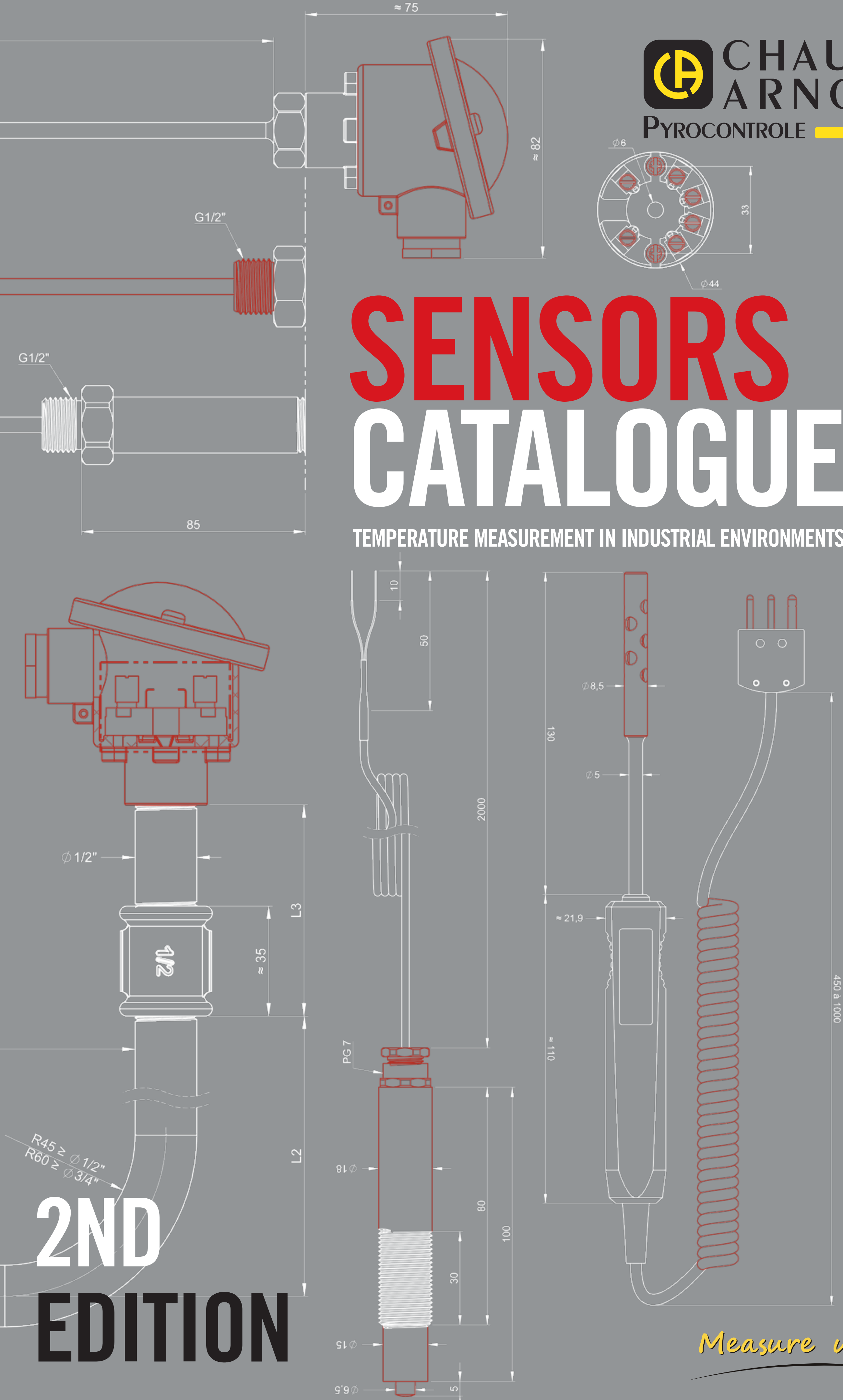
CHAUVIN ARNOUX
PYROCONTROLE

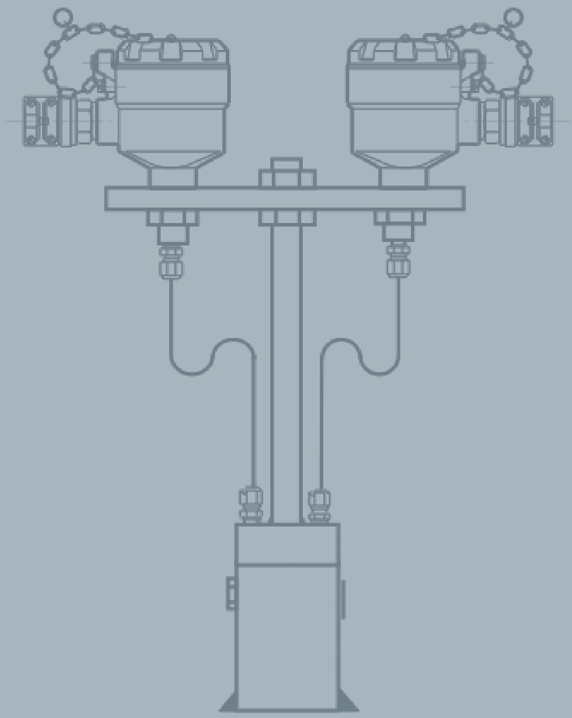
SENSORS CATALOGUE

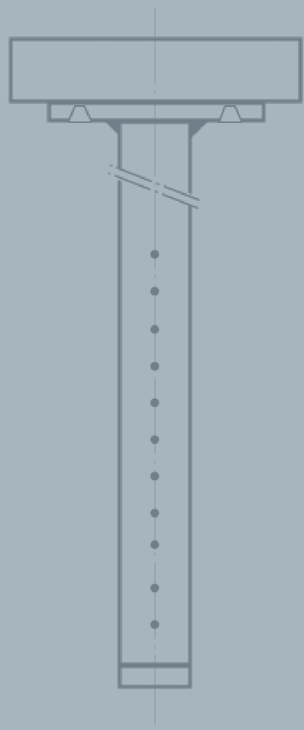
TEMPERATURE MEASUREMENT IN INDUSTRIAL ENVIRONMENTS

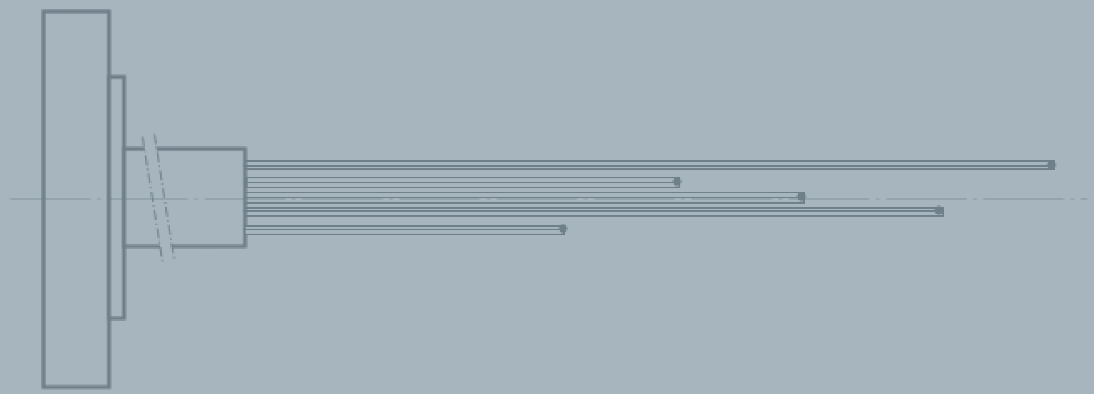


2ND EDITION

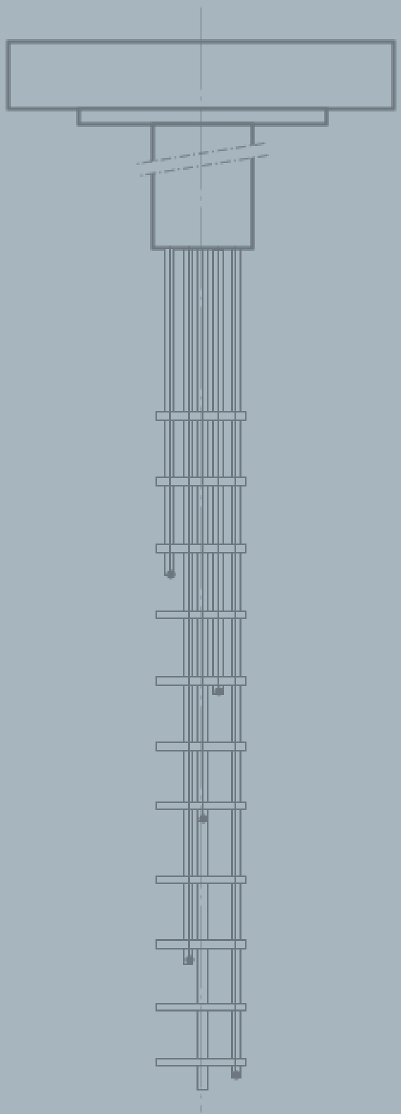
Measure up

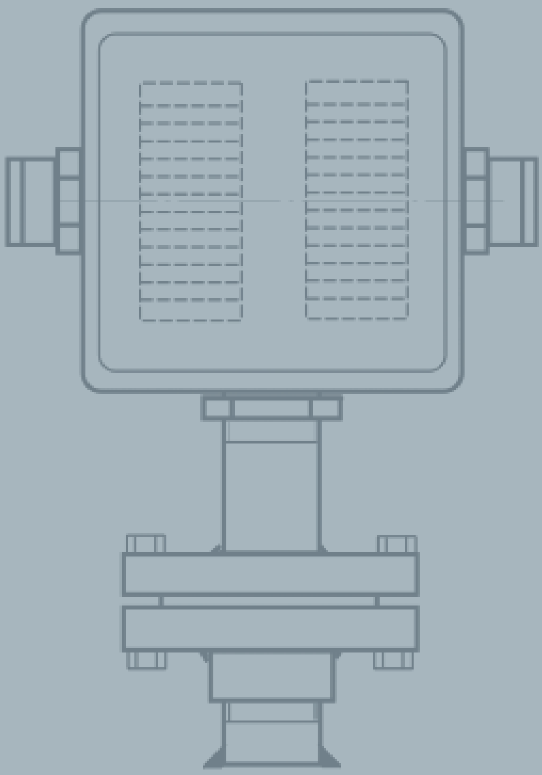




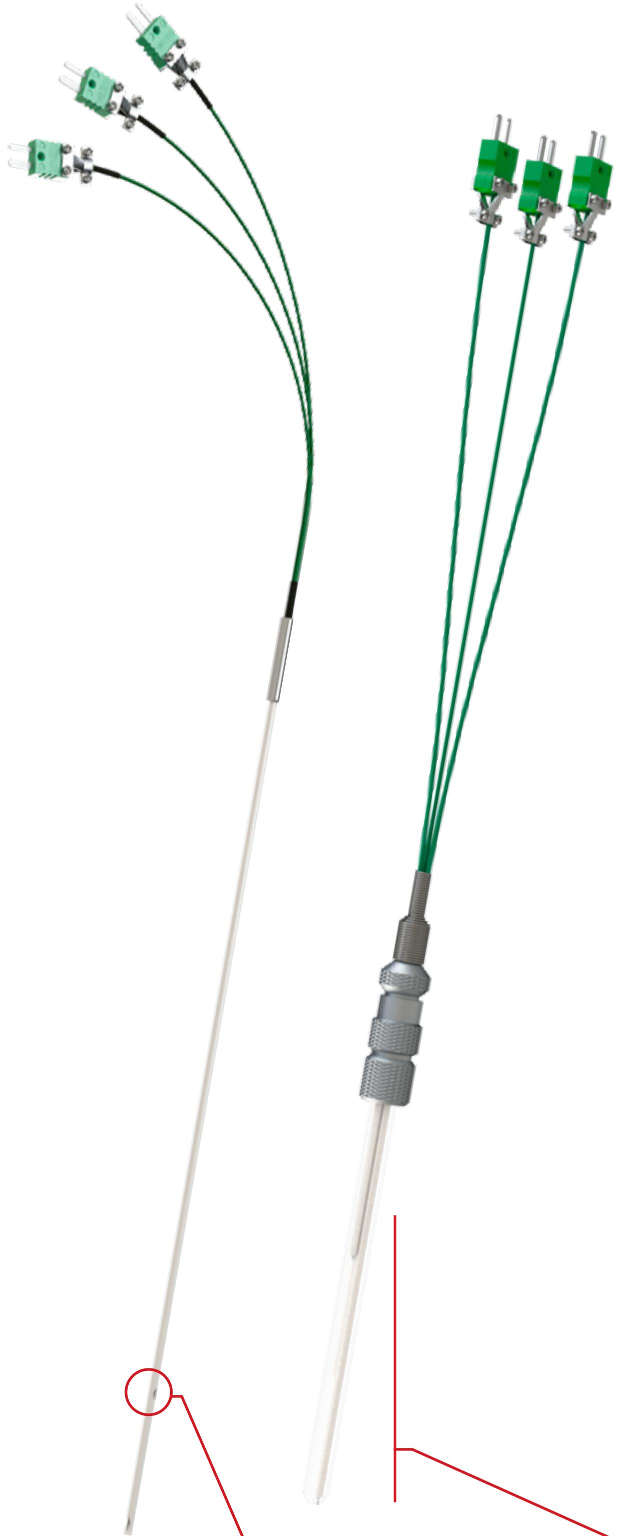


SENSORS FOR SPECIAL APPLICATIONS





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.

