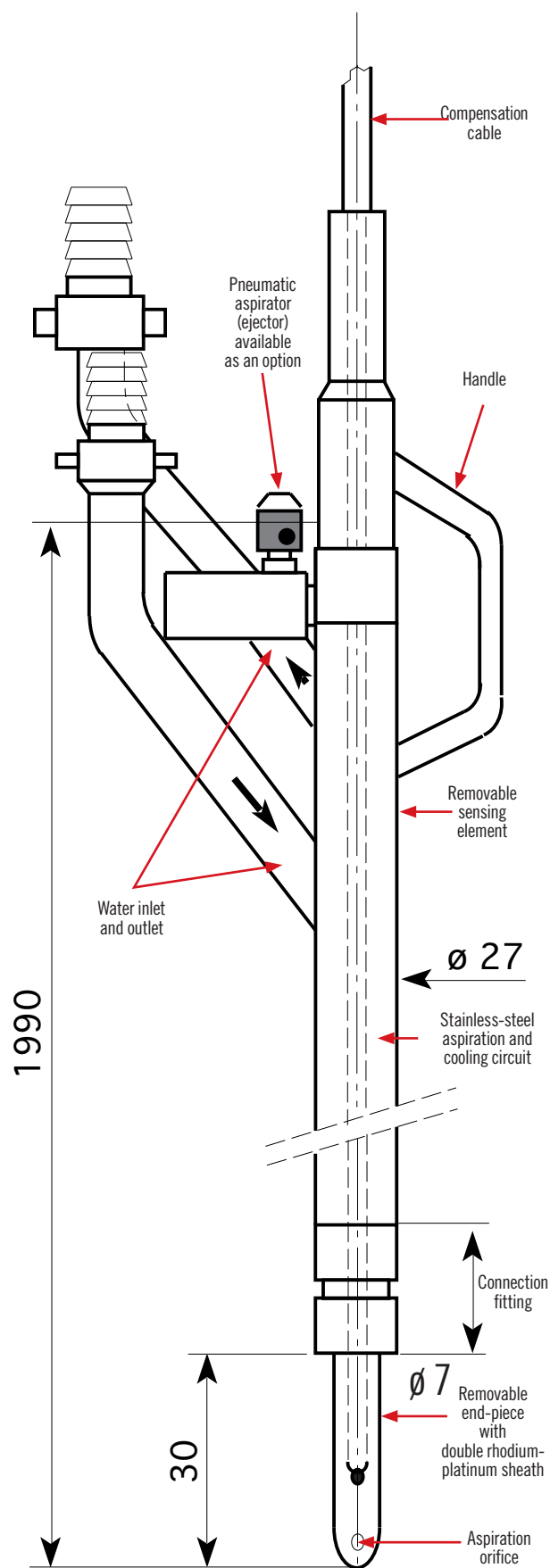
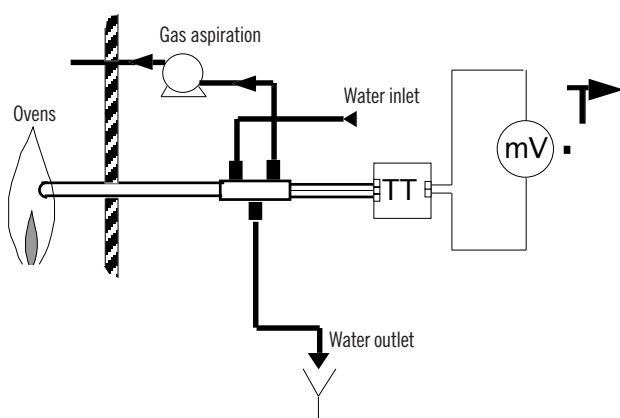
The type of thermocouple depends on the temperature to be measured:

- K thermocouple: 1100 °C
- S or R thermocouple: 1500 °C
- B thermocouple: 1600 °C

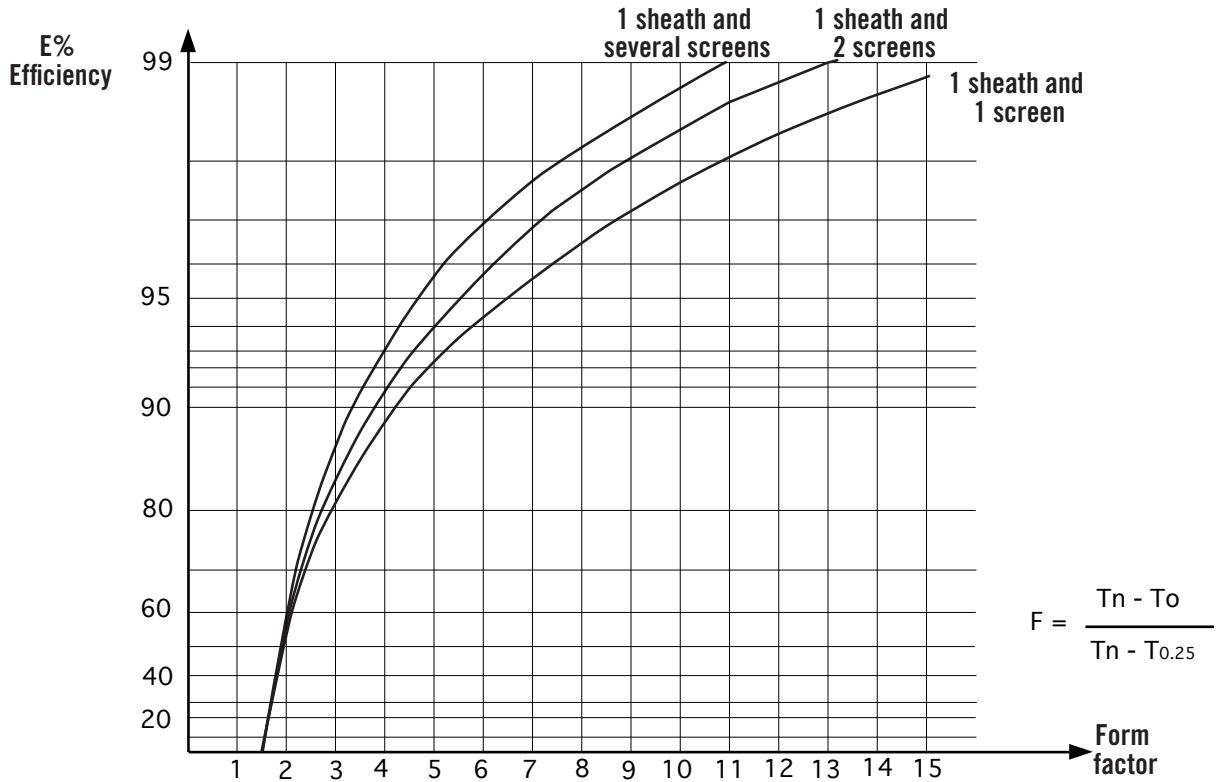
THE END-PIECE

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.

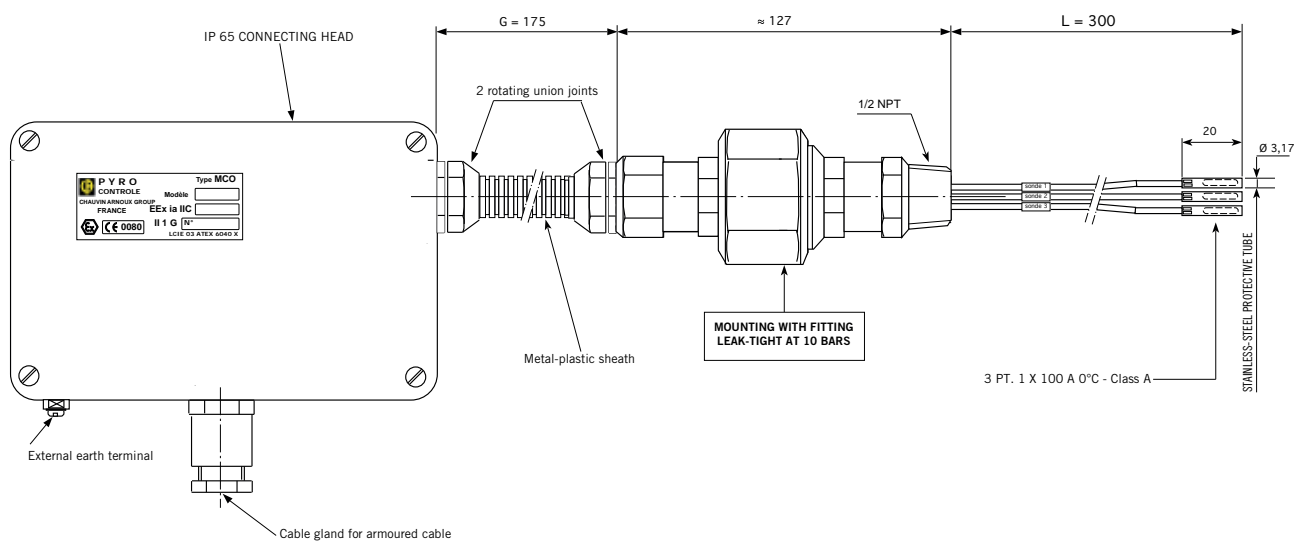
SPECIFICATIONS

| | |
|-----------------------|---|
| 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

