Range 73
MEASURING INSTRUMENTS

Temperature measurement

RTD Pt100 sensor

Model 7361 3-wire output

Model 7362 4-20 mA 2-wire output - with integrated transmitter

Specifications

Process connection: Ø8mm plain stem
Instrument connection: DIN B head
Temperature measurement range: -50°C to +250°C
Electrical output: Pt100 - 3-wire or 4-20 mA 2-wire
Accuracy: IEC 60751 - Class A
Material: 316L stainless steel stem - epoxy-coated aluminium DIN B head - M20x1.5 nut (gland)

IP65

On request:

- Class B
- Ø6mm stem
- DAN ATEX, MA head
- Process connection Clamp or SMS

ISO 9001 BUREAU VERITAS Certification

CE

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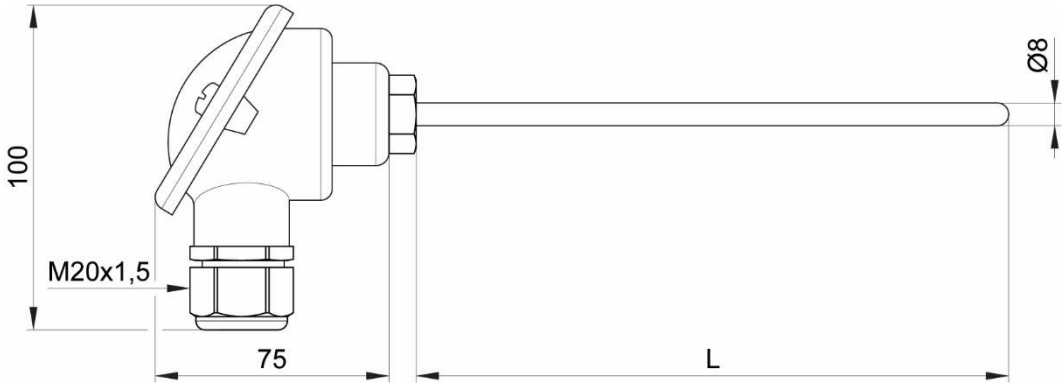


L (mm)	Part number without transmitter	Part number with transmitter
100	673618-100	673628-100
150	673618-150	673628-150
200	673618-200	673628-200
250	673618-250	673628-250
300	673618-300	673628-300
600	673618-600	673628-600

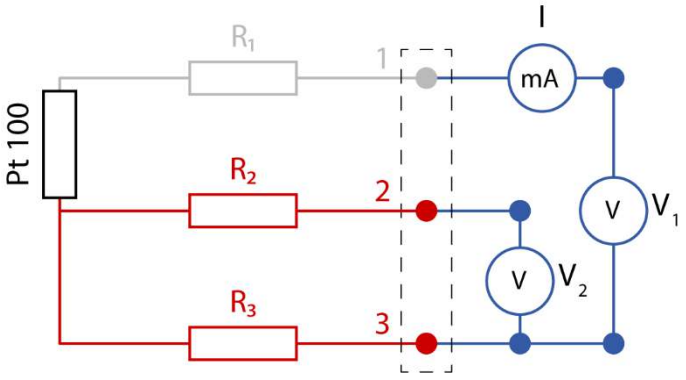
Use and wiring

A RTD Pt100 sensor measures temperature through the principle of temperature-dependant resistance change in a platinum conductor.
This phenomenon is well-known and is very stable over time.
Pt100 corresponds to the resistance measured by the sensor at 0°C (100 Ω).