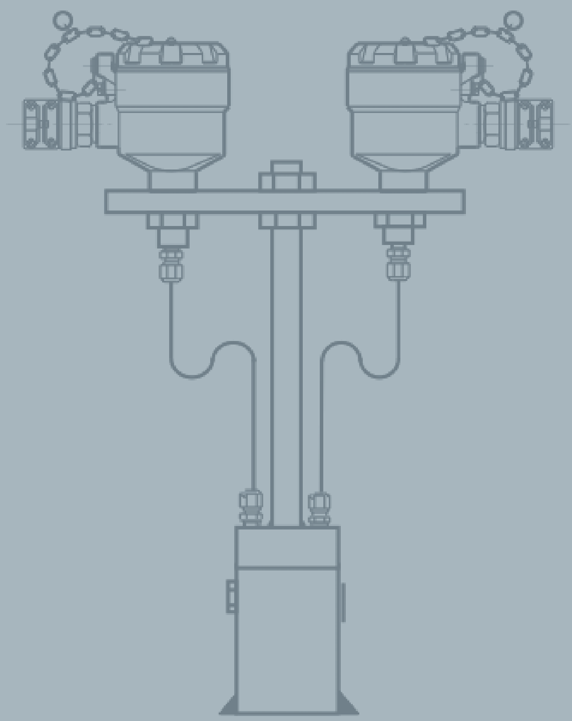
Photovoltaic cell manufacturing also requires the use of ovens with several zones in which the temperatures range from 600°C to 1,300°C.

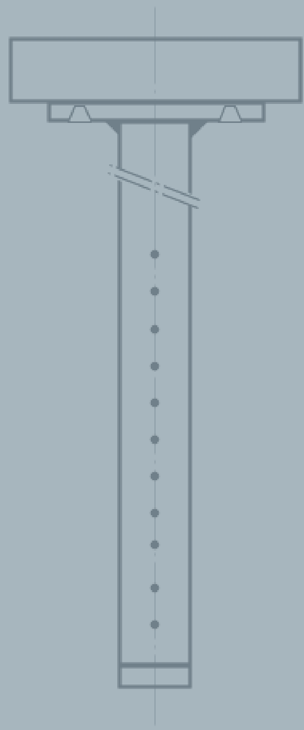
- For these applications, we develop and manufacture multipoint profile sensors and spikes.

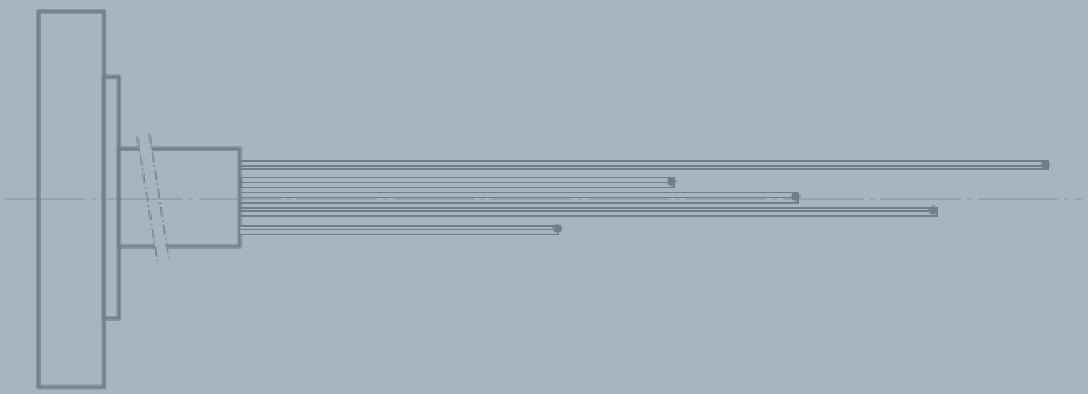
For profile sensors, we use a single ceramic sheath to insulate the TCs and an external quartz protective sheath. S, R or B thermocouples may be used. We can propose 2 to 6 thermocouples for a profile sensor. These sensors can be equipped with handles for easy, risk-free installation in the oven.

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

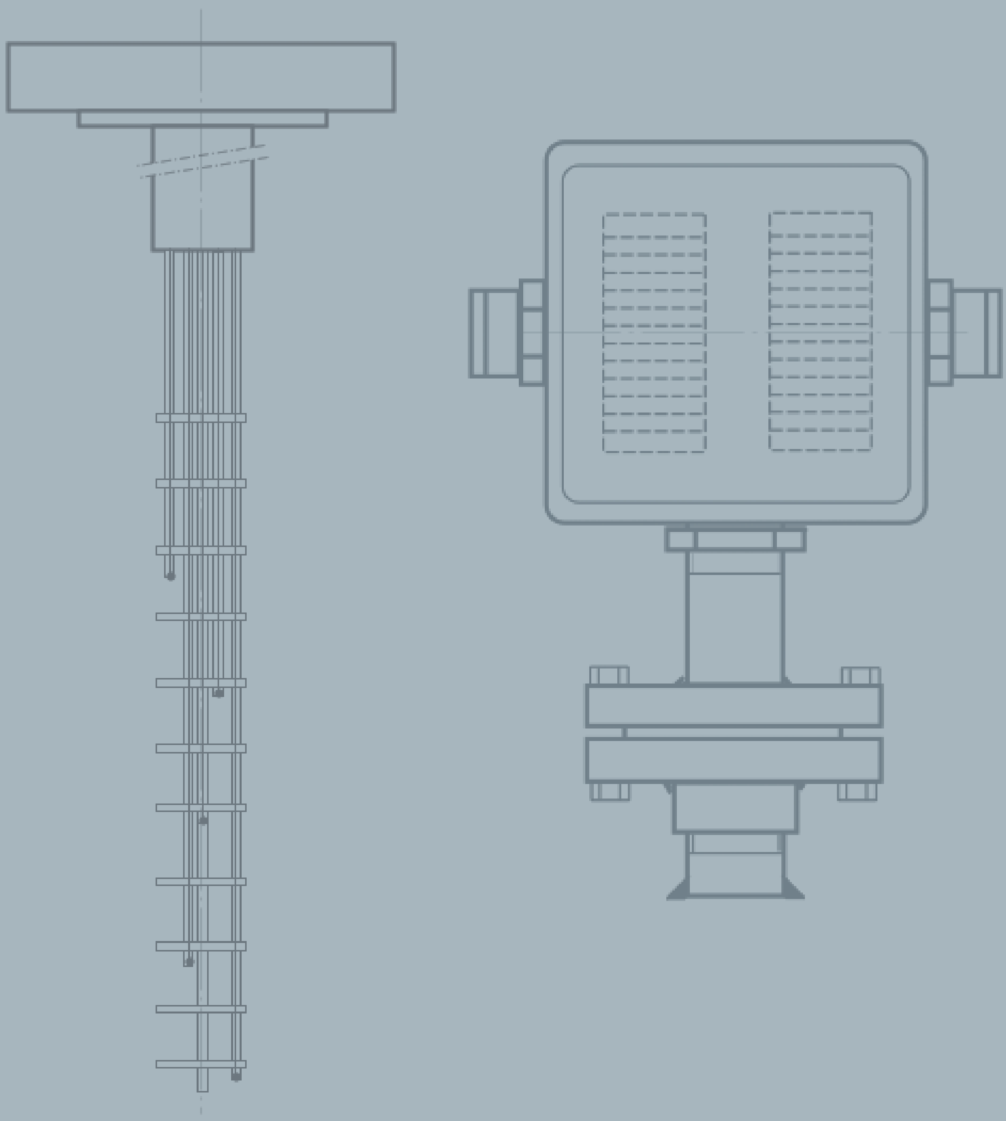
Numerous different versions can be produced, so please do not hesitate to ask us for a quotation.







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

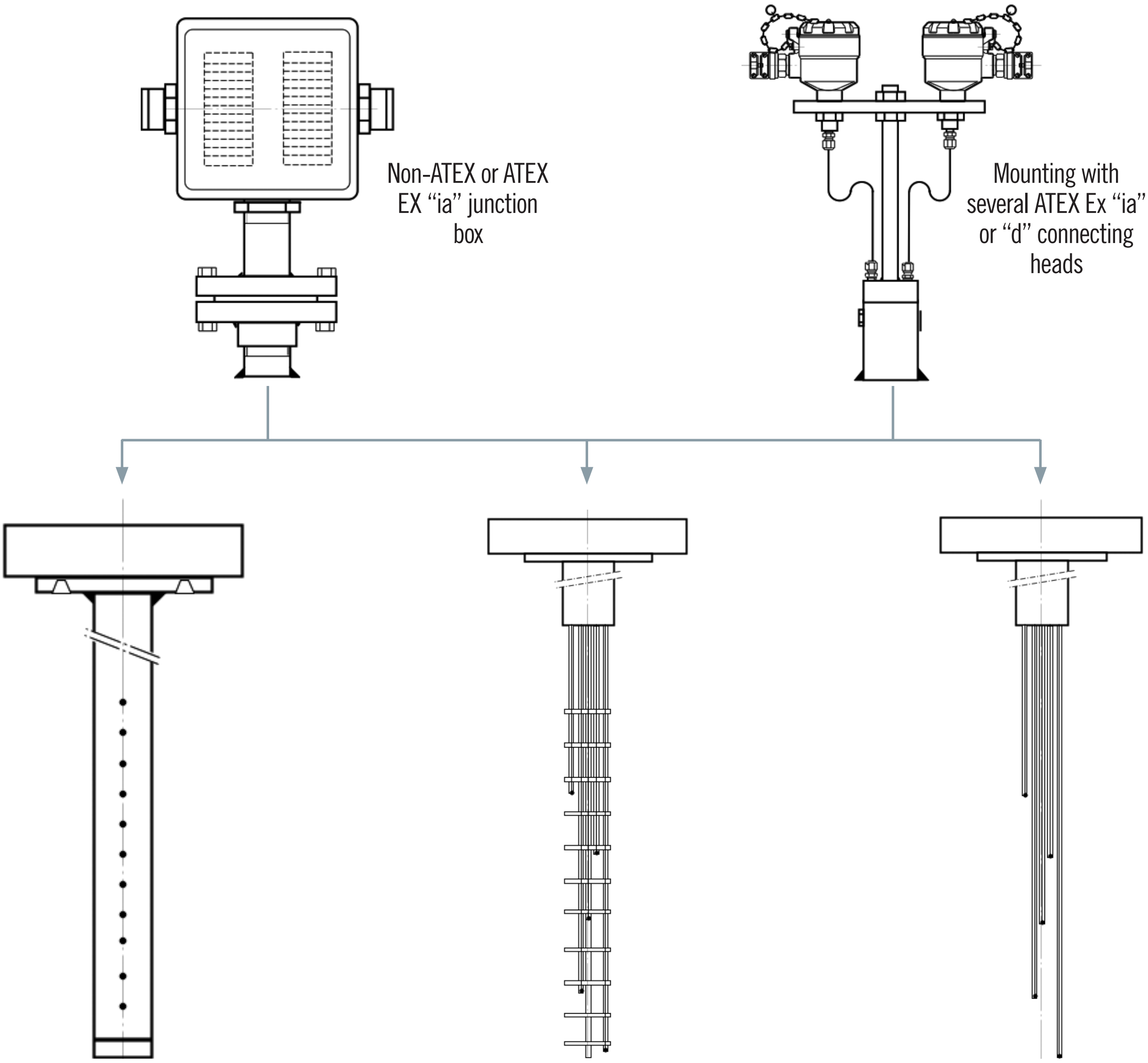
Our multipoint sensors are available in several configurations, depending on the customer's requirements. There may be from 3 to 40 measurement points depending on the sensor model.