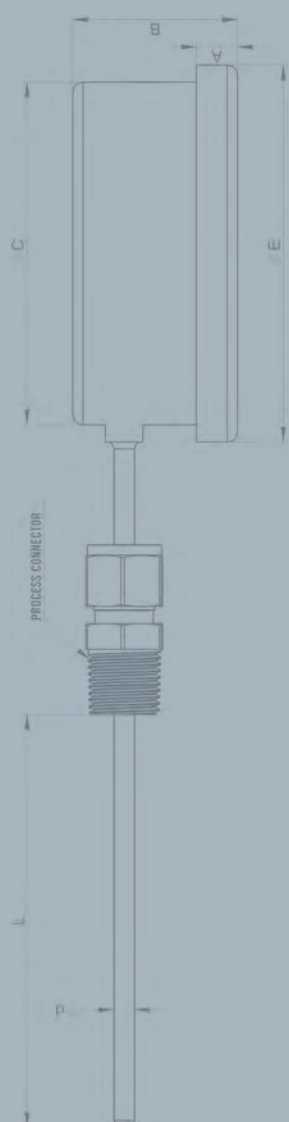
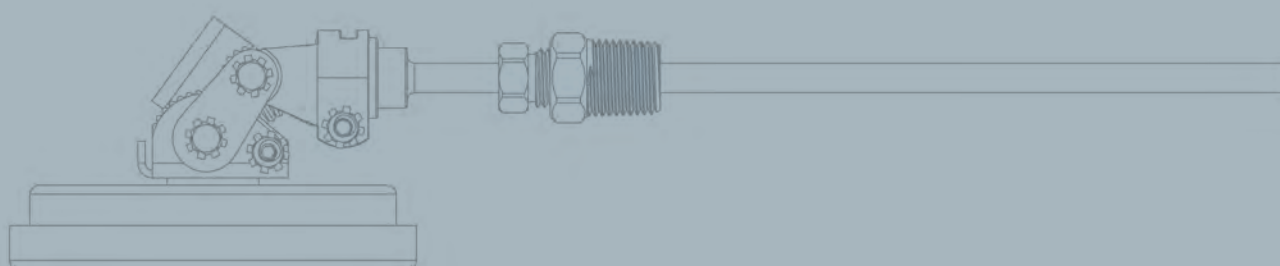
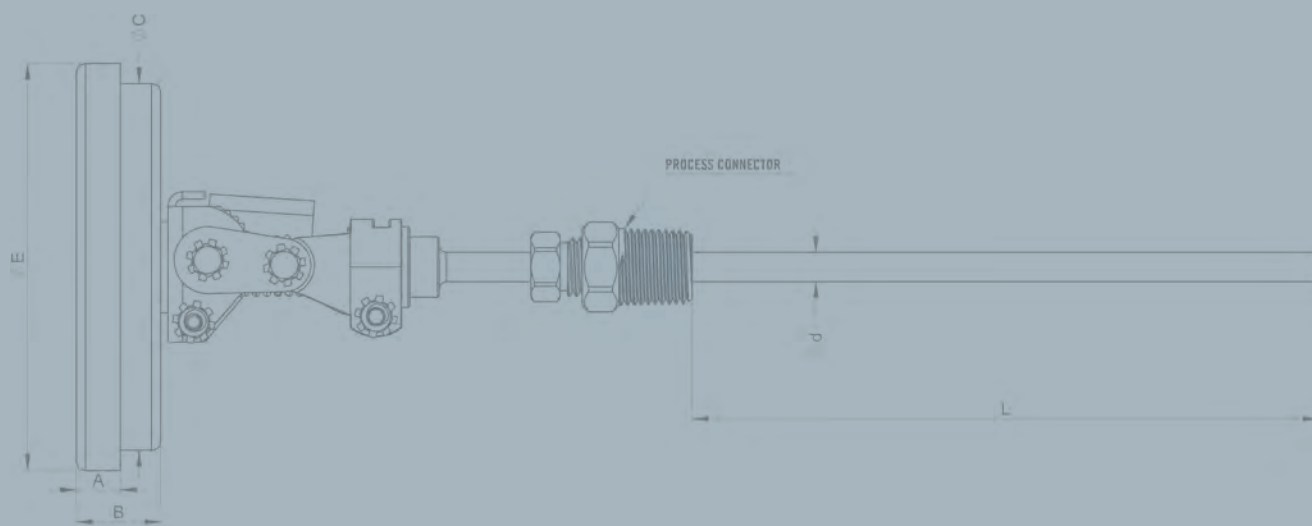
- Withstands strong vibrations
- Quick response time
- 1 or more measuring points
- Qualified for explosive zones
- Output via HART transmitter

DIAGRAM (MM)

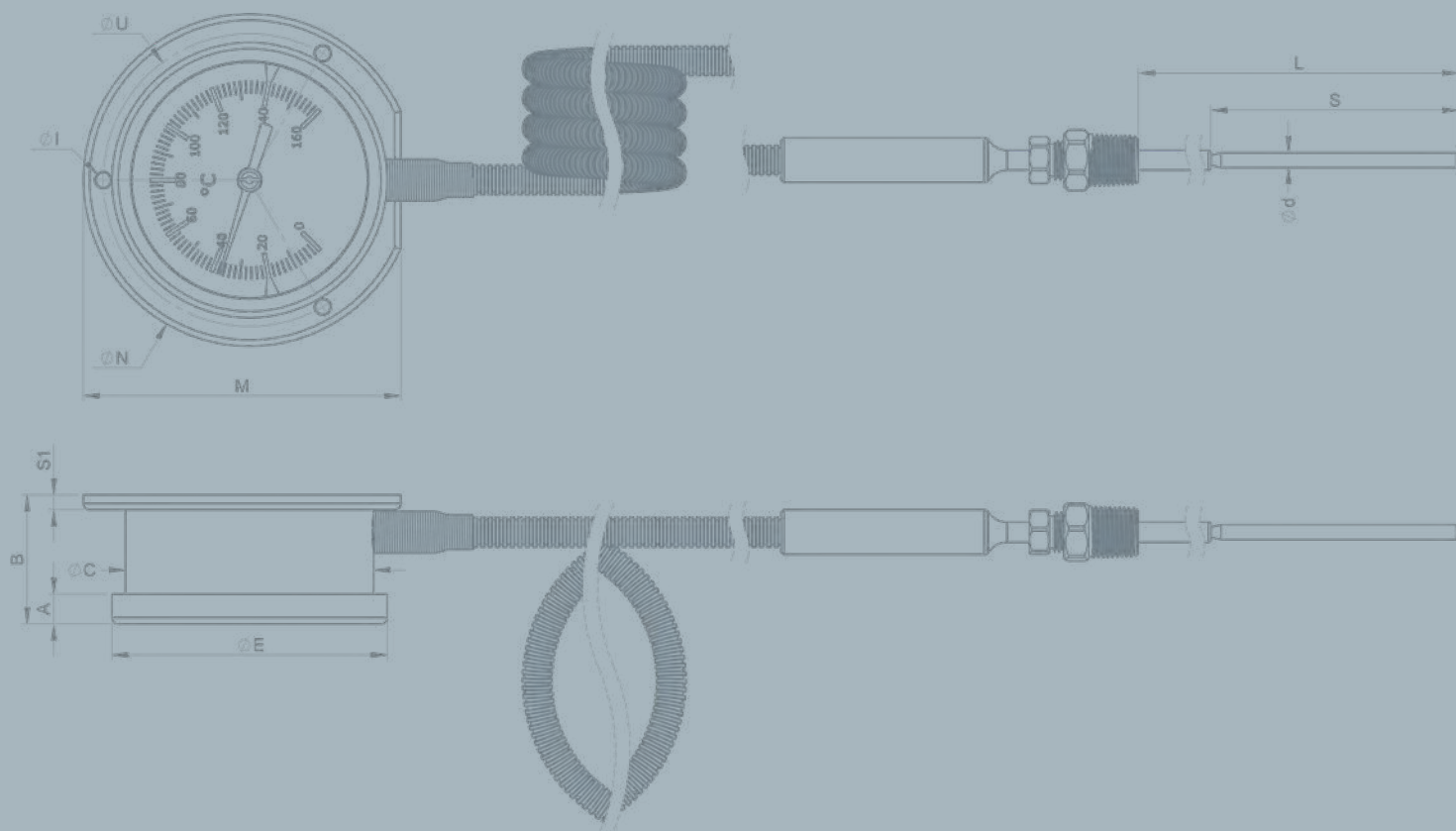


ORDERS: PLEASE CONTACT US

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

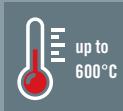
CLASS
1

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 $\varnothing \leq 6.35$ mm) |
| | | 3/8" BsP / male (for plunger $\varnothing \leq 10$ 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 |



