

TEMPERATURE MEASUREMENT

In process industry, in pharmaceutical and food production, the correct temperature measuring method is essential to maintain the the installations proper functioning and safety and to guarantee the quality of the production.

Officine Orobiche, active in the instrumentation field for more than 60 years, through the collaboration and the experience of a sector leading corporation, has developed its own temperature measurement products that includes:

- Thermoresistances
- Thermocouples
- Thermowells
- Temperature transmitters

Our wide range of temperature sensors, assembling tools and transmitters, realized both with standard or customized design, grants the highest functioning reliability and covers many applications in many industrial processes.

In our new product line we apply the key concepts of our company policy:

- Flexibility, that enables us to give fast and effective answers to our clients requests.
- Technical and commercial assistance before and after sale.
- Reliability in delivery time, thanks to an always up to date order tracking.
- Regular technical and production updates.
- Great value for price.



THERMORESISTANCES - MODEL TR



In industrial processes temperature is one of the most important parameters, therefore for its measurement it is necessary to use of simple but highly resistant instruments.

The most widespread instrument for temperature measurement is the resistance thermometer. In this instrument the sensitive element is a length of platinum wrapped around a ceramic support and covered with a dust of Magnesium oxide MgO, that ensures protection and electrical insulation.

The wire electrical resistance varies according to the temperature, the derived signal is precise and repeatable, its nominal standard value is 100 Ohm at 0 °C.

Thermoresistances TR model are copliant to different standards:

- UNI 7937
- DIN 43760
- IEC 751

They are available in two types:

TYPE	SYMBOL	OPERATING RANGE [°C]
Platinum	Pt 100 Ohm	-200 / +850
Nickel	Ni 100 Ohm	-60 / +180

Thermoresistances Pt 100 Ohm are available with three different sensor type:

- Ceramic (T max. 750 °C): a filament of platinum is coiled and encapsulated in a ceramic material shell. It is used in the fabrication of high accuracy thermometers or with high temperatures.
- Glass (T max. 600 °C): a platinum filament is wrapped on a glass support, and then encapsulated in an external protective sleeve made of glass. It's used in fields where are necessary great accuracy and reproducibility (sample thermometers).
- Thin film (T max. 450 °C): a platinum microfilm is deposited on a ceramic support, then a laser technology create an electrical circuit with the correct electrical resistance.

Resistance thermometers can be connected to the measuring units through two, three or four wires connections, the choice depends on the accuracy needed.





Another instrument used to measure temperature is the thermocouple. Our thermocouples are designed for a very wide range of applications and guarantee solid, accurate and reliable temperature measurement between -200 °C and +1800 °C.

They are made by two different homogeneous metal conductors isolated throughout their length. The two elements are joined at one end (hot end) and connected to a measuring circuit at the other end (cold end).

The temperature difference between the hot and cold end creates a variable electromotive force in function of temperature and the conductors' type.

Thermocouples model TR are copliant to different standards:

- UNI 7938
- ANSI MC96
- IEC 584

The thermocouple type depends on the metals used as conductors:

TYPE	MATERIALS	OPERATING RANGE [°C]	DESCRIPTION
К	Chromel / Alumel	0 / 1250	Thermocouple made of nickel alloy suitable for high tem- perature measurement in oxidizing environments. Not suitable for reducing environments.
J	Iron / Costantan	0 / 750	Suitable for medium temperatures in reducing environ- ments in presence of hydrogen and coal. The iron pre- sence makes it not suitable for oxidizing environments.
Т	Copper / Costantan	-200 / 350	Thermocouple that allows accurate measures at low temperatures in oxidizing and reducing environments.
E	Chromel / Costantan	0 / 870	Thermocouple suitable for oxidizing environments.
S	Pt / Pt Rh 10%	0 / 1450	Thermocouple made of noble metals (platinum and rho- dium) that allows very accurate measures. Especially re- sistant at high temperatures is usually used in oxidizing environments. Not suitable for reducing environments or containing metallic vapors.
R	Pt / Pt Rh 13%	0 / 1450	Like the "S" type thermocouple but with different per- centage of the two metals.
В	Pt 30% Rh / Pt 6% Rh	0 /1700	Thermocouple made of noble metals. The higher per- centage of rhodium than the "S" and "B" types makes it more resistant at high temperatures and mechanical stresses.
N	Nicrosil / Nisil	0 / 1300	Alternative to the "K" type thermocouple in terms of ac- curacy and reproducibility.
W3	W3%Re / W25%Re	0 / 2310	Thermocouple for very high temperatures made of a positive pole in tungsten containing 3% rhenium and a negative pole in tungsten containing 25% rhenium. Especially resistant to reducing environments and with presence of hydrogen or other inert gases. Not suitable for use with air or other oxidizing environments.
W5	W5%Re / W26%Re	0 / 2310	Like thermocouple "W3" but the different percentage of rhenium makes increase its mechanical resistance.

THERMOWELLS

Thermowells are used to protect the thermometric element from corrosive effects, fluid pressure and speed or vibrations.

The materials used in thermowells manufacturing are:

- AISI304
- AISI316L
- INCONEL
- DUPLEX
- SUPER DUPLEX
- HASTELLOY
- MONEL

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Tapered bar stock thermowell

The thermowell part below the process connection (flanged or threaded) inserted in the process fluid is called "stem" and its shape in determinated by the characteristics of the process fluid.

Thermowells designs are divided in:

- Thermowells made by a filled bar stock or a tube with process connections flanged or threaded
- Flanged thermowells with full penetration welds
- Lapped and polished finish



Stepped bar stock thermowell



TRANSMITTERS

Temperature transmitters are placed in solid aluminium or stainless steel housings designed for many application fields: Chemistry, Pharmaceutical, Oil & Gas, Power plants, Food & Beverage etc..

They guarantee great accuracy and a perfect isolation from electromagnetic interferences indipendently from the operating field.

They are available in version:

- Analogic 4/20 mA
- Analogic 4/20 mA HART
- Digital Profibus
- Digital Fieldbus

The transmitter can be installed top mounted or remotly in two versions:

- Installation integrated with the temperature sensor;
- Remote installation wall mounted or on a 2" pipe stand.



Flanged thermowell



APPROVALS

- On request the following approvals are avilable:
- ATEX Intrinsically safe Ex ia • •
 - ATEX Explosion proof Ex d
- IECEx Ex ia •
- IECEx Ex d •
- FM CSA •
- EAC .



EHC

HOUSINGS

The instruments standard version comes with a diecast aluminium housing:



On request for corrosive ambients is available a stainless steel housing:













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