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



Mounting with sensing elements on the same generator line in a tube

Mounting with straight sensing elements with cross braces to maintain them

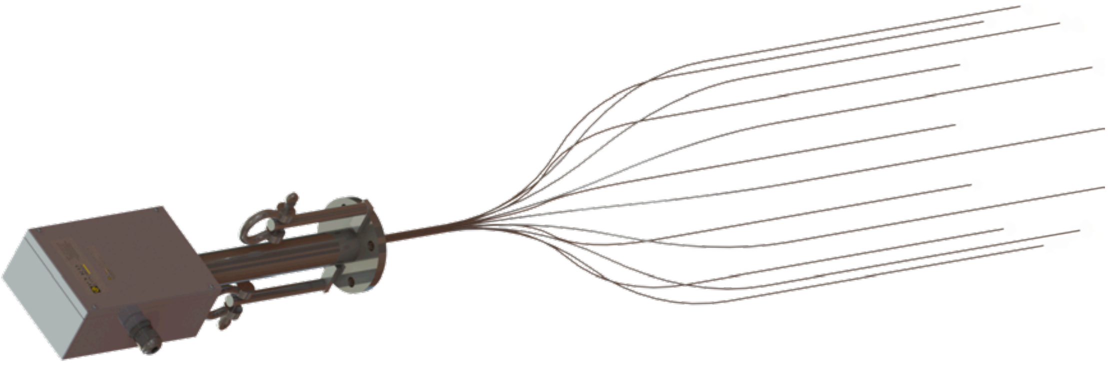
Mounting with unrestricted, bendable sensing elements

Non-contractual document - Please confirm specifications when ordering.

OUR STANDARDS

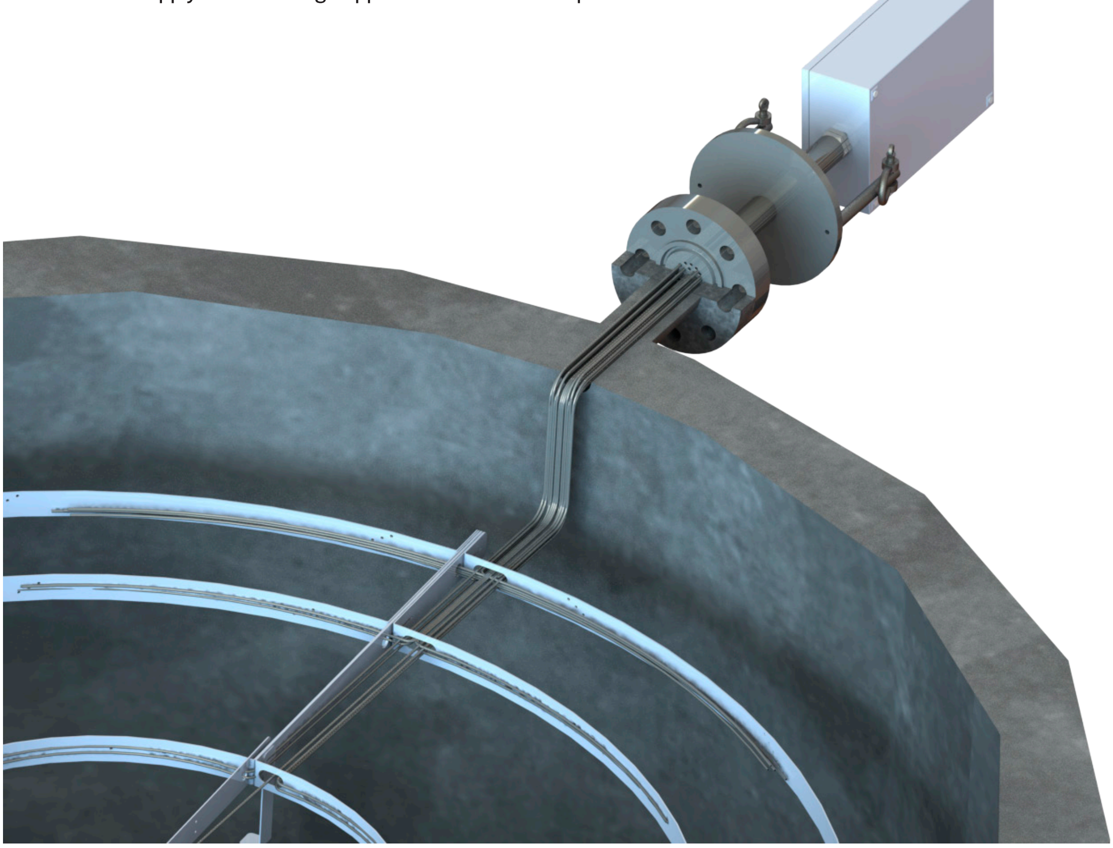
Temperature measurement assemblies with free, bendable elements:

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		

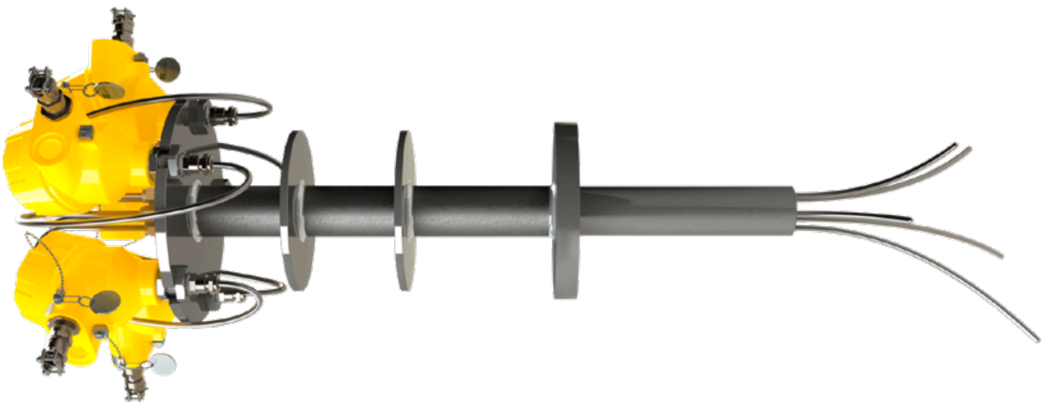


Model: PiGD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
4.5	4 to 30	20	600	550
6				
8				

Note: We can supply the mounting support for the thermocouples.



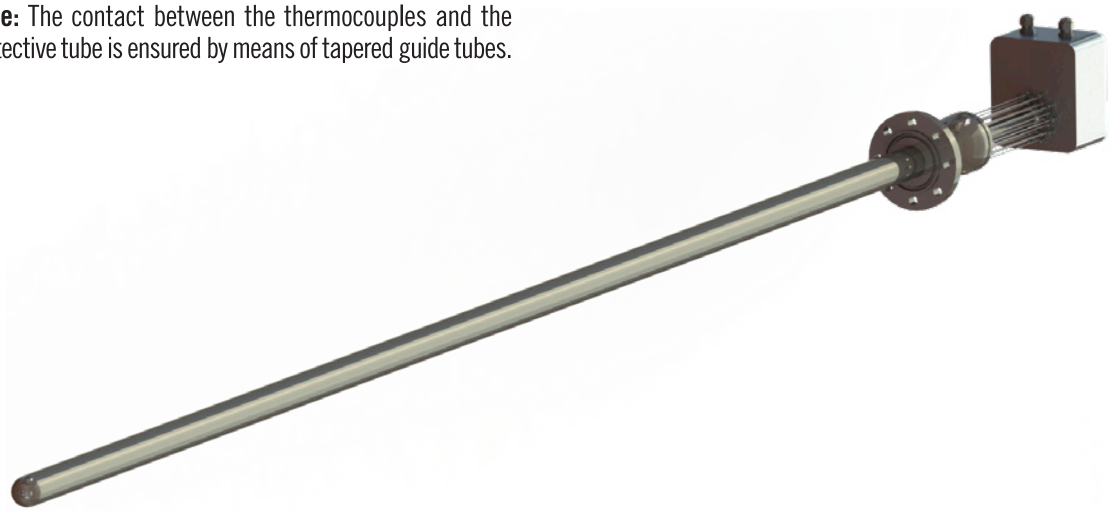
Model: PiTD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
4.5	5	30	600	450
6				
8				



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

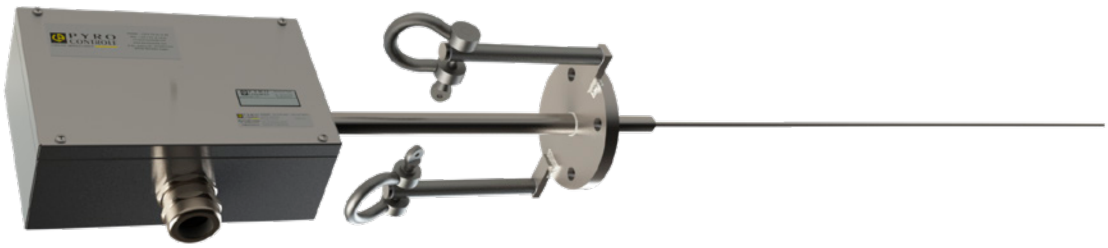
Note: The contact between the thermocouples and the protective tube is ensured by means of tapered guide tubes.



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				

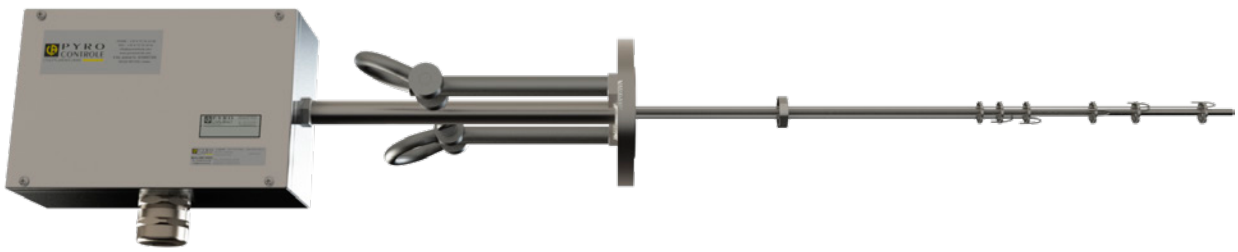
Note: Variant with cylindrical cover and compensation cable available.



Assemblies with positioning spacers:

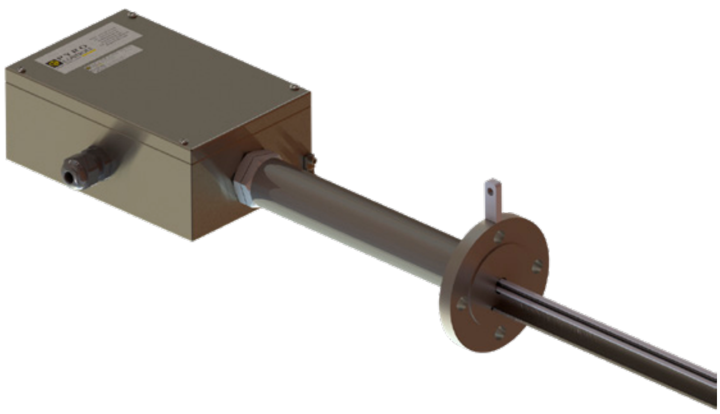
Model: EPPD				
Thermocouple diameter (mm)	Number of measuring points	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
2	4 to 12	10	700	550

Note: Variant with cylindrical cover and compensation cable available.