**ATEX
OPTION**



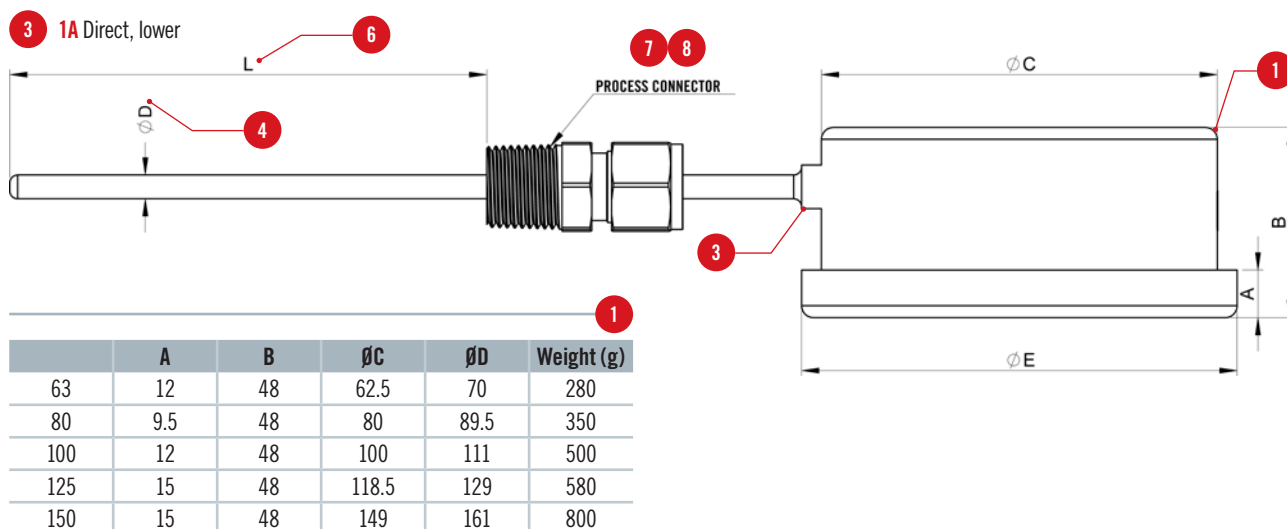
DESIGN YOUR THERMOMETER

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

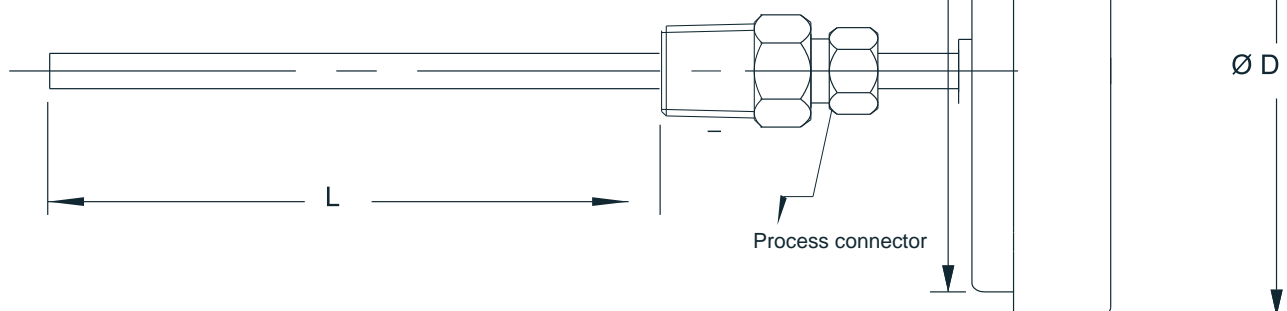
| STANDARD MODEL | CASING | RANGE | MOUNTING | IMMERSED \varnothing | PROT. | IMMERSED LENGTH | PROCESS CONNECTION TYPE | PROCESS CONNECTOR | OPTION |
|--------------------------------|-------------------------------------|---|----------|----------------------------------|----------------------|---------------------|-------------------------|--|--|
| 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 NM20 / BM38 TR15 / NM34 BM34 / NM27 NF12 / NF34 | 1 / 2 3 / 4 5 / 6 7 / A B / C D |

DIAGRAM (MM)



3 2A Centre, rear

| | 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

| | | | |
|------------|--------------|------------|---------------|
| 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)

| | | | | | |
|------------|---------------|------------|-------------|------------|-------------|
| 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

| | | | |
|-----------|---------------|-----------|--------------|
| 1A | Direct, lower | 2A | Centre, rear |
|-----------|---------------|-----------|--------------|

IMMERSED DIAMETER

| | | | |
|-----------|---------------|-----------|--------|
| 60 | 6.0 mm | 95 | 9.5 mm |
| 14 | 1/4" (6.35mm) | 10 | 10 mm |
| 80 | 8.0 mm | 12 | 12 mm |

PROTECTION

| | | | |
|-----------|------|-----------|---------------------|
| P5 | IP65 | P7 | IP67 |
| P6 | IP66 | HS | Hermetically sealed |

IMMERSED LENGTH

| | |
|-------------|------------------|
| xxxx | 50 mm to 1500 mm |
|-------------|------------------|

MIN. IMMERSED LENGTH

| 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

| | | | | | |
|-----------|-------|-----------|------------|-----------|-------------------|
| RX | Fixed | RG | Adjustable | RT | Pivoting / Rotary |
|-----------|-------|-----------|------------|-----------|-------------------|

PROCESS CONNECTOR

| | | | | | |
|-------------|-------------|-------------|----------------|-------------|-----------------|
| 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 | 1/2"NPT (F) |
| BM14 | 1/4"BSP (M) | NM34 | 3/4"NPT (M) | NF34 | 3/4"NPT (F) |

OPTIONS

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

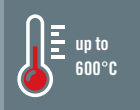
CLASS
1

DESCRIPTION

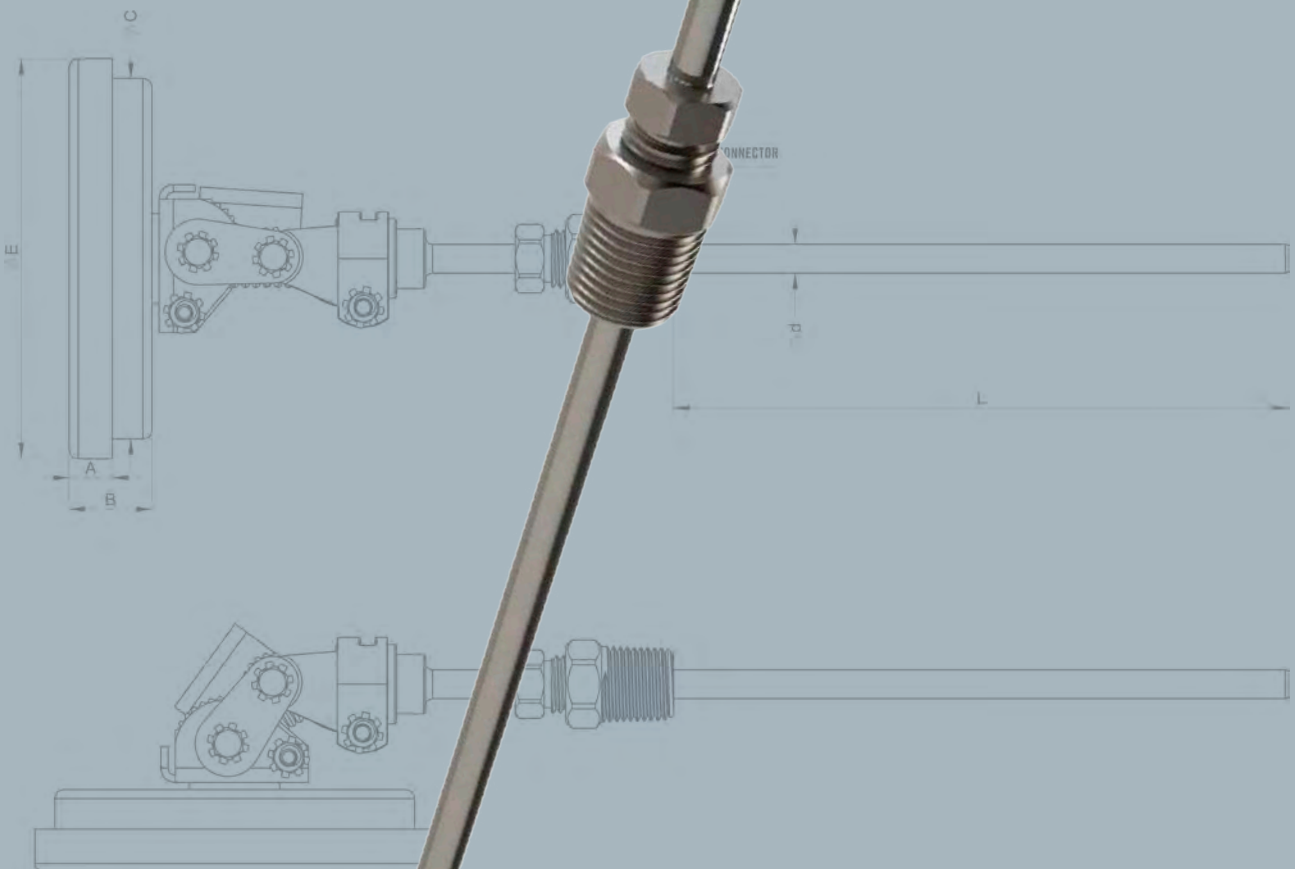
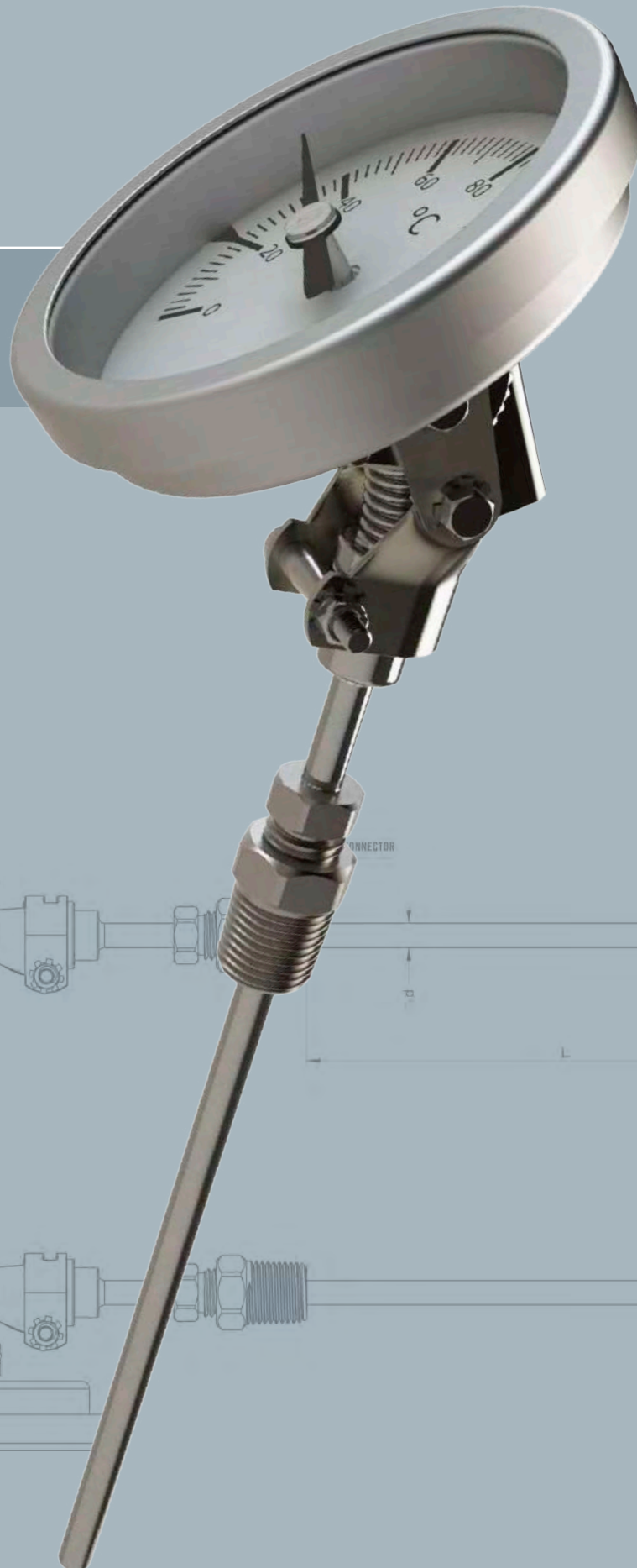
Bimetallic thermometer with multidirectional dial. Adjustable zero. For corrosive liquids and gases in the agri-food industry, pharmacy, chemicals, petrochemicals and the nuclear sector.