Wiring

Pt100 3-wire output:

You can connect a 3-wire Pt100 in several ways, as long as you measure the value of resistance Pt100 in Ohms (Ω)



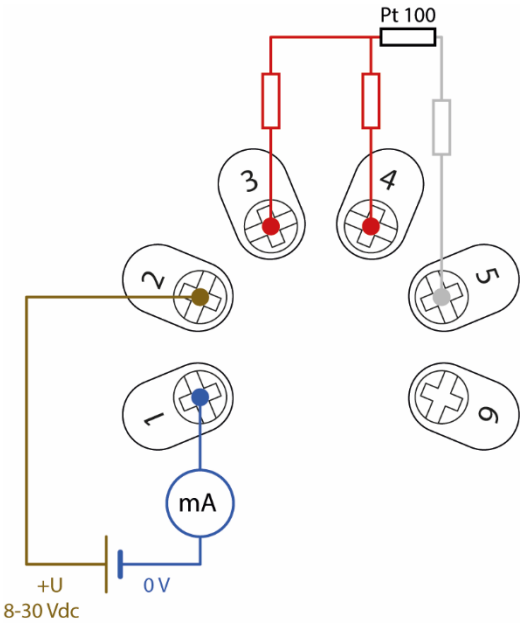
In this example, measure the voltage between terminals 1 and 3 (V_1) and terminals 2 and 3 (V_2), then measure the input current (I):

$V_{Pt100} = V_1 - (2 \times V_2)$
$R_{Pt100} = V_{Pt100} / I$

4-20mA transmitter 2-wire output:

The converter is powered by 8-30VDC direct voltage.
The Pt100 sensor is already wired to the converter.

Connect the 8-30 VDC power supply to port (2)
Connect the neutral to port (1)
The temperature measurement is made by measuring the current on the neutral (1)

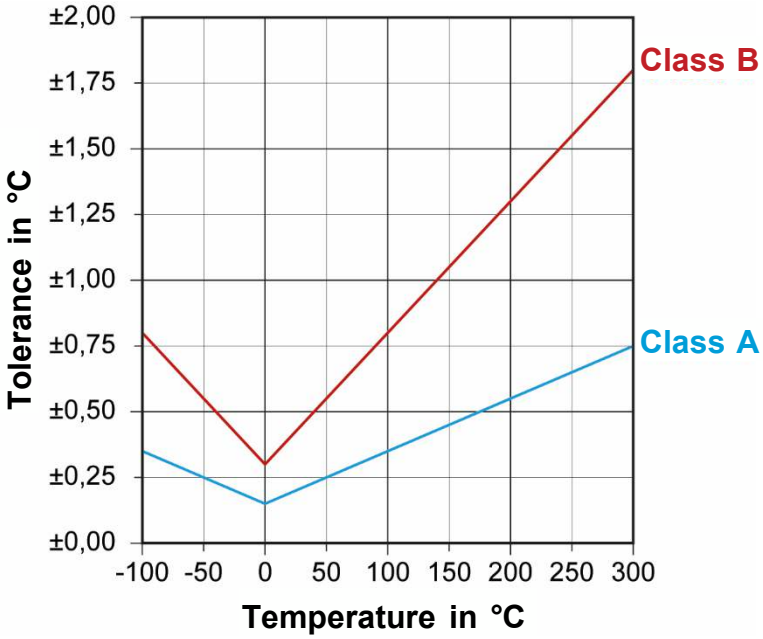


Resistance-temperature relationship

Measurement values and accuracy are standardised by IEC 60751

Accuracy class

Temperature (°C)	Class A		Class B	
	± °C	± Ω	± °C	± Ω
-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