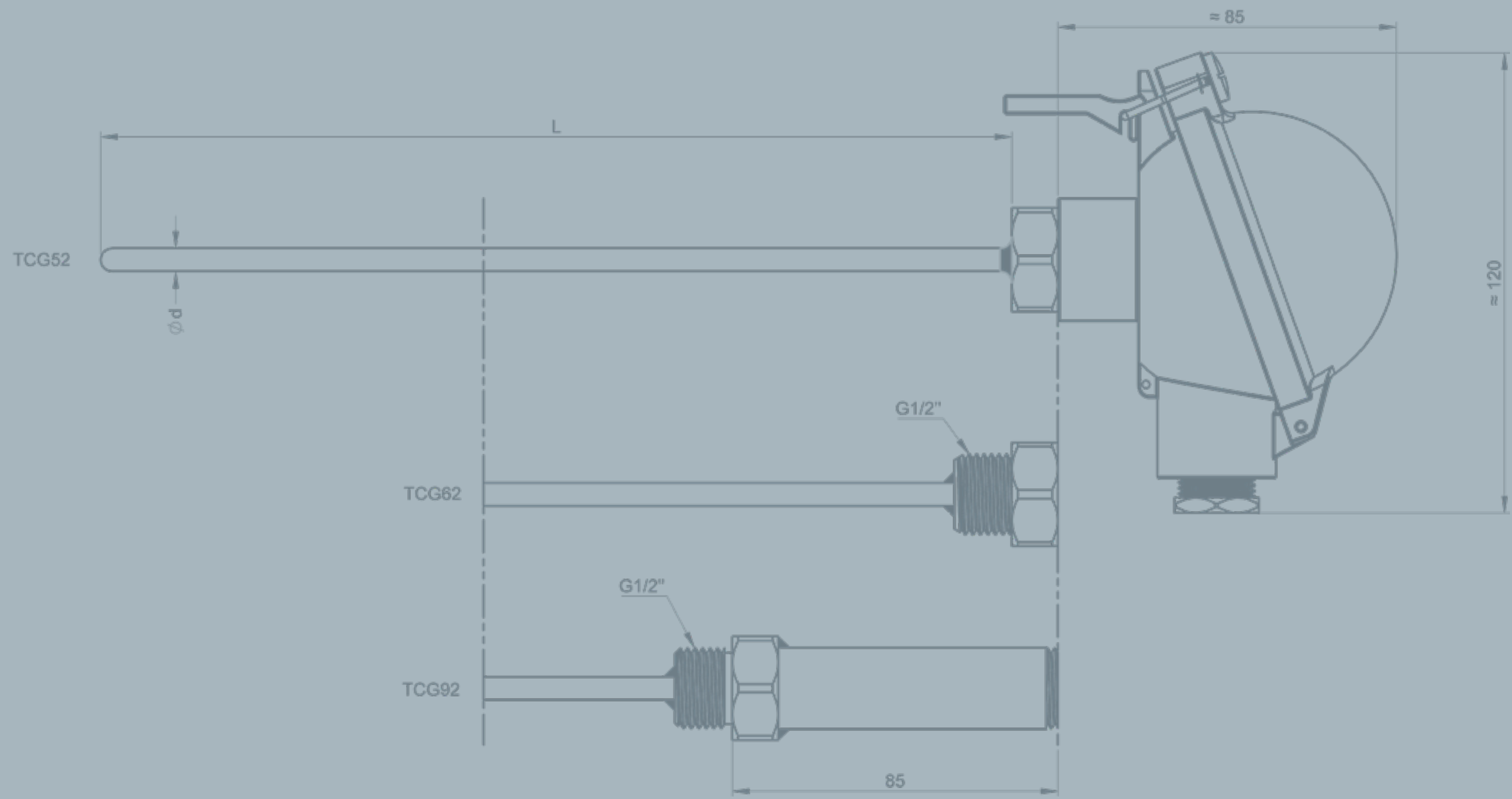


Teebar assemblies:

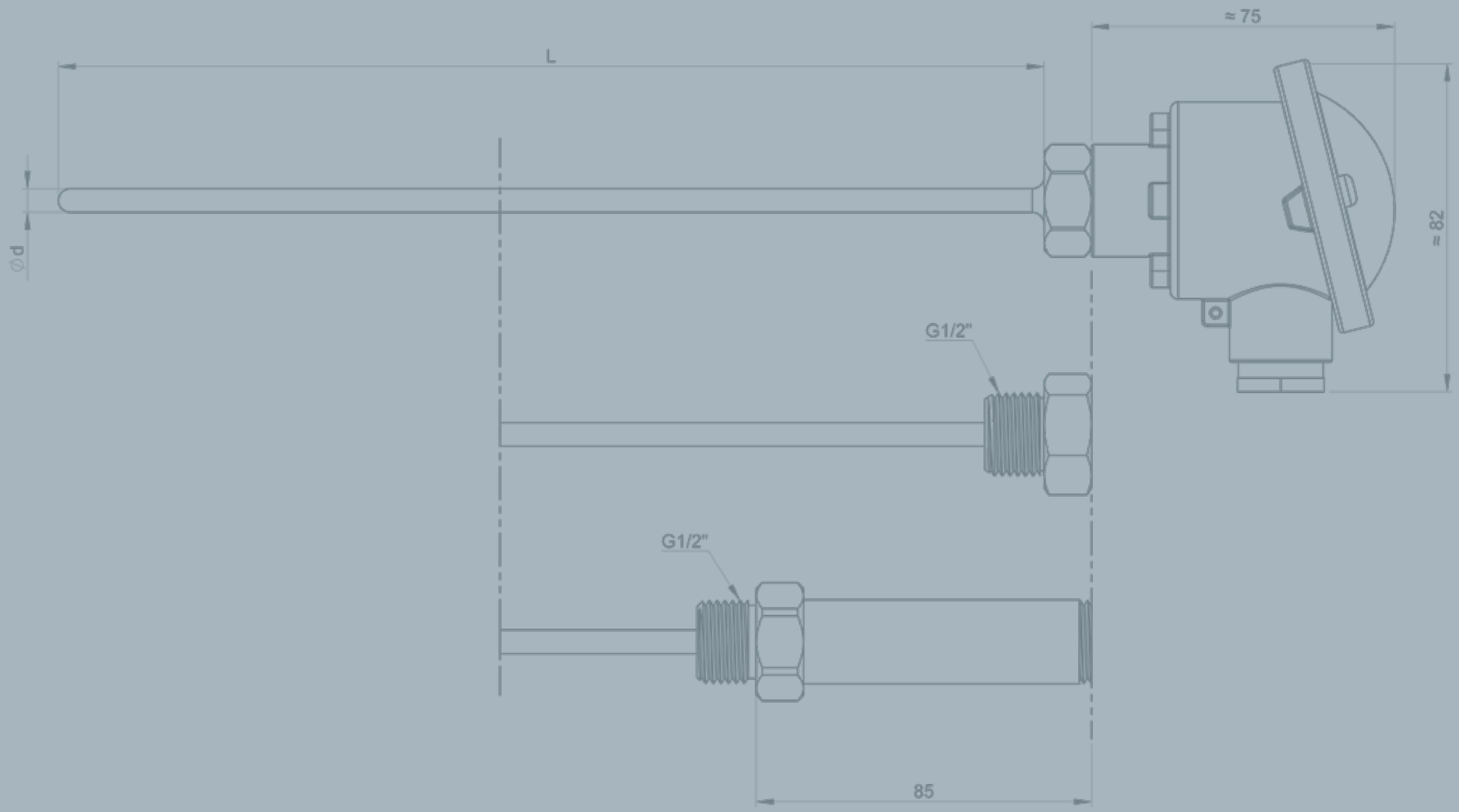
Model: TTPD					
Thermocouple diameter (mm)	Number of measuring points	Protective tube type (standard)	Max. length (m)	Max. temperature (C°)*	Max. pressure (b)*
3	3 to 5	Ø6 mm SS 316L	6	700	350



* 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

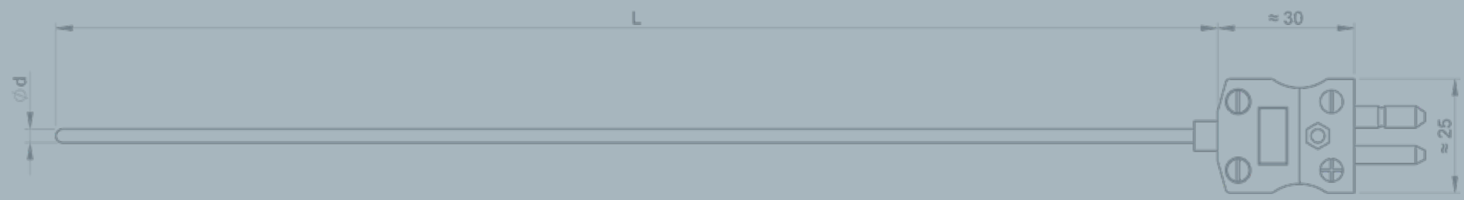
STRENGTHS

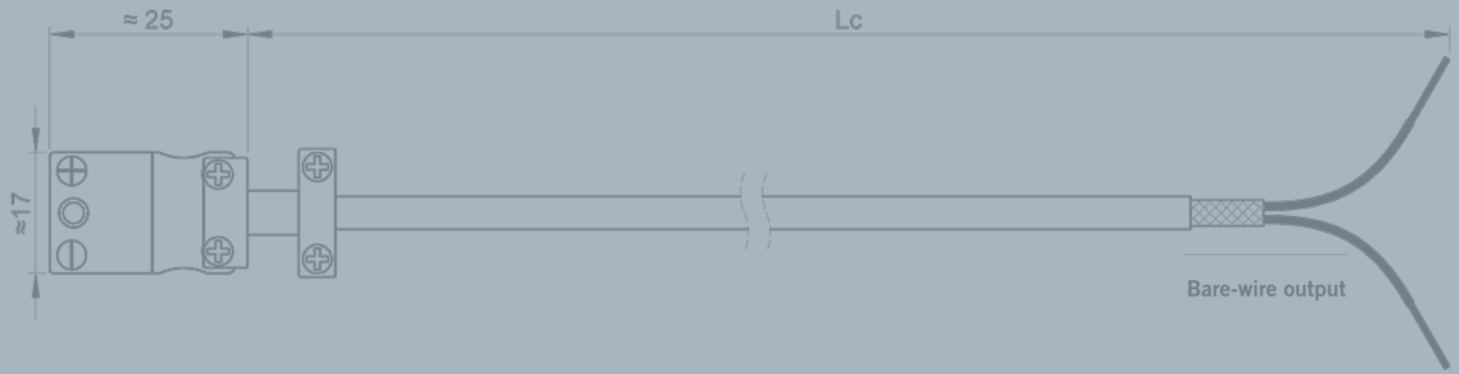
- Pressure range up to 4,700 bars
- Very short response time: less than one second
- Withstands shocks and vibrations
- ATEX/ IECEx-compliant
- Particularly compact: from 1.5 to 6 mm diameter

EXAMPLES

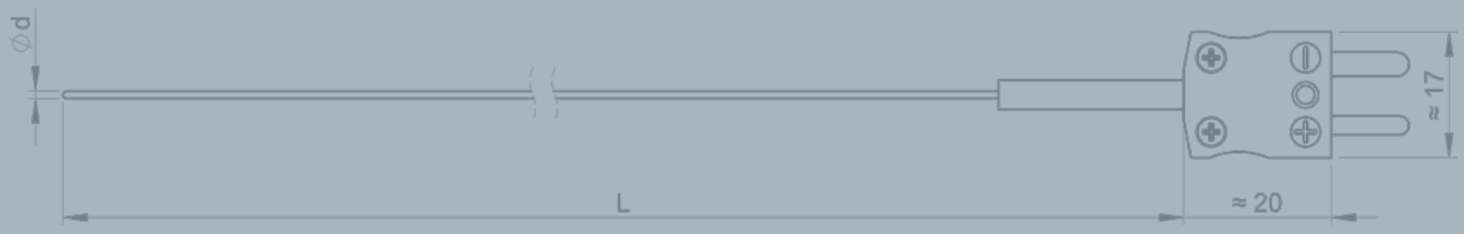
CONTACT US FOR OTHER REQUESTS

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





SENSORS COMPLIANT WITH AMS 2750



Ød
L
≈ 20
≈ 17

≈ 40
Lc
≈25
Bare-wire output

DESCRIPTION

Aerospace Material Specifications (AMS 2750) defines a certain number of rules concerning the thermal treatments of metals in the aerospace sector. As a specialist in pyrometric measurement, Pyrocontrole has a complete range of thermocouples compliant with the requirements of this standard.

Discover the various applications of these sensors installed in industrial furnaces.

Providing reliable, accurate measurements, **the thermocouple range** fulfils the four control functions required by the AMS 2750 standard for **heat-treatment furnaces in classes 1 to 6**. The higher the requirements of the furnace's class, the more the instruments need to be accurate.

SPECIFICATIONS

Furnace class	TUS (Temperature Uniformity Surveys)	Maximum SAT (System Accuracy Test) difference
	°C	°C
1	± 3	± 1.1
2	± 6	± 1.7
3	± 8	± 2.2
4	± 10	± 2.2
5	± 14	± 2.8
6	± 28	± 5.6

AMS 2750 THERMOCOUPLE APPLICATIONS

AMS 2750 thermocouples can be used for four applications.

- Sensors for ensuring temperature uniformity in the furnace (TUS - Temperature Uniformity Survey),
- Sensors for checking the accuracy of the reading (SAT -System Accuracy Test)
- Sensors for controlling and recording the process
- Sensors for monitoring the temperatures of the loads (sensors installed on the parts)
- The SAT/TUS tests must be performed by the customer with temperature sensors which operate independently from the instruments in the furnace.