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 $\varnothing \leq 6.35$ mm) |
| | | 3/8" BsP / male (for plunger $\varnothing \leq 10$ mm) |
| | | 3/4" NPT or BsP / male |
| | | m20 x 1.5 / male, m27 x 2 / male |
| Protection | | IP 65, IP 66, IP 67 |



**ATEX
OPTION**



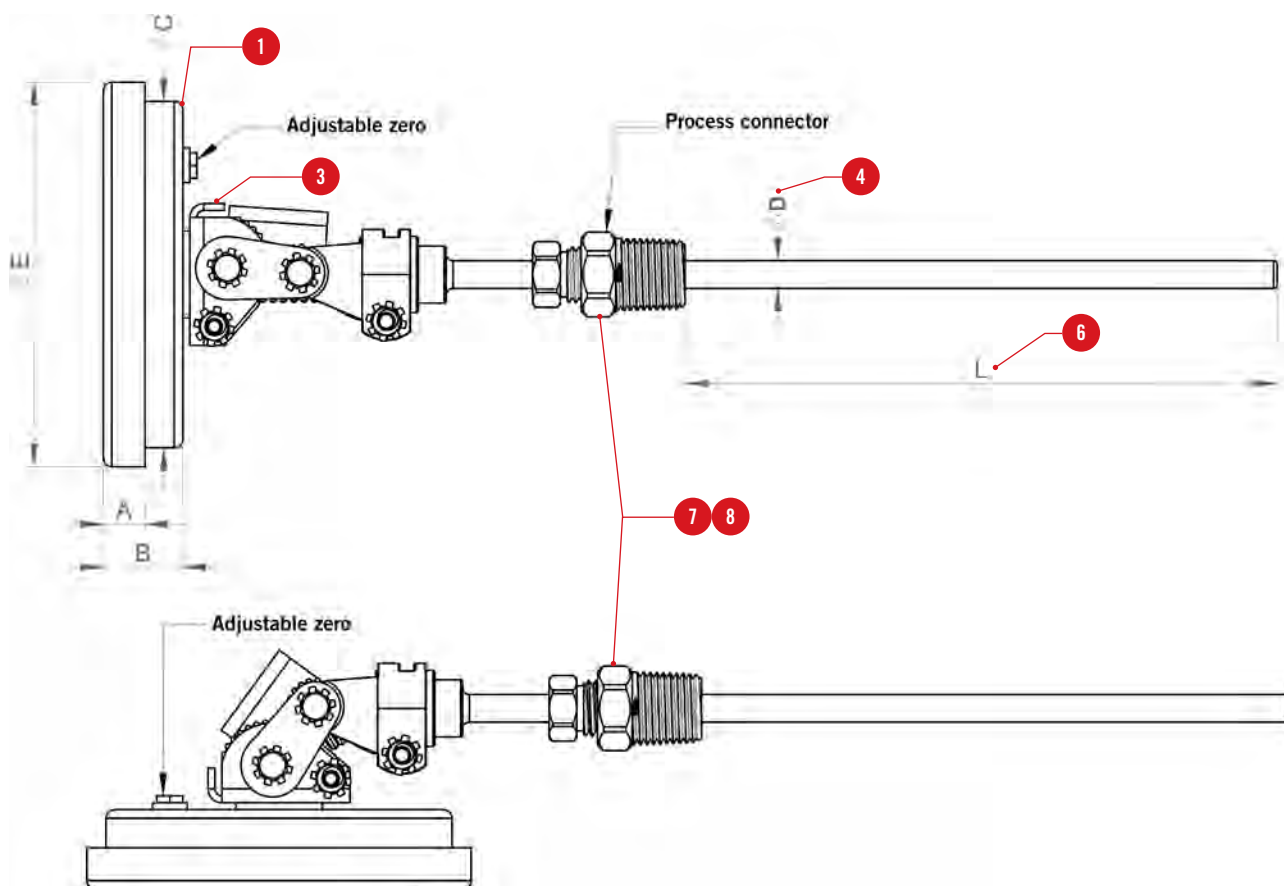
DESIGN YOUR THERMOMETER

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 |
|--------------------------------|-------------------------|--|----------|----------------------------------|----------------------|----------------------|-------------------------|---|--|
| 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 NM20 / BM38 TR15 / NM34 BM34 / NM27 | 1 / 2 3 / 4 5 / 6 7 / A B / C D |

DIAGRAM (MM)



| | 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

| | | | |
|------------|------------|------------|----------------|
| 080 | 80mm / 3" | 125 | 125mm / 4" 1/2 |
| 100 | 100mm / 4" | 150 | 150mm / 6" |

MEASUREMENT RANGE (°C)

| | | | | | |
|------------|---------------|------------|-------------|------------|-------------|
| 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

| | |
|-----------|--------------------------------|
| 2D | Centre, rear, multidirectional |
|-----------|--------------------------------|

IMMERSED DIAMETER

| | | | |
|-----------|---------------|-----------|--------|
| 60 | 6.0 mm | 95 | 9.5 mm |
| 14 | 1/4" (6,35mm) | 10 | 10 mm |
| 80 | 8.0 mm | 12 | 12 mm |

PROTECTION

| | | | |
|-----------|------|-----------|---------------------|
| P5 | IP65 | P7 | IP67 |
| P6 | IP66 | HS | Hermetically sealed |

IMMERSED LENGTH

| | |
|-------------|-------------------|
| xxxx | 110 mm to 1500 mm |
|-------------|-------------------|

MIN. IMMERSED LENGTH

| 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

| | | | | | |
|-----------|-------|-----------|------------|-----------|-------------------|
| RX | Fixed | R6 | Adjustable | RT | Pivoting / Rotary |
|-----------|-------|-----------|------------|-----------|-------------------|

PROCESS CONNECTOR

| | | | | | |
|-------------|-------------|-------------|----------------|-------------|-----------------|
| 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

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 MIMMERSED
UP TO
2 MDIAL
DIAMETER
100 TO
250 MMIP
67

DESCRIPTION

Gas expansion thermometer. Multiple mounting possibilities. For corrosive liquids and gases in the chemicals and petrochemicals sectors.