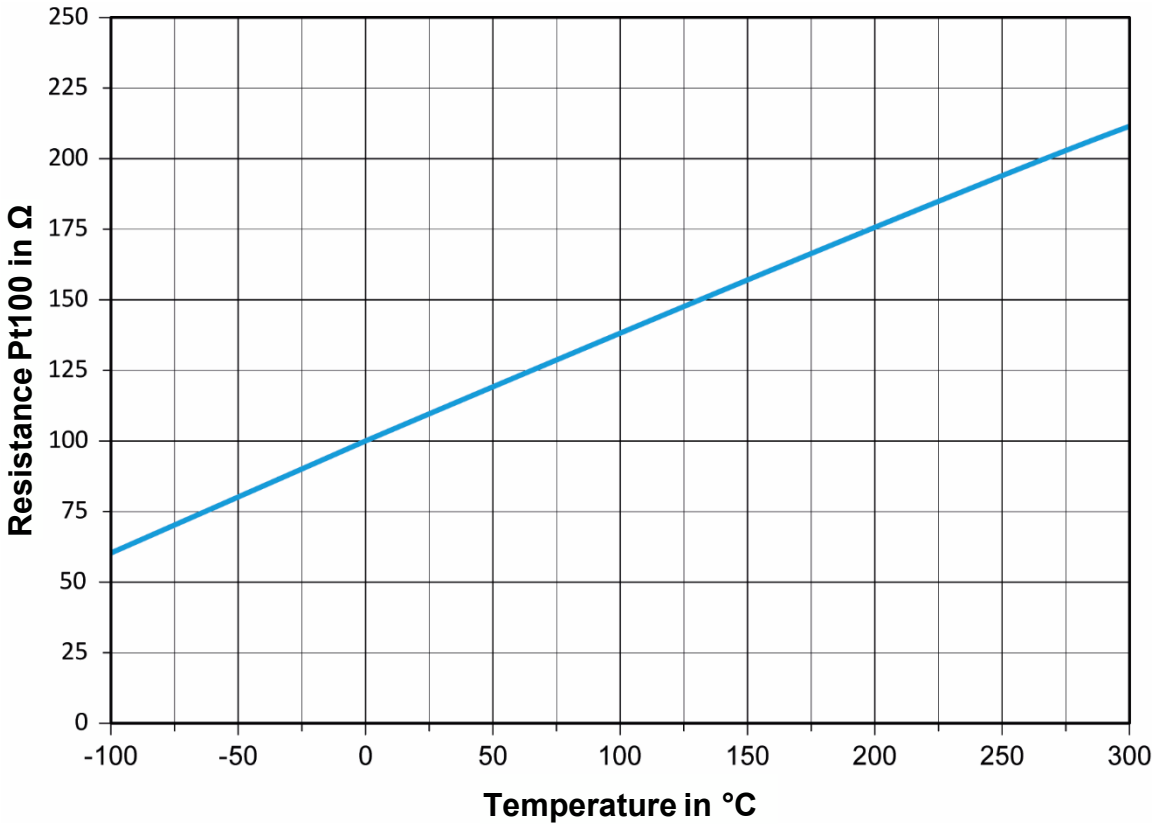


Resistance- temperature conversion

For these Pt100 sensors you can link resistance and temperature through a Callendar-Van Dusen (CVD) equation:

- For a temperature between -100°C to 0°C:
  - $R_{Pt100} = 100 \times [1 + (3{,}9083 \times 10^{-3} \times T) - (5{,}775 \times 10^{-7} \times T^{2}) - (4{,}183 \times 10^{-12} \times (T - 100) \times T^{3})]$

- For a temperature between 0°C to 300°C:
  - $R_{Pt100} = 100 \times [1 + (3{,}9083 \times 10^{-3} \times T) - (5{,}775 \times 10^{-7} \times T^{2})]$



The main causes of measurement inaccuracy

As well as the accuracy class, the connection mode, connection cable length, material and diameter are all variables that can influence Pt100 measurements:

- The electronic data capture system adds its own error that can vary according to the ambient temperature and the location where it is installed. In particular, if the data capture module is installed outside, either in the cold or with the sun directly on it.
- In order to reduce errors, electronic modules are sometimes calibrated when they are made. You can only control the modification to this calibration over time by using reliable electronic components.
- Thermal coupling can also influence the sensor's measurements.
- The platinum sensor's electrical resistance is measured through an electrical current, so the self-heating of the sensor through the Joule effect can lead to an error in excess of the actual result.
- The presence of the sensor can change the temperature locally, this change is even greater when the measured fluid has a low thermal conductivity:
    - o The temperature sensor can mechanically create a thermal bridge between the measurement point and its attachment point.
    - o The sensor can create a heat sink.
    - o The self-heating of the sensor can cause a localised increase in thermal energy.

Accessories

- You can accurately locate the measurement point in the centre of piping by installing the sensor in a sliding compression fitting: Model **7365.**
- The RTD sensor can be installed in a thermowell to facilitate maintenance and so that you do not need to purge the piping if you need to carry out maintenance on the measuring instrument. Please contact us for more information.