AMS 2750 E REQUIREMENTS CONCERNING THERMOCOUPLE

- § 3.1.2.6.2: Thermocouple accuracy: ±1.1°C or 0.4 % of ITI; whichever is larger.
- § 3.1.2.6.3: maximum difference tolerated between the couples: ± 1.1° C

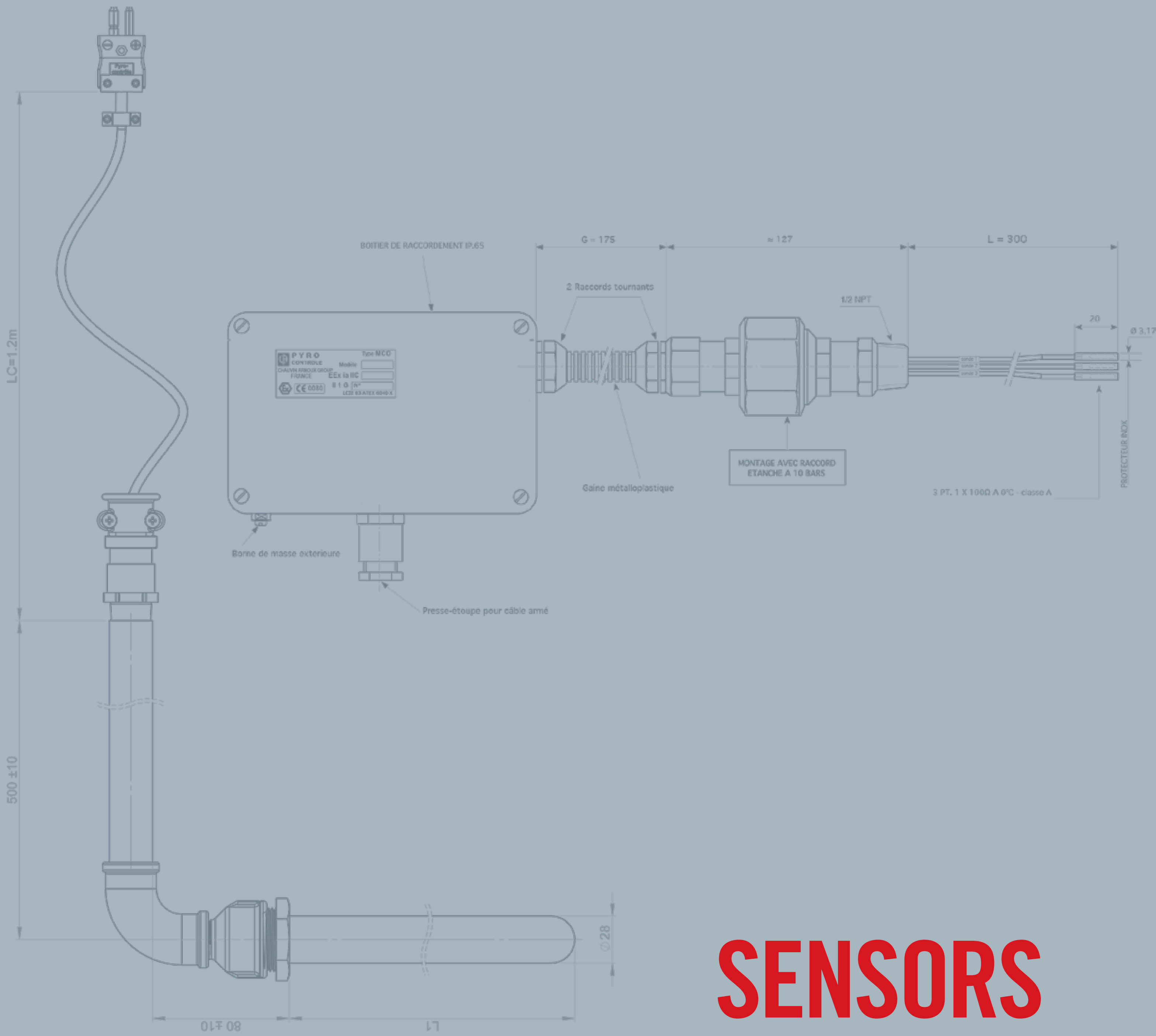
OUR CALIBRATION SERVICES

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

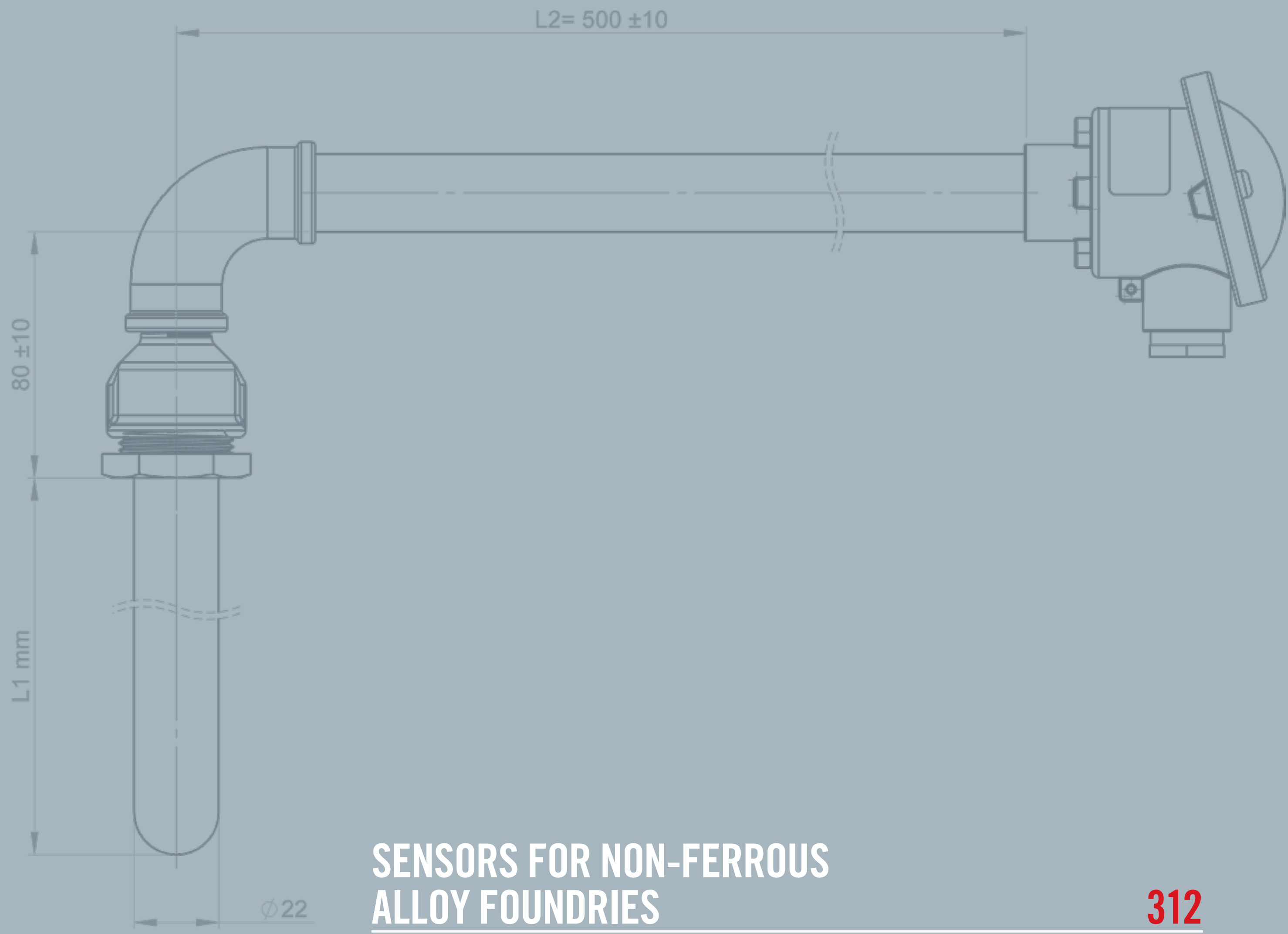
- Calibration of the beginning and end of the coil of sheathed cables used to manufacture the sensors.
- Calibration every 140°C across the sensor's operating range.
- See page 24

In addition, we can also perform calibration per batch to guarantee that the batch of sensors is homogeneous.

Certification of the AMS 2750E standard					PYROCONTROLE offering	
Application (AMS classification)		**Reference standard**	**Calibration frequency**	**Max. error**	**TC**	**Temperature range**
Reference standard (3.1.2 reference standard)		National ref. standard	Before 1st use + every 5 years	None	-	-
Primary standard (3.1.3 primary standard)		Reference standard	Before 1st use + every 3 years	± 0.6 or ± 0.001 x t	-	-
Secondary standard (3.1.4 secondary standard)		Reference standard or primary standard	Before 1st use + every year	± 1.1 or ± 0.004 x t	N	-40°C ≤ t ≤ 1000°C (2)
			Before 1st use + every 2 years	± 0.6 or ± 0.005 x t	B	600°C ≤ t ≤ 1700°C
Mapping (3.1.5 temperature uniformity survey)		Reference standard or primary standard	Before 1st use + every 3 months	± 2.2 or ± 0.0075 x t	J	375°C ≤ t ≤ 750°C
					N	-40°C ≤ t ≤ 1200°C
			Before 1st use - Prohibited afterwards		K	-40°C ≤ t ≤ 1200°C
			Before 1st use + every 6 months	± 1°C or ± 0.0025 x t	S / R	0°C ≤ t ≤ 1600°C
				± 1% or ± 0.005 x t	B	600°C ≤ t ≤ 1700°C
Measurement chain variations (3.1.6 system accuracy test)		Reference standard or primary standard	Before 1st use + every 3 months	± 1.1 or ± 0.004 x t	N	-40°C ≤ t ≤ 1000°C (2)
			Before 1st use - Prohibited afterwards		K	-40°C ≤ t ≤ 1000°C
			Before 1st use + every 6 months	± 1 or ± 0.005 x t	B	600°C ≤ t ≤ 1700°C
Process (3.1.7 control, recording and monitoring)	Furnace class 1 and 2	Reference standard or primary standard	Before 1st use	± 1.1 or ± 0.004 x t	K / N	-40°C ≤ t ≤ 1000°C
					S / R	0°C ≤ t ≤ 1600°C
					B	600°C ≤ t ≤ 1700°C
	Furnace class 3 to 6		Before 1st use	± 2.2 or ± 0.0075 x t	J	375°C ≤ t ≤ 750°C
					K / N	-40°C ≤ t ≤ 1200°C
					S / R	0°C ≤ t ≤ 1600°C
					B	600°C ≤ t ≤ 1700°C
Load (3.1.8 load)		Reference standard or primary standard	Before 1st use - Prohibited afterwards	± 2.2 or ± 0.0075 x t	J	375°C ≤ t ≤ 750°C
					K/N	-40°C ≤ t ≤ 1000°C
			Before 1st use + every 6 months		S / R	0°C ≤ t ≤ 1600°C
					B	600°C ≤ t ≤ 1700°C



SENSORS FOR MISCELLANEOUS APPLICATIONS


L2= 500 ±10
80 ±10
L1 mm
∅22

LK SENSOR
THERMOCOUPLE

IP 54 | CLASS 1 | IEC 584-1 | up to 800°C

DESCRIPTION

Sensors for non-ferrous alloy foundries. Due to its excellent mechanical properties, the silicon nitride sheath offers very good resistance to breakage and abrasion.