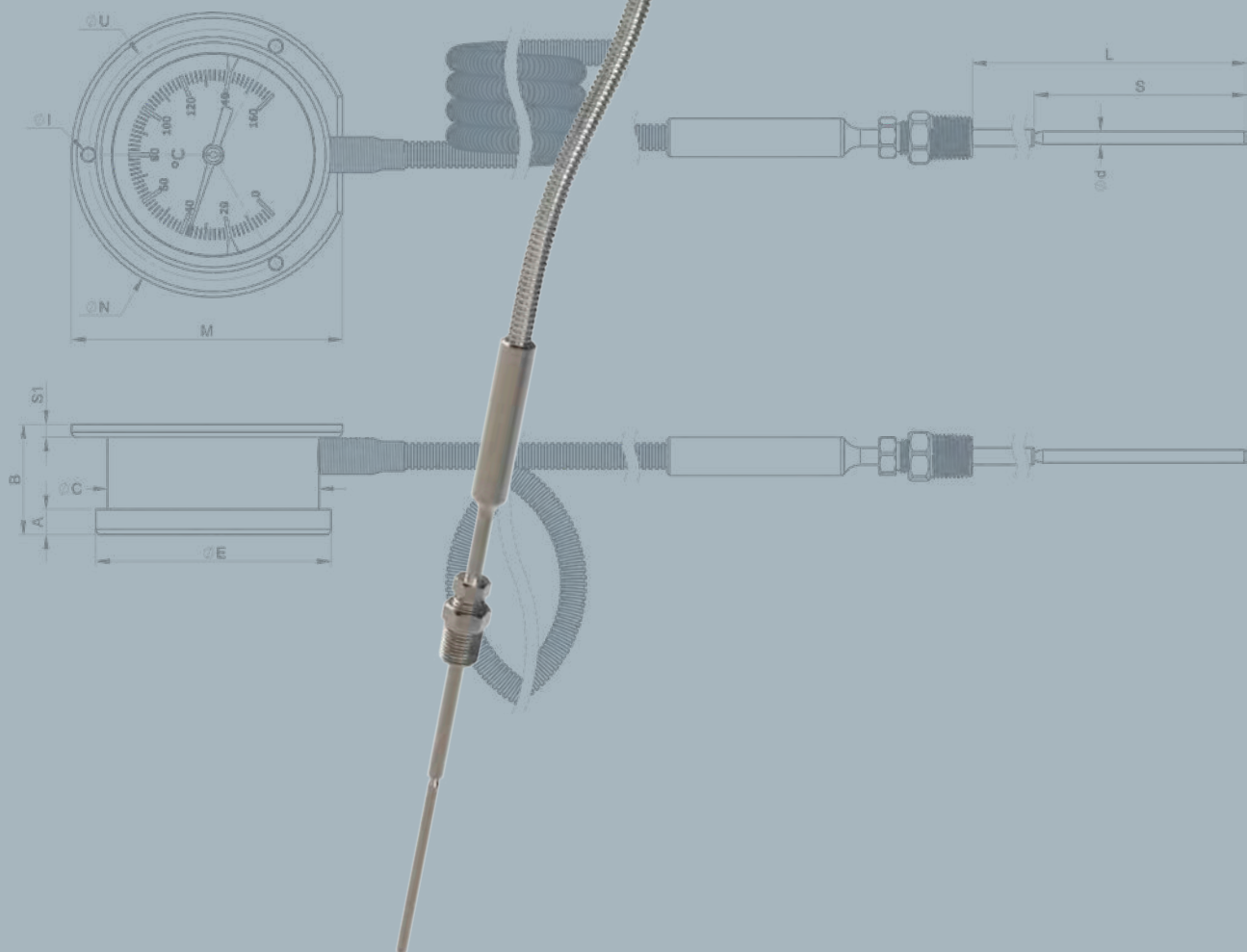
SPECIFICATIONS

| | | |
|---------------------|-----------------------|---|
| 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 $\varnothing \leq 6.35$ mm) |
| | | 3/8" BsP / male (for plunger $\varnothing \leq 10$ mm) |
| | | m20 x 1.5 / male |
| Protection | | IP 65, IP 66, IP 67 |

CLASS
1



up to
700°C



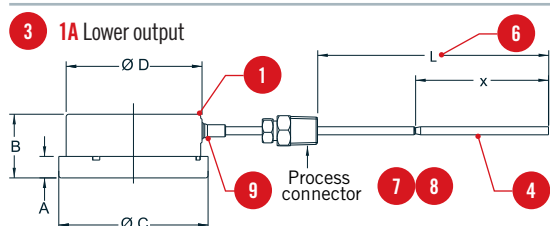
DESIGN YOUR THERMOMETER

CONFIGURATOR CODE

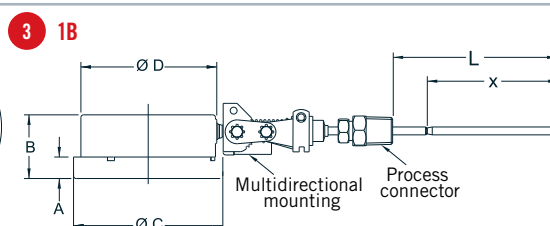
Parameters to be indicated when ordering. Example:

| 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 |

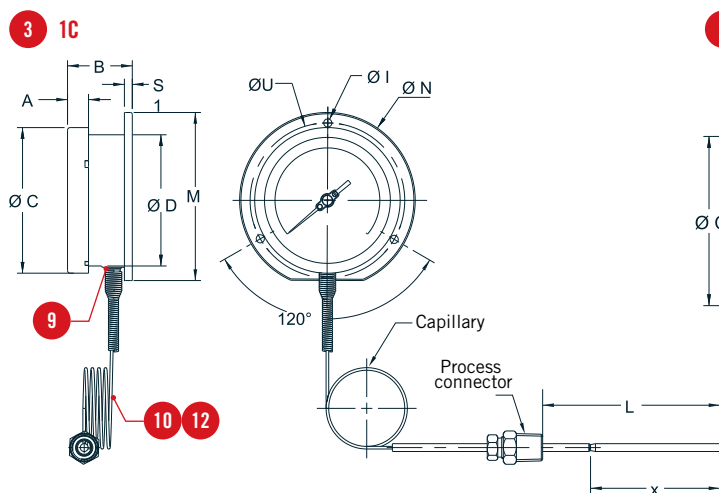
DIAGRAM (MM)



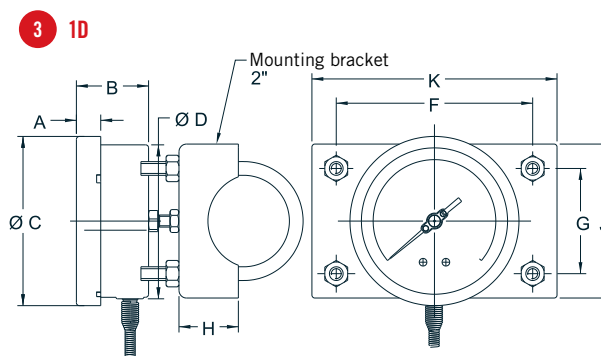
| 1 | A | B | ØC | ØD |
|-----|----|----|-----|-------|
| 100 | 12 | 48 | 111 | 100 |
| 125 | 15 | 48 | 129 | 118,5 |



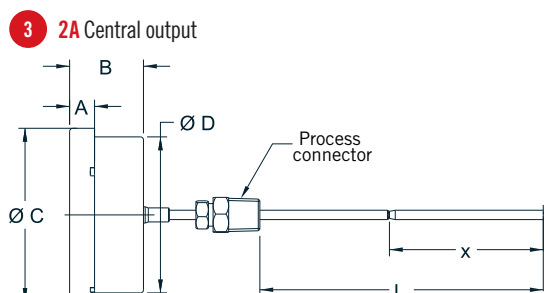
| 1 | A | B | ØC | ØD |
|-----|------|----|-----|-----|
| 150 | 15 | 48 | 161 | 149 |
| 250 | 18,5 | 50 | 263 | 250 |



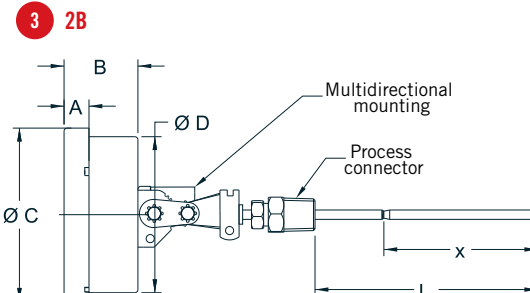
| 1 | A | B | ØC | ØD | ØI | ØN | M | S1 | ØU |
|-----|------|------|-----|-------|----|-----|-------|-----|-----|
| 100 | 12 | 52 | 111 | 100 | 6 | 134 | 128 | 6 | 118 |
| 125 | 15 | 50 | 129 | 118,5 | 6 | 150 | 143,5 | 4 | 137 |
| 150 | 15 | 52 | 161 | 149 | 6 | 186 | 172,4 | 6 | 168 |
| 250 | 18,5 | 51,5 | 263 | 250 | 7 | 290 | 286,5 | 1,5 | 276 |



| 1 | A | B | ØC | ØD | F | G | H | J | K |
|--|---|---|----|----|-----|----|----|-----|-----|
| For casing dimensions, please see 1A, 1B | | | | | 129 | 69 | 39 | 101 | 161 |



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

| | | | |
|-----|---------------|-----|-------------|
| 100 | 100mm / 4" | 150 | 150mm / 6" |
| 125 | 125mm / 4"1/2 | 250 | 250mm / 10" |

MEASUREMENT RANGE (°C)

| | | | | | |
|-----|---------------|-----|---------------|-----|---------------|
| 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

| Lower output | | Central output | |
|--------------|----------------------------|----------------|------------------|
| 1A | Direct | 2A | Rear |
| 1B | Multidirectional | 2B | Multidirectional |
| 1C | Mounting on wall / surface | | |
| 1D | 2" pipe mounting | | |

IMMERSED DIAMETER

| | | | |
|----|---------------|----|--------|
| 60 | 6.0 mm | 95 | 9.5 mm |
| 14 | 1/4" (6.35mm) | 10 | 10 mm |
| 80 | 8.0 mm | 12 | 12 mm |

PROTECTION

| | | | |
|----|------|----|---------------------|
| P5 | IP65 | P7 | IP67 |
| P6 | IP66 | HS | Hermetically sealed |

IMMERSED LENGTH

| | |
|------|-------------------|
| xxxx | 100 mm to 2000 mm |
|------|-------------------|

PROCESS CONNECTION TYPE

| | | | | | |
|----|-------|----|------------|----|-------------------|
| RX | Fixed | RG | Adjustable | RT | Pivoting / Rotary |
|----|-------|----|------------|----|-------------------|

PROCESS CONNECTOR

| | | | | | |
|------|-------------|------|----------------|------|-----------------|
| 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 | 1/2"NPT (F) |
| BM14 | 1/4"BSP (M) | NM34 | 3/4"NPT (M) | NF34 | 3/4"NPT (F) |

ASSEMBLY

| | | | |
|----|------------------|----|--------------------|
| ST | direct (plunger) | CT | remote (capillary) |
|----|------------------|----|--------------------|

CAPILLARY MATERIAL

| | | | |
|----|------|----|------|
| AB | 304L | AC | 316L |
|----|------|----|------|

ARMOURING

| | | | | | |
|----|-------|----|-------|----|-------------------------------|
| AB | 304 L | AC | 316 L | HF | PVC (Max. ambient temp. 60°C) |
|----|-------|----|-------|----|-------------------------------|