SPECIFICATIONS

Model		LK
Compliance with standards		IEC 584-1
Type		K
Class		1
Sheathed thermocouple diameter (mm)		4.5
Thermocouple		Single
Operating temperature (°C)		800°C
Length L1 Min/Max (mm)		360 to 1160 mm
Length L2 Min/Max (mm)		500 mm
Support tube		Diameter 21.3 mm
Protective tube	Material	Silicon nitride Si3N4
	Diameter	22 mm
Output	Head type	DIN B
	Material	Light alloy
	Output	1 cable gland M20x1.5
	Cable diam.	5.5 to 7.5 mm
	Equipment	Ceramic terminal strip
	IP	IP54
Accessories		Extension cables, compensation cables

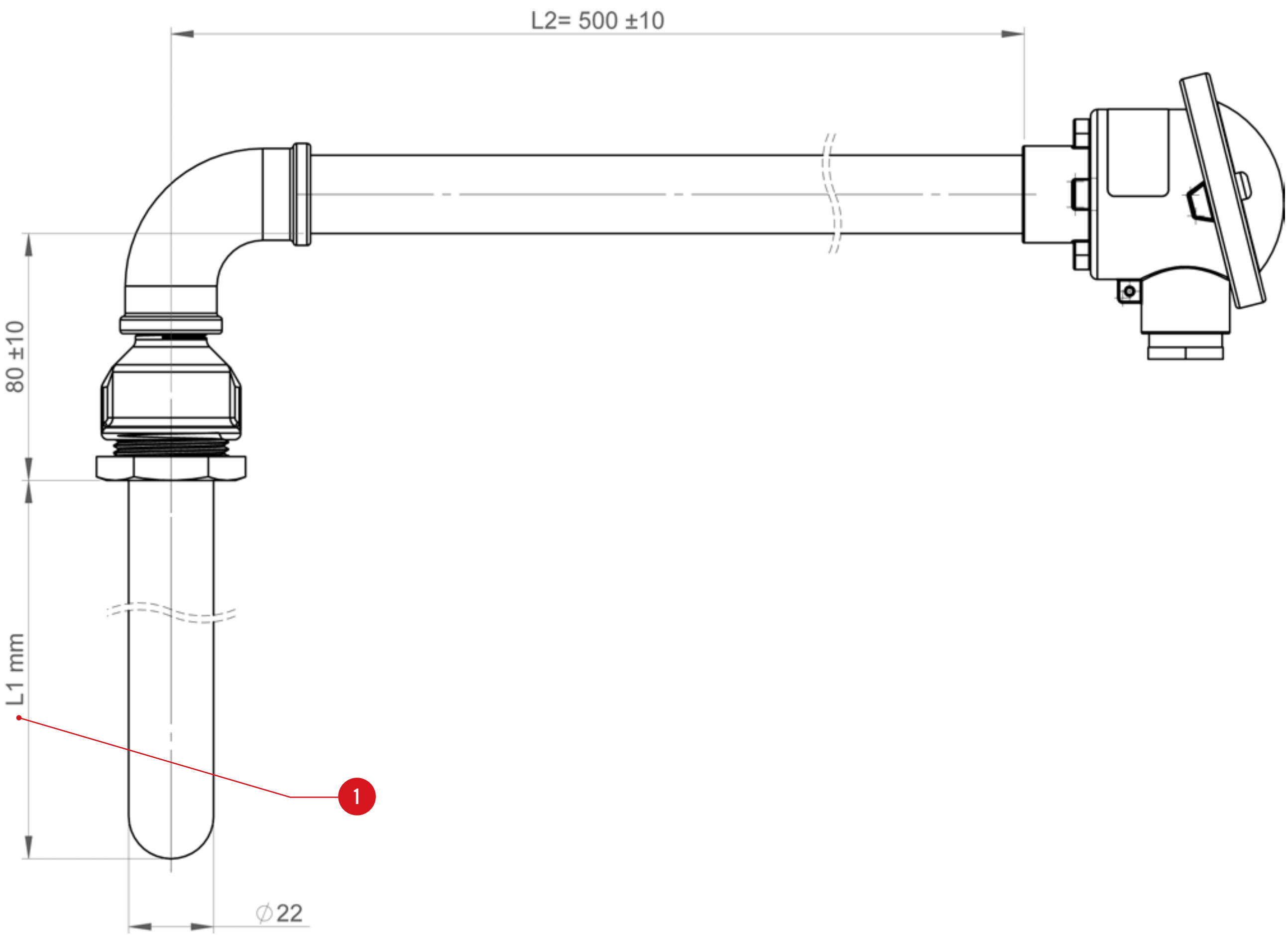
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		LENGTH L1 (mm)
LK	-	560
Reference in table and diagram		1
Possible choice		360 460 560 660 1060 1160

DIAGRAM (MM)

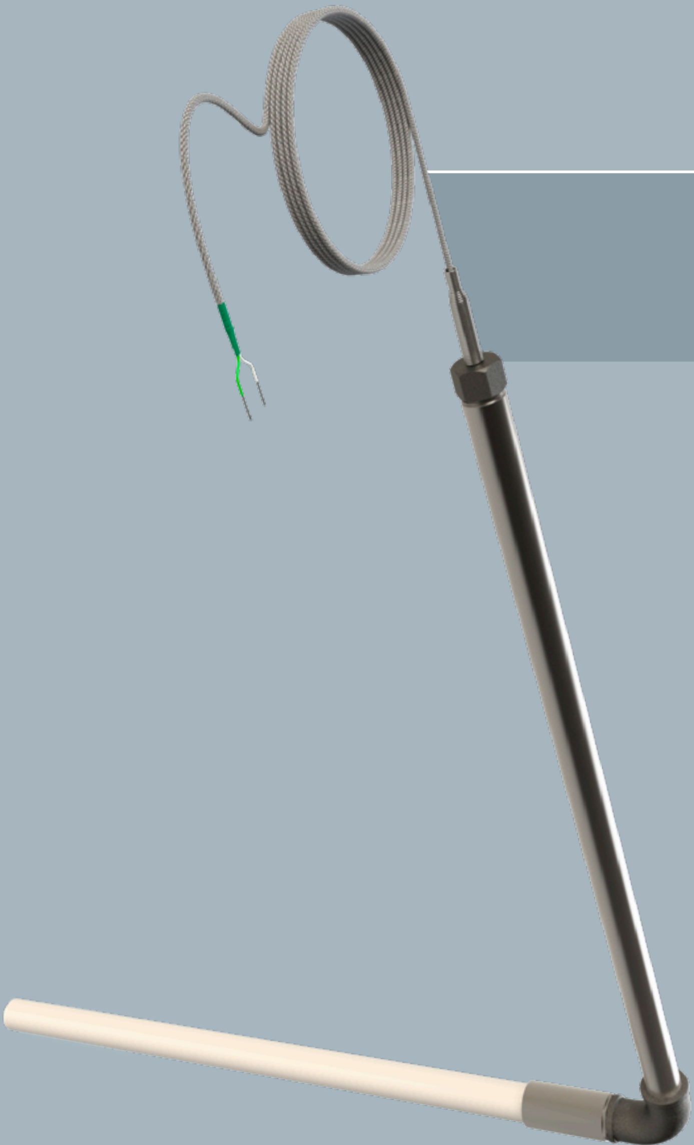


THERMOCOUPLE INFORMATION

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

PYROJET

THERMOCOUPLE



CLASS 1 | IEC 584-1 | CABLE OUTPUT | up to 800°C

DESCRIPTION

Sensors for non-ferrous alloy foundries. Due to its excellent mechanical properties, the silicon nitride sheath offers very good resistance to breakage and abrasion.

SPECIFICATIONS

Model		PYROJET
Compliance with standards		IEC 584-1
Type		K
Class		1
Sheathed thermocouple diameter (mm)		4.5
Thermocouple		Single
Operating temperature (°C)		800°C
Length L1 Min/Max (mm)		460 and 900 mm
Length L2 Min/Max (mm)		500 mm
Support tube		Diameter 21.3 mm
Protective tube	Material	Silicon nitride Si3N4
	Diameter	28 mm
Output	Cable	flexible extension under metal braid
	Length (mm)	1200
	Dimensions	4X6
	Operating temperature	250°C
	Connector	male compensated with cable clamp

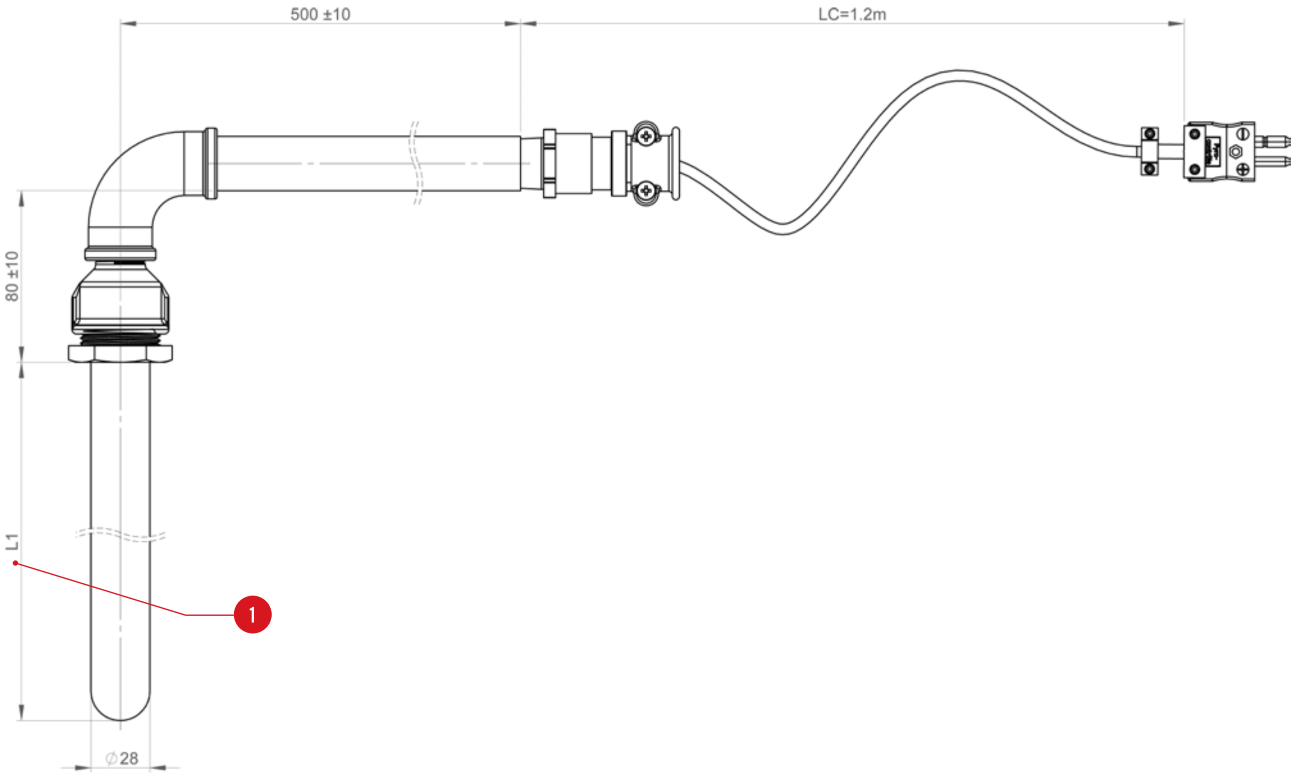
DESIGN YOUR SENSOR

CONFIGURATOR CODE

Parameters to be indicated when ordering. Example:

MODEL		LENGTH L1 (mm)
Pyrojet	-	900
Reference in table and diagram		1
Possible choice		460 900

DIAGRAM (MM)



THERMOCOUPLE INFORMATION

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

ASPIRATED SENSORS

These sensors are designed to measure the temperature of gaseous environments, and particularly flames and fumes.

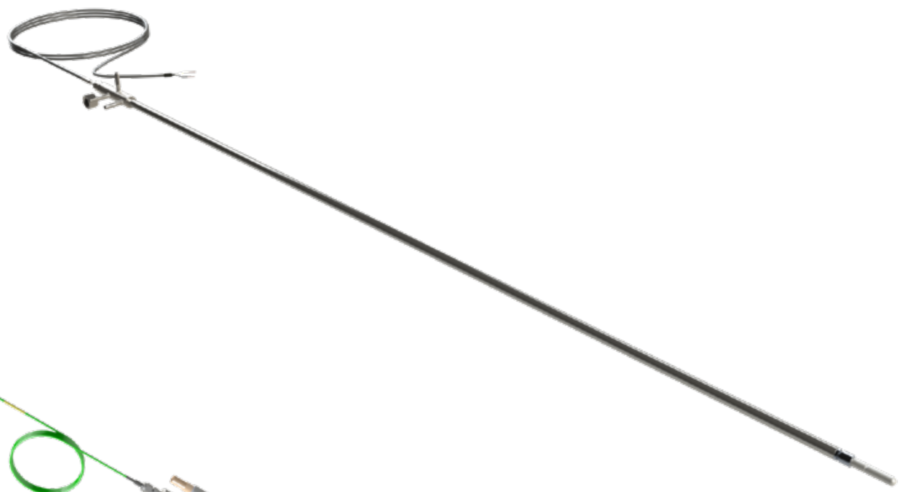
The temperature indicated by a thermocouple plunged into a gas is usually different from the gas's actual temperature. This indication is rendered false at the thermocouple's hot junction by:

- Poor heat exchange between the gas and the thermocouple,
- Losses through radiation due to heat exchange between the hot junction and the surrounding environment,
- Thermal conductivity along the thermocouple wires.

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

- Encourage heat exchange by convection between the thermocouple and the gas. To achieve this, the speed of the gas must be increased at the level of the hot junction. The principle is therefore to aspirate part of the gas to be measured around the thermocouple.
- Reduce the various losses and, above all, the losses due to radiation from the hot junction.