CAPILLARY LENGTH

| | |
|------|-----------------|
| xxxx | 250 to 25,000mm |
|------|-----------------|

OPTIONS

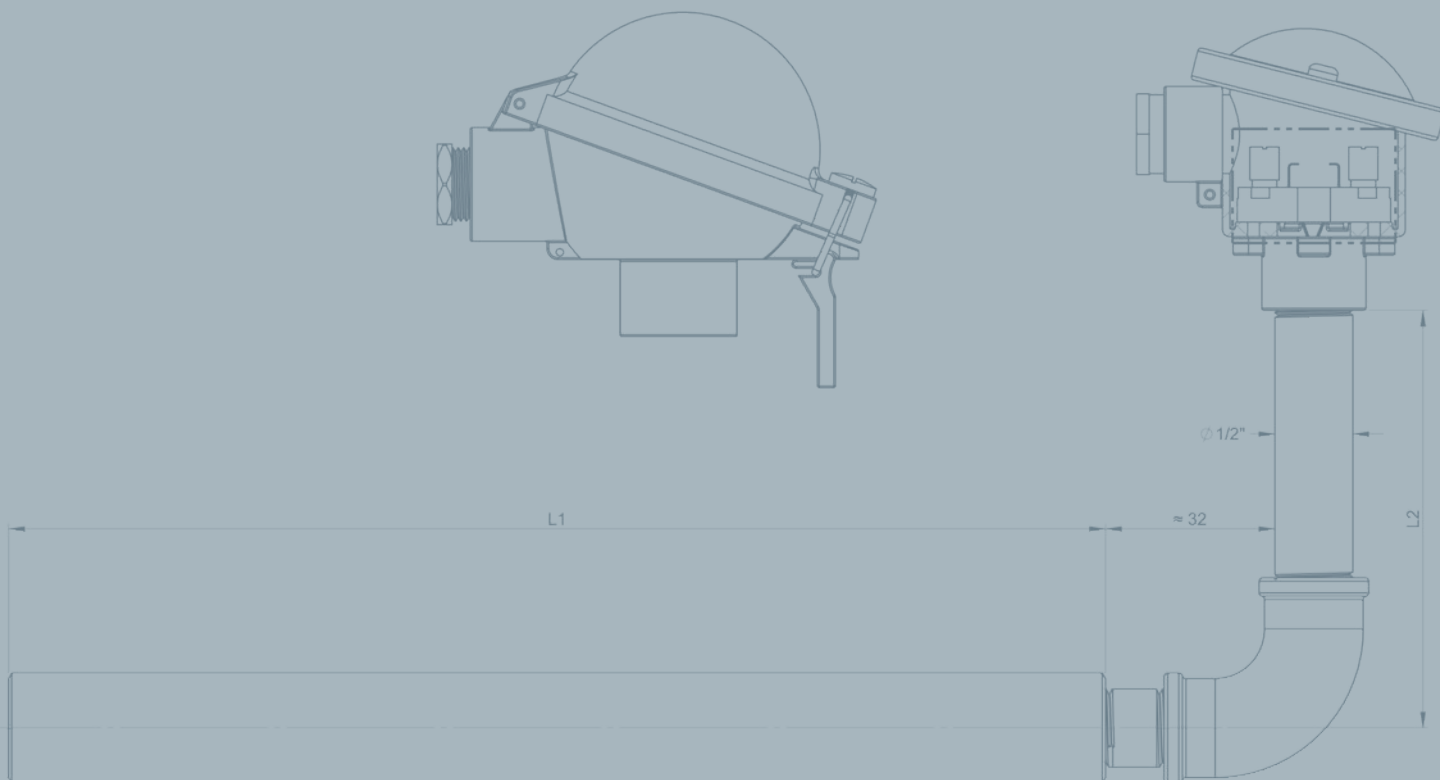
Several options are available. They should be indicated one after the other.

| | |
|---|--------------------------------------|
| 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 |

For any other configuration, please contact us.



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)

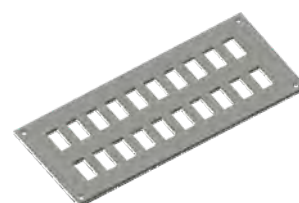


Miniature cable clamp



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 | |
| 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 |
| | | | 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

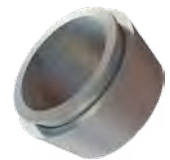
Stainless steel cable gland



| 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 | 1/4" NPT | L078841-000 |
| | | 8.0 mm | 1/2" NPT | 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 | 1/4" NPT | L228126-000 |
| | | 5.0 mm | 3/8 G tapered | 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 |
| Brass | FEP | 8.0 mm | 1/4" NPT | L228128-000 |
| | | 1.5 mm | 1/8" NPT | L228143-000 |
| | | 3.0 mm | 1/4" NPT | L228145-000 |
| | | 3.2 mm | G1/8 | L078948-000 |
| | | 4.5 mm | 1/4" NPT | L228146-000 |
| | | 6.0 mm | G1/4 | L078845-000 |
| | Brass | 6.0 mm | 1/4" NPT | L228147-000 |
| | | 8.0 mm | G3/8 | L078846-000 |
| | | 1.5mm | 1/8" NPT | L078927-000 |
| | | 3.0 mm | 1/4" NPT | L078930-000 |
| | | 6.0 mm | 1/4" NPT | L078936-000 |
| | | 8.0 mm | 1/4" NPT | L078941-000 |

SPARE FERRULES

Stainless steel 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 |

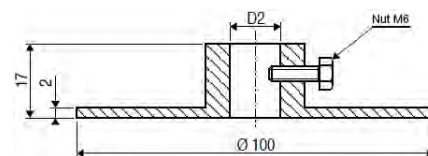
LEAK-TIGHT FITTINGS FOR WELDING - CEMENT

| 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 | LU79110-000 |
| Steel | Steel | 30 (-) | | LU78981-000 |
| 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") | | LU79112-000 |
| Stainless steel | Stainless steel | 21,3 (1/2") | 1"NPT | LU78984-000 |



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.pyrocontrol.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 certificate | Code |
|----------|---------------------|------------------|-----------|------------------|-----------------------|--|------------------|-------------|
| PE9 | Nickel-plated brass | 1 | Yes | No | 5 - 9.5 | - | Without | L017211-000 |
| 1/2" NPT | Nickel-plated brass | 1 | No | No | 4 - 8 | - | Without | L017128-000 |
| 1/2" NPT | Nickel-plated brass | 1 | Yes | No | 4 - 8 | - | Without | L017225-000 |
| 1/2" NPT | Nickel-plated brass | 1 | Yes | No | 7 - 12 | - | ATEX "d" | L017395-000 |
| 3/4" NPT | Nickel-plated brass | 1 | Yes | Yes | 10 - 16 | 7 - 12 | ATEX "d" | L017350-000 |
| 3/4" NPT | Nickel-plated brass | 1 | Yes | No | 7 - 12 | - | ATEX "d" | L017396-000 |
| M20 | Polyamide | 1 | No | No | 7 - 12 | - | Without | L017640-000 |
| M20 | Nickel-plated brass | 2 | No | No | 4 - 6 | - | Without | L017669-000 |
| M20 | Nickel-plated brass | 1 | Yes | No | 7 - 12 | - | ATEX "d" | L017690-000 |
| M20 | Nickel-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 |



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

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

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: $\theta < 1000$ °C: 0.1°C and $\theta \geq 1000$ °C: 1°C Display in °F: $\theta < 1000$ °F: 0.1°F and $\theta \geq 1000$ °F: 1°F | |
| Accuracy | (J, K, T, N, E) $\theta \leq -100$ °C $\pm (0.2 \% R^* + 0.6$ °C) -100 °C $< \theta \leq +100$ °C $\pm (0.15 \% R + 0.6$ °C) $+100$ °C $< \theta \pm (0.1 \% R + 0.6$ °C) (R, S) $\theta \leq +100$ °C $\pm (0.15 \% R + 1.0$ °C) $+100$ °C $< \theta \pm (0.1 \% R + 1.0$ °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 |