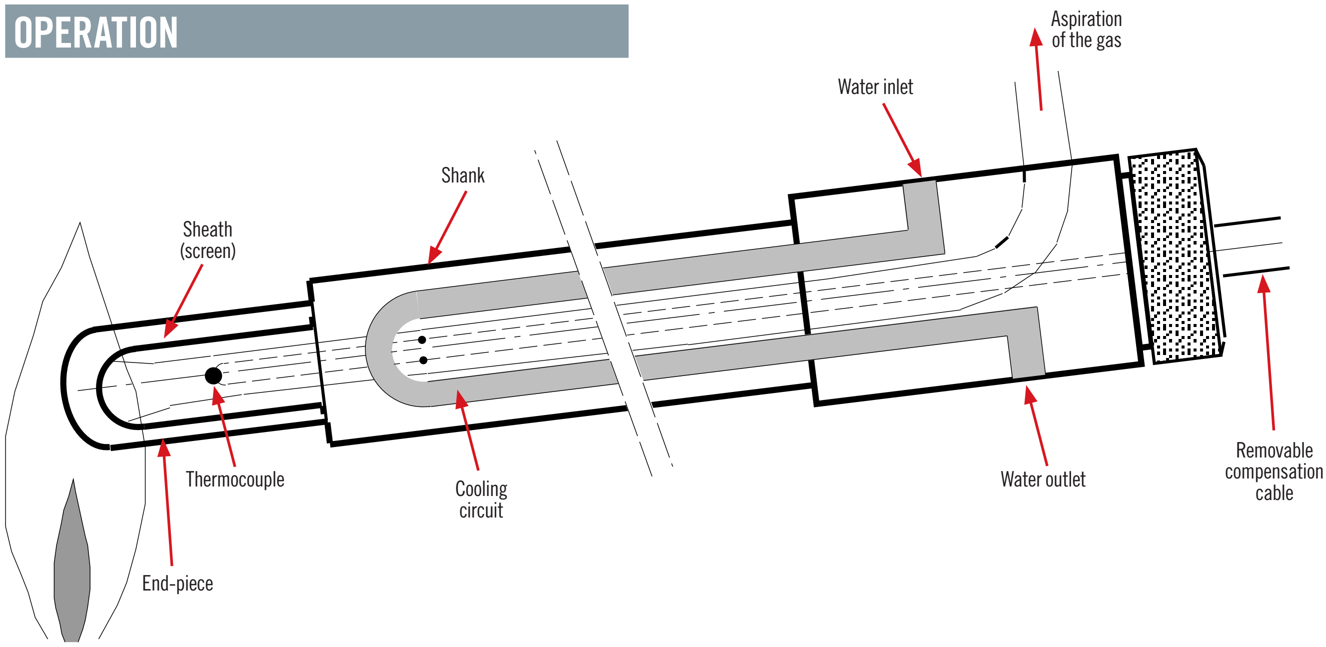
The use of aspirated sensors requires prior experimental determination of an efficiency coefficient specific to the instrument and depending on the speed of aspiration.



MINIATURE ASPIRATED SENSOR

INDUSTRIAL ASPIRATED SENSOR

OPERATION



The flame or fumes are aspirated into the sensor by means of a pump. This aspiration facilitates heat exchange by convection between the thermocouple and the gas. A thermocouple measures the temperature at the hot spot. The efficiency coefficient is determined "in situ". It enables you to calculate the actual temperature of the gas sampled by correcting the influence of the nominal aspiration chosen.

Heat loss by radiation from the hot junction is reduced by one or more sheaths placed inside the sensor's end-piece.

THE SHANK

This contains the aspiration and cooling circuit, the systems for connecting and fastening the sensing element and the fastening elements for the end-piece.

THE END-PIECE

Its role is mainly to reduce losses due to radiation. The gas required for the measurement is aspirated via an orifice located at the tip of the end-piece. The end-piece is simple to remove.

EXPERIMENTAL DETERMINATION OF THE EFFICIENCY COEFFICIENT "E%"

NOTATION

- **F**: Form factor calculated on the basis of a "static" temperature reading
- **F'**: Form factor calculated on the basis of a "dynamic" temperature reading
- **To**: Temperature reading with zero aspiration
- **Tn**: Temperature reading with nominal aspiration
- **T 0.25** : Temperature reading with aspiration at 1/4 of its nominal value
- **Tg** : Actual gas temperature
- **E%** : Efficiency coefficient

$$E\% = 100 \frac{Tn - To}{Tg - To} \qquad F = \frac{Tn - To}{Tn - T0.25} \qquad F' = \frac{\Delta to}{\Delta tn}$$

- **WHERE ΔTO** = time necessary to go from Tn to To by shutting down the aspiration
- **Δtn** = time necessary go from To to Tn by restarting the aspiration

These various coefficients depend on the temperature level, the characteristics of the gas and the sensor. They must therefore be measured "in situ".

Recommended nominal aspiration speed: 50 to 60 m/s at the level of the hot junction. In other words, for a thermocouple Ø1.6 with a sheath Ø 3: approximately 200 l/h STP by aspiration.

E% can be determined on the basis of F or F', using one of the two calculation charts attached.

METHOD OF DETERMINATION

Mount the sensor with the cooling circuit and the gas aspiration system. Keep the probe slightly tilted downwards to prevent air-bubble formation at the tip of the sensor).

- If you choose to determine F, measure To, Tn and T0.25

$$F = \frac{Tn - To}{Tn - T0.25}$$

- If you choose to determine F', measure Δto and Δtn

$$F' = \frac{\Delta to}{\Delta tn}$$

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

Note the values which you have determined for: E%, Tn, To, T0.25, Δto and Δtn

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

$$Tg = 100 \frac{Tn - To}{E\%} + To$$

MINIATURE ASPIRATED SENSOR

USE

Based on the principles described above, this sensor is characterized by its small dimensions and its operating temperature. It is intended mainly for measuring the temperature of gases with a low flow-rate or small flames in the laboratory.

THE END-PIECE

This comprises two concentric sheaths enveloping the thermocouple. The end-piece material, rhodium-platinum, enables it to withstand temperatures up to 1900° C for 15 min.

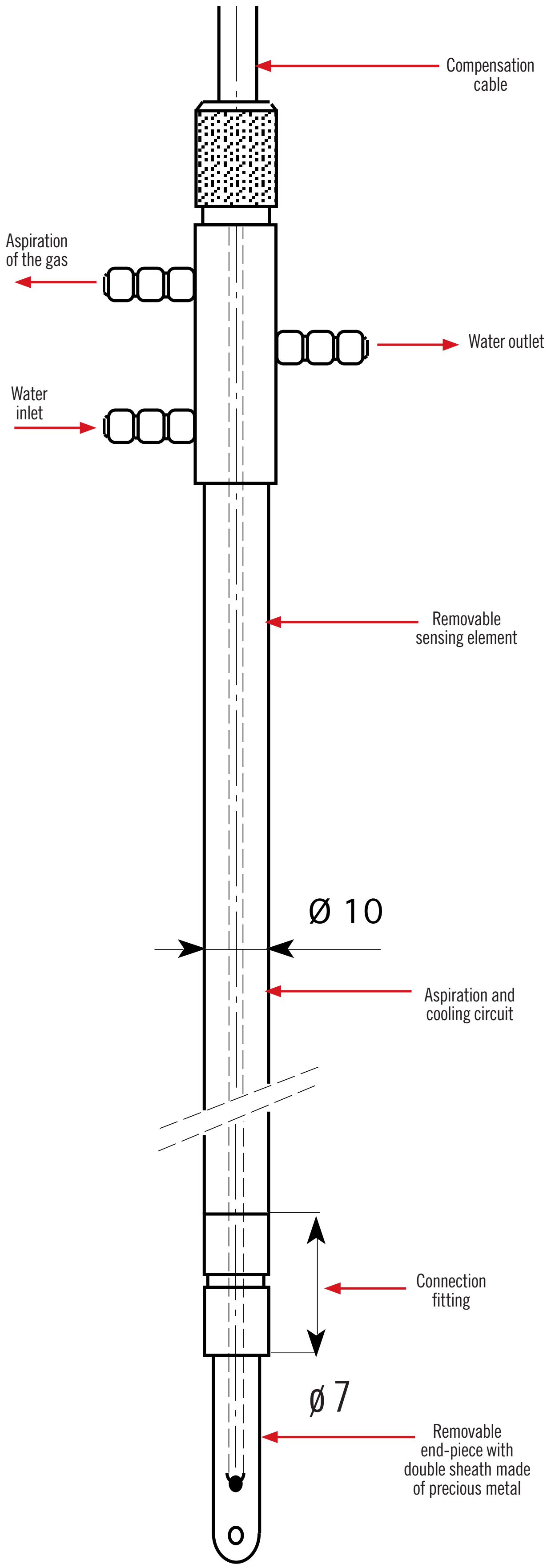
THE SENSING ELEMENT

This is a thermocouple whose type depends on the temperature to be measured.

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

With each sensor, a specific calibration table is provided for the batch of wires from which the thermocouple was assembled.

This table can be used to establish the temperature/emf correspondence specific to the thermocouple used.



SEMI-INDUSTRIAL ASPIRATED SENSOR

USE

This is intended for semi-intensive use at temperatures up to de 1600° C, depending on the type of thermocouple with which it is equipped.

Its design and light weight make it particularly easy to handle. It is used for checking combustion in fire boxes.

THE END-PIECE

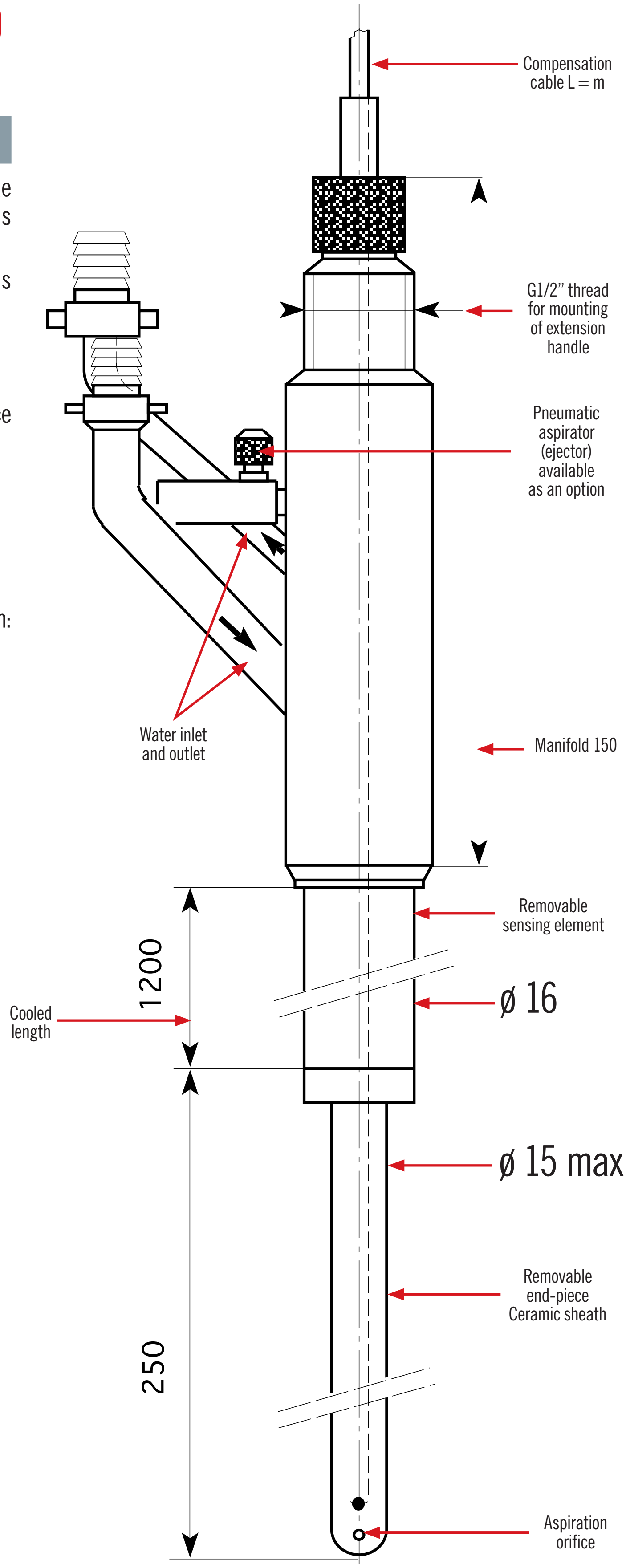
This comprises 2 ceramic sheaths which act as screens to reduce losses by radiation.

THE SENSING ELEMENT

There are several possibilities:

- sheathed K thermocouple with inconel sheath: 1100 °C
- sheathed S or R thermocouple with 10% rhodium-platinum sheath: 1500 °C
- sheathed B thermocouple with 10% rhodium-platinum sheath: 1600 °C.

In each case, the output is provided by a compensation cable - length to be defined.



INDUSTRIAL ASPIRATED SENSOR

USE

Intended for intensive use at temperatures up to 1600° C.

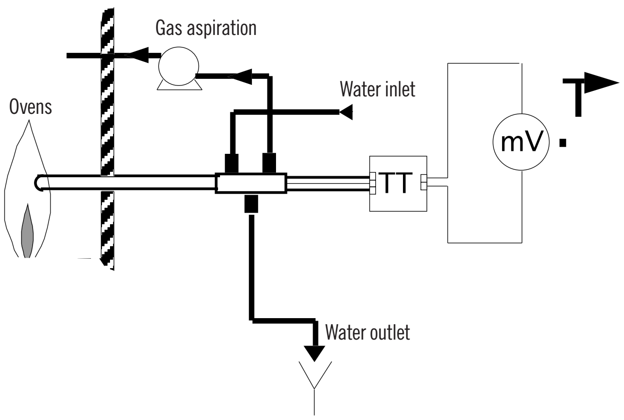
The type of thermocouple depends on the temperature to be measured:

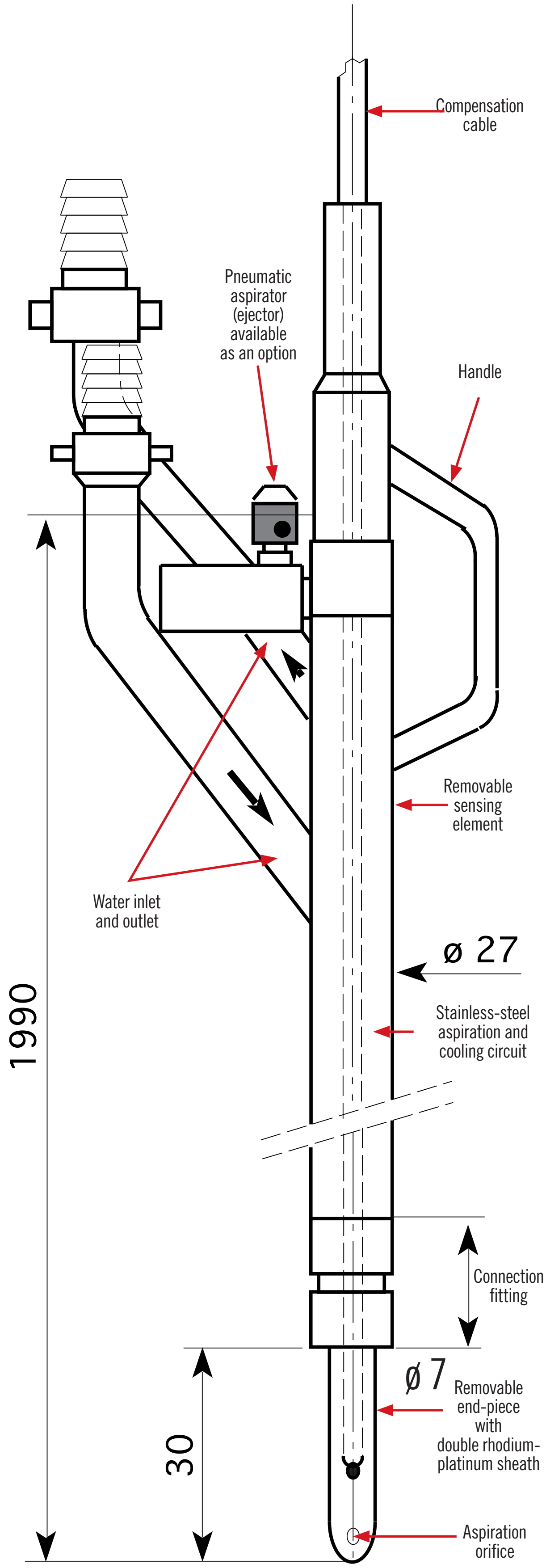
- K thermocouple: 1100 °C
- S or R thermocouple: 1500 °C
- B thermocouple: 1600 °C

THE END-PIECE

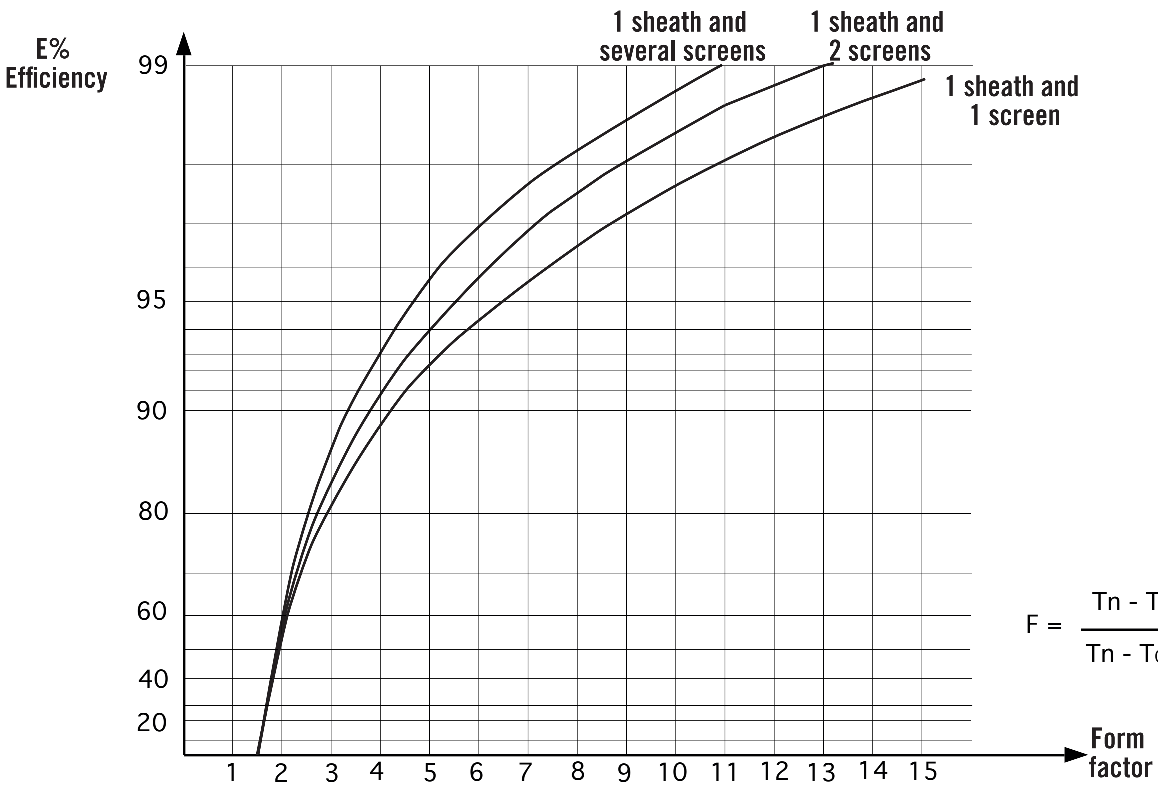
This comprises two rhodium-platinum sheaths which act as screens. The end-piece can be removed quickly. The gas necessary for the measurement is aspirated via two orifices at the tip of the end-piece.

EXAMPLE OF INSTALLATION

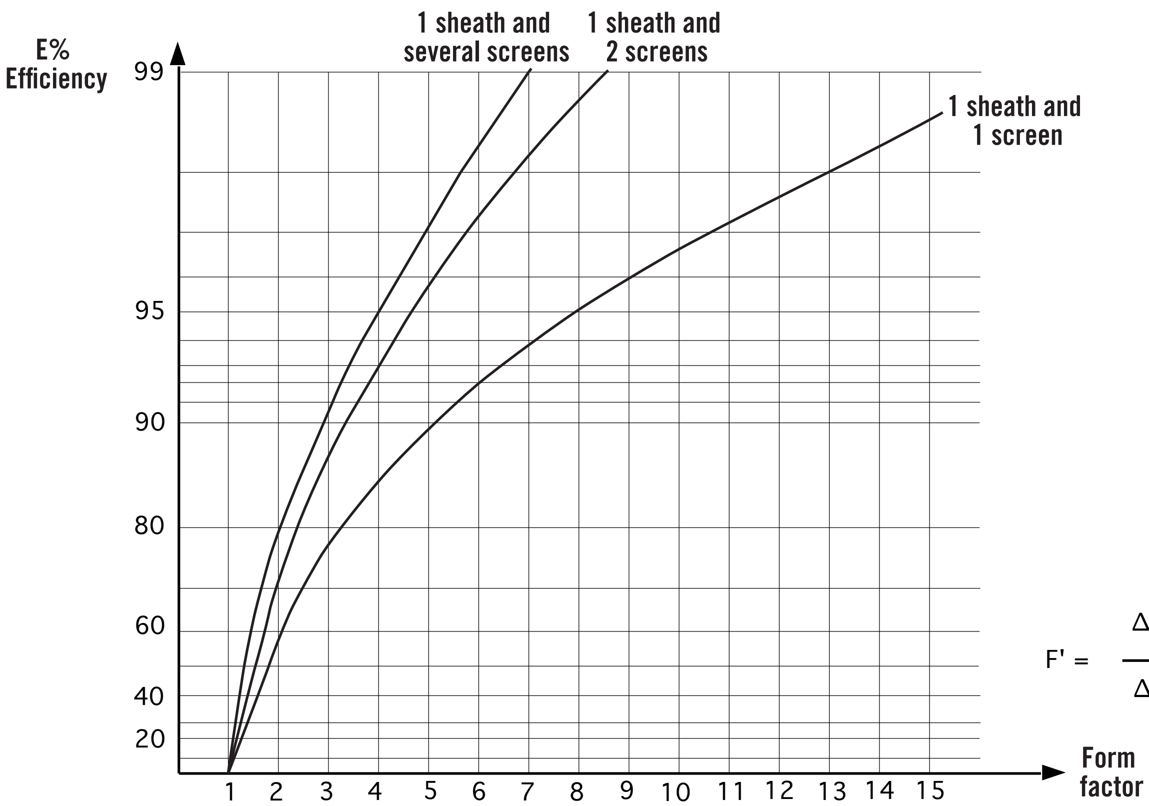




ASPIRATED SENSOR



$$F = \frac{Tn - To}{Tn - T_{0.25}}$$



$$F' = \frac{\Delta to}{\Delta tn}$$

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.

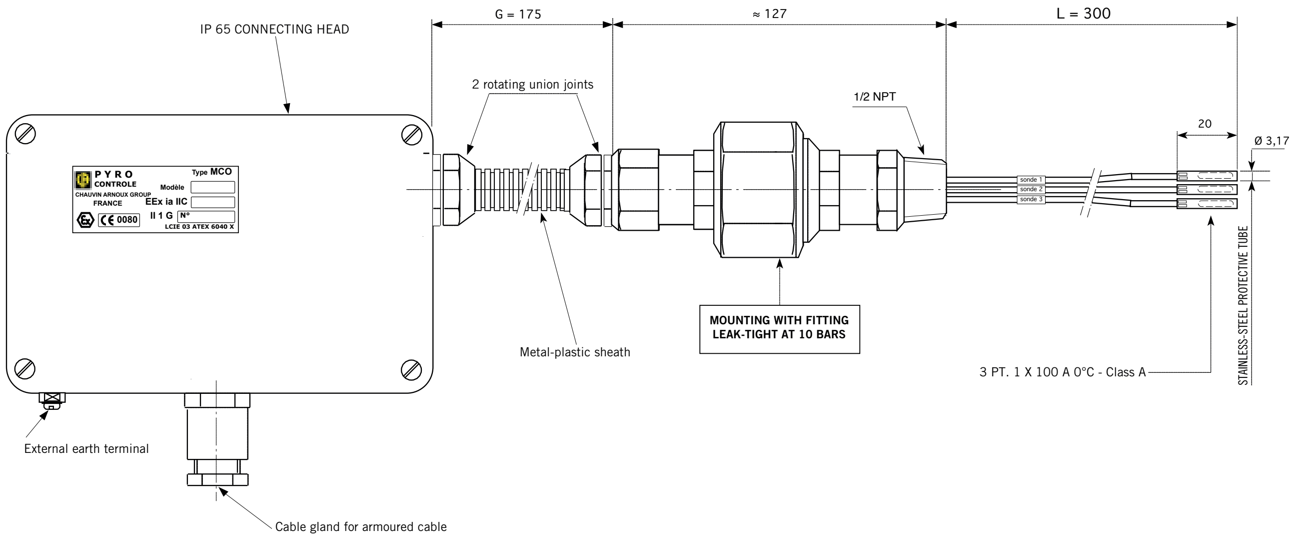
SPECIFICATIONS

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.

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