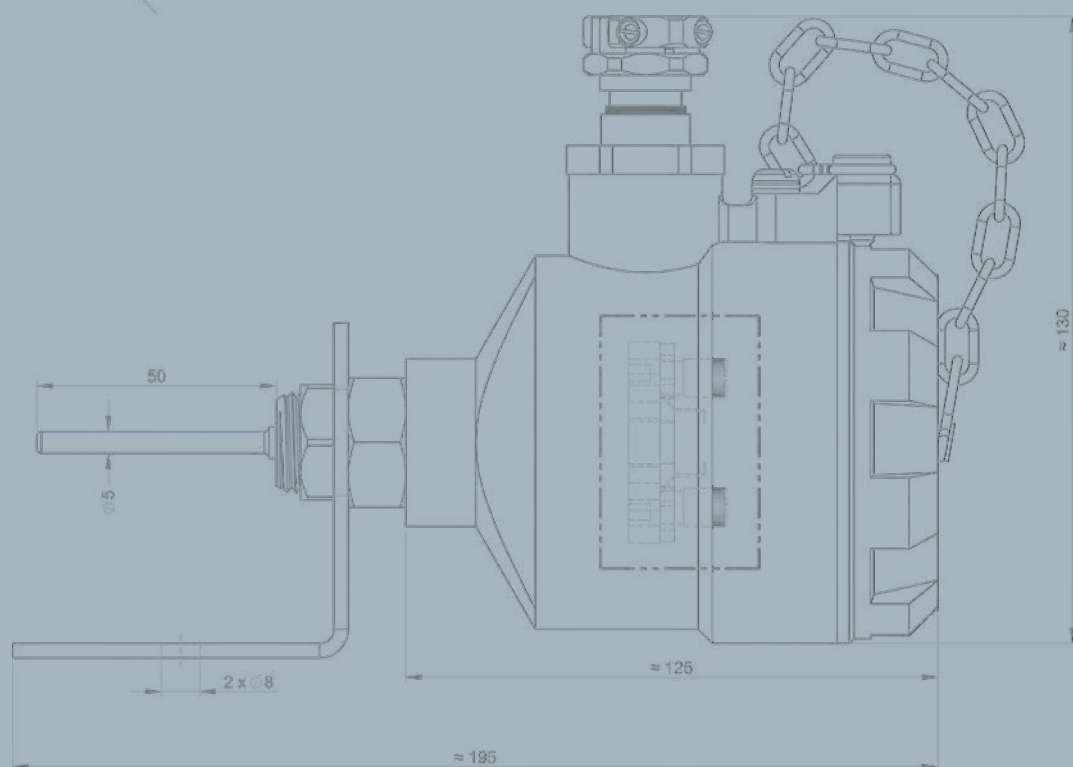
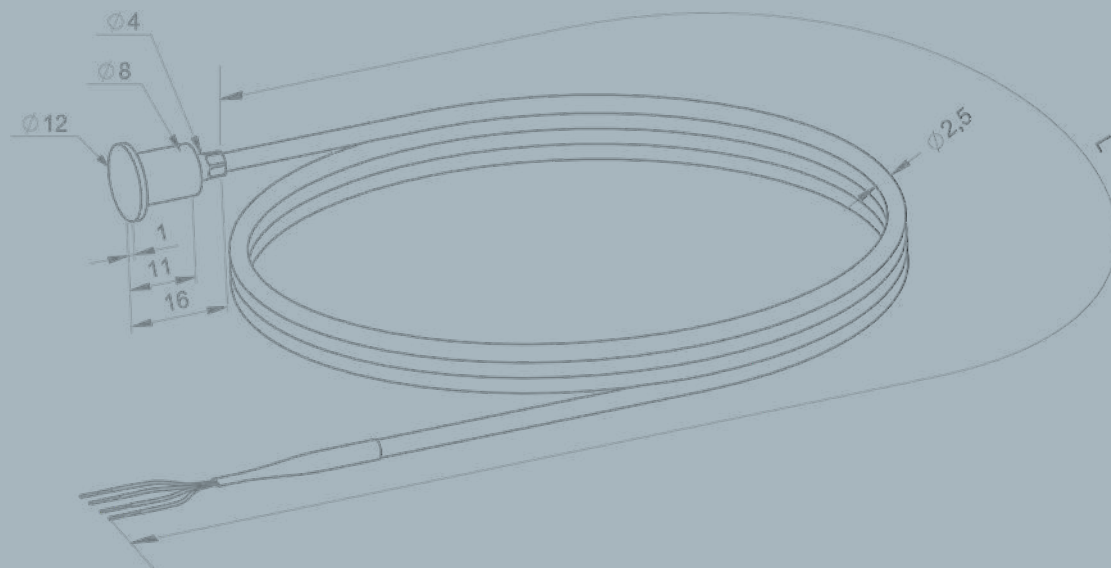
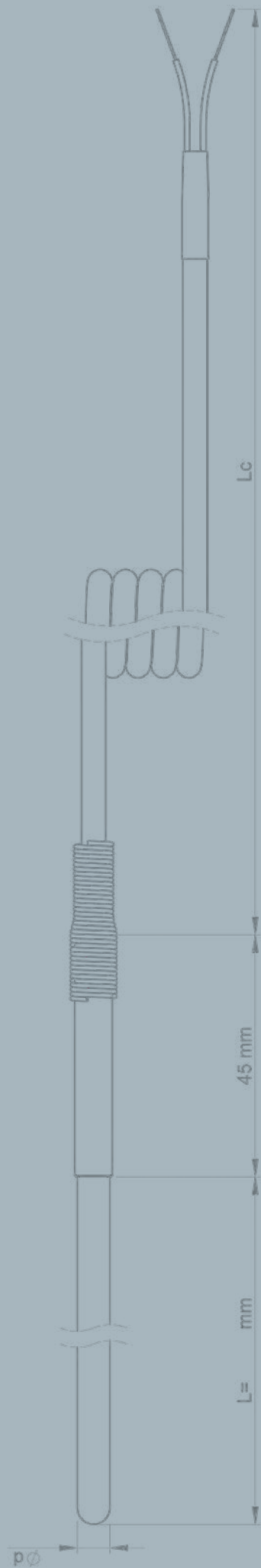
ADDITIONAL INFO

- 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

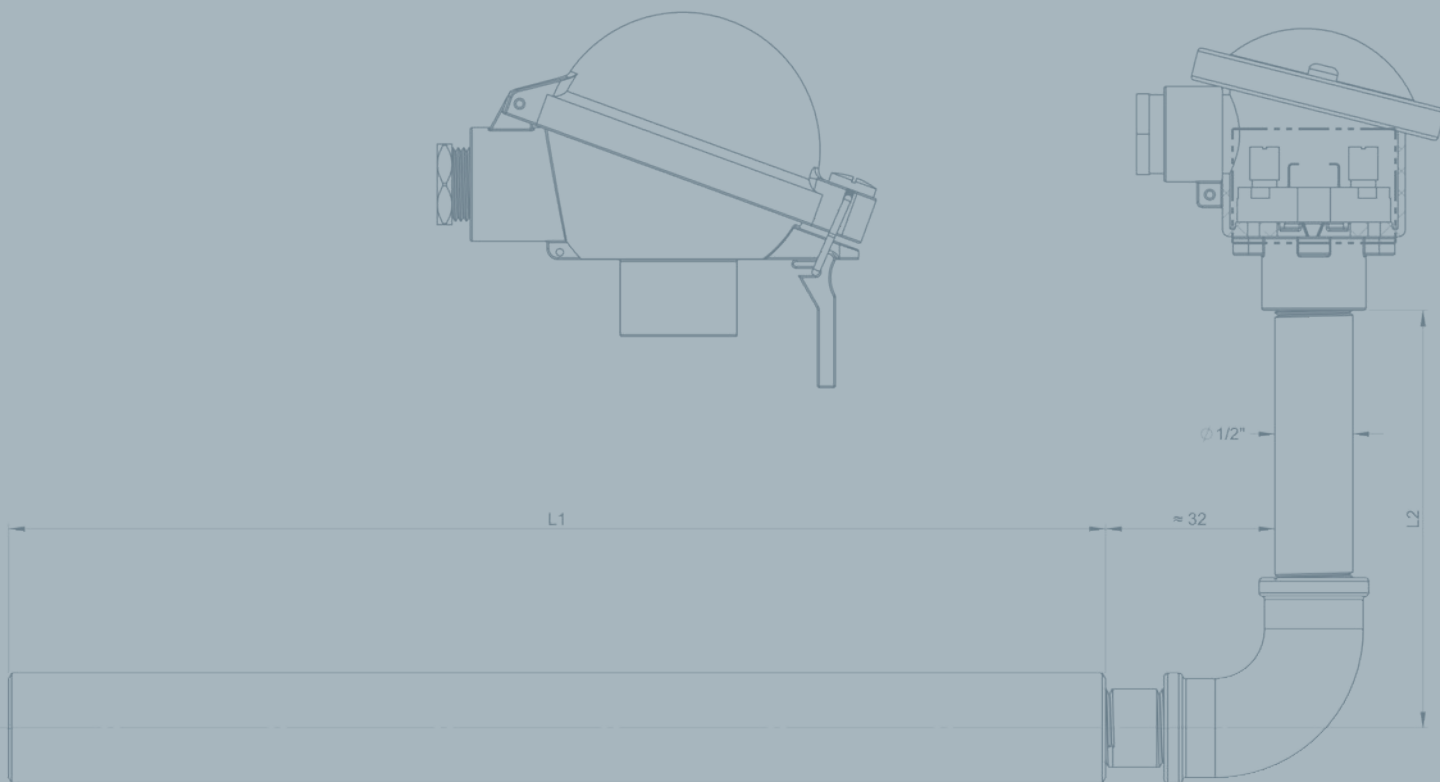
CONTENTS

C.A 1823 delivered with:

- 1 carrying bag
- 3 x 1.5V LR6 batteries
- 1 USB cable
- 1 measurement report



GLOSSARY



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 °F.

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: T_{90} . Unit: the Kelvin, symbol: K
- the practical international Celsius temperature: t_{90} .

Unit: degree Celsius, symbol: °C

These two temperatures are linked by the equation:

$$t_{90} = T_{90} - 273.16 \text{ K}$$

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):
 $R(t) = R_0 [1 + At + Bt^2 + Ct^3 (t-100)]$ from 0 °C to 850 °C

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

$$A = 3.9083 \times 10^{-3} \text{ °C}^{-1}$$

$$B = -5.775 \times 10^{-7} \text{ °C}^{-2}$$

$$C = -4.183 \times 10^{-12} \text{ °C}^{-3}$$

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 ($\Omega \cdot m$)

R = resistance measured (Ω)

S = conductor cross-section (m^2)

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: $^{\circ}C \cdot W^{-1}$

Self-heating coefficient: If a current of known intensity flows through a sensing element whose resistance is R , the power ($P = R \cdot I^2$) 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: $^{\circ}C \cdot W^{-1}$

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 (H_2S), 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: $\alpha \ 100 = (R_{100} - R_0) / 100 \times R_0$, where R_0 and R_{100} 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

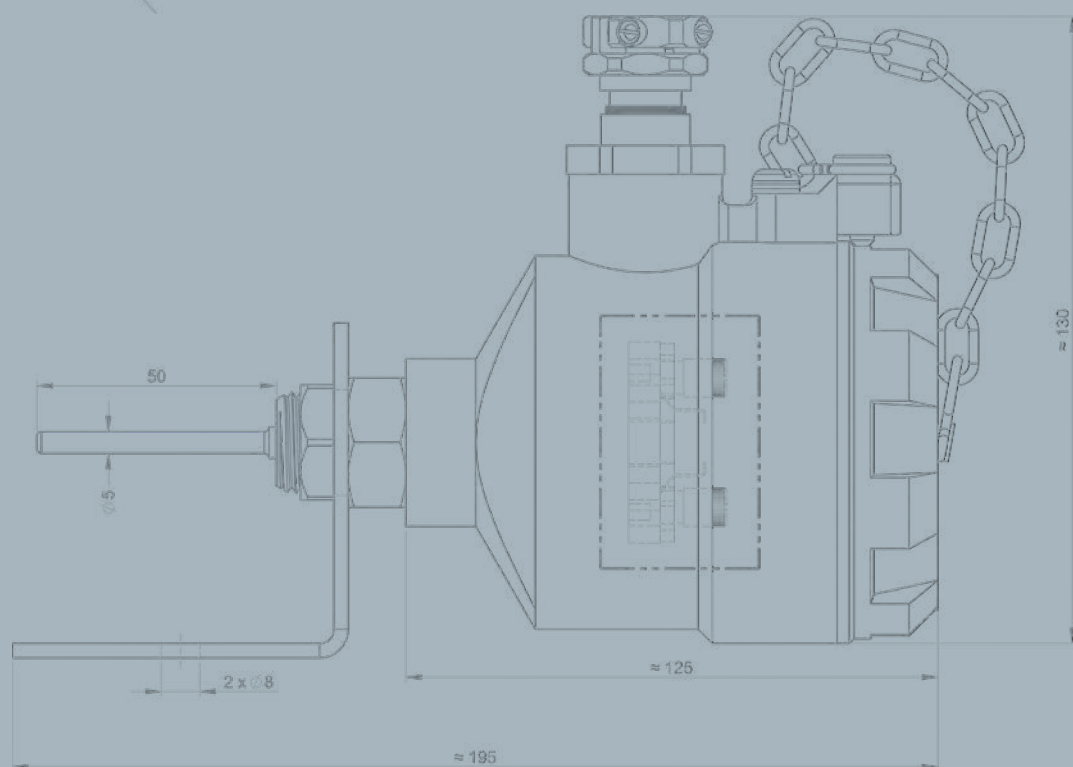
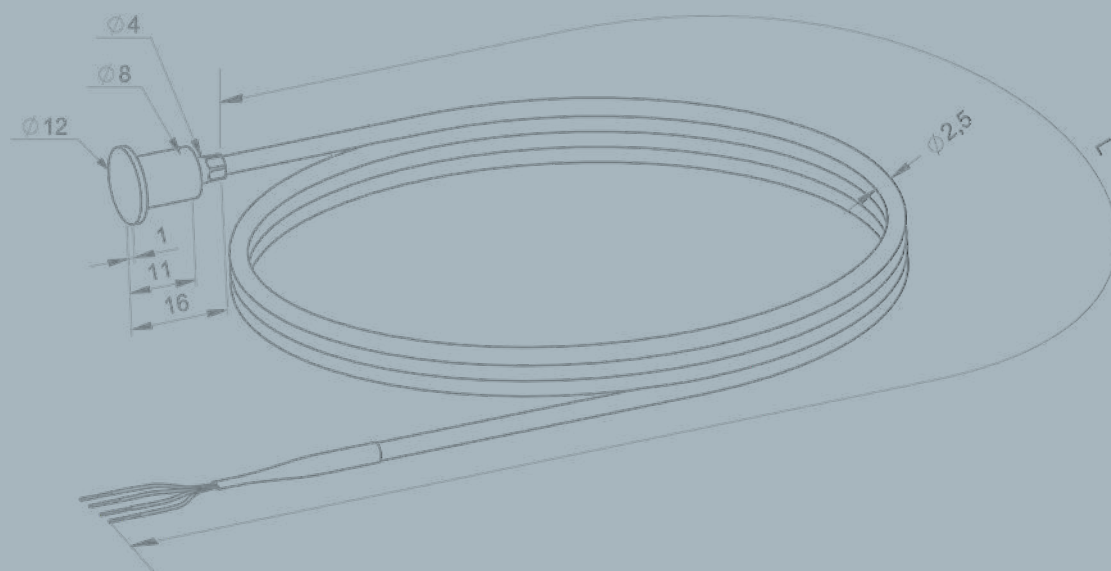
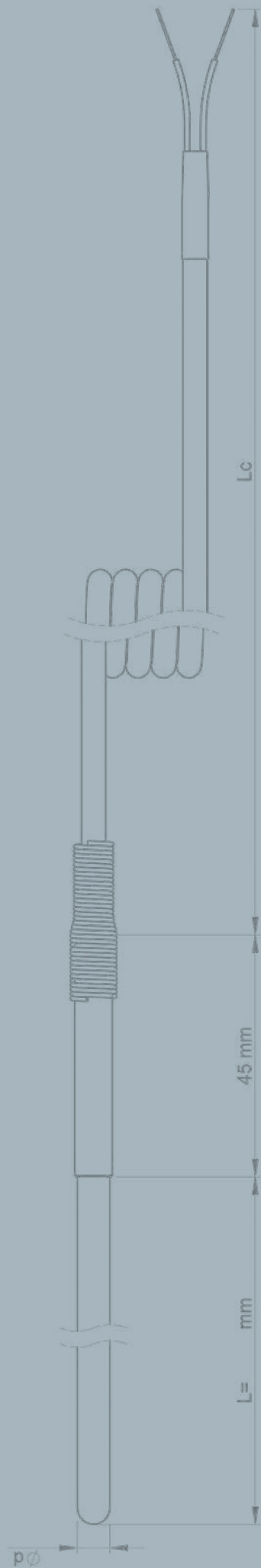
The time constant is the 63% measurement response time where the sensor reaction time is negligible.

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.

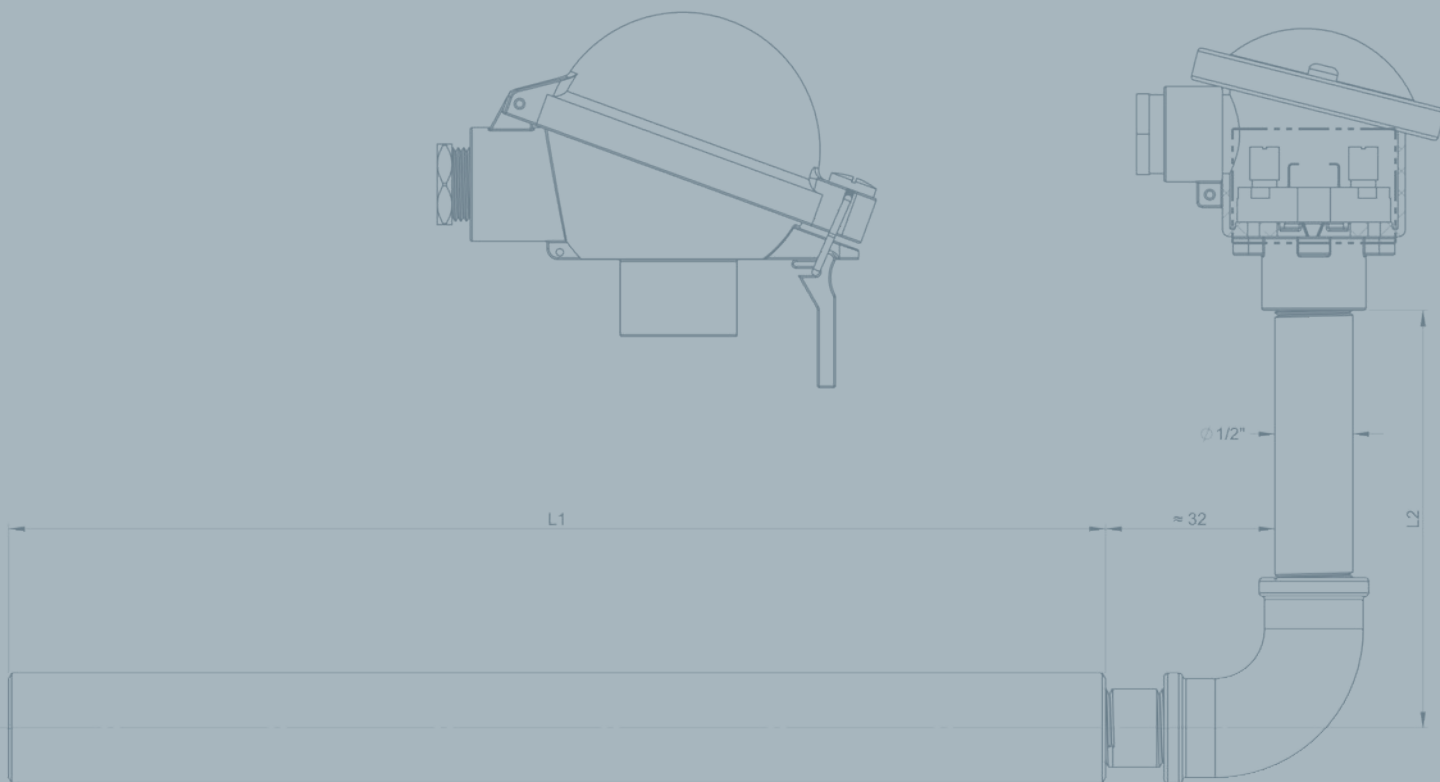
Transfer by convection: Convection is a heat transfer which occurs in fluids (and gases) in movement. Convection concerns the energy transfer due to particle-to-particle interaction in the moving fluid.

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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