Product Data Sheet
2022-2023

Platinum Resistance Thermometers (Pt100)

PEK381

Introduction

- Long-term stability
- High measurement repeatability
- High measurement range
- Fast response time
- High pressure resistance

Application Area

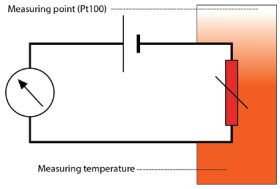
In the process industry, Pt100 sensors represent the most frequently used and the most common type of resistance sensor worldwide.
Should be considered that influence of the cable length in the overall measuring error is only a fraction of that of Pt100 sensors.
In modern temperature transmitter/ controllers or display instruments this is usually the case, as the sensor input can be freely configured as Pt100.

General information

- Temperature is a measurement for the thermal state of a material
- The body to be measured should be coupled as closely as possible to the temperature sensor system.
- One of the most-used methods is the
- measurement with a resistance thermometer.
- Pt100 measuring resistors are normally used for industrial applications.
- measuring resistors used in thermometers will be wire-wound measuring resistors
- (W = Wire-Wound)

Introduction

Temperature is the most frequently measured parameter in the process industry. In electrical, contact thermometers two measurement principles have asserted themselves as a standard. RTD - Resistance sensors and TC – Thermocouples.
In RTD (Resistance Temperature Detector) thermometers the sensing element consists of an electrical resistance which in resistance sensors the electrical resistance changes with a change in temperature. They are suitable for the measurement of temperatures between -200 °C and approx. 600 °C and stand out due to high measurement accuracy and long-term stability. The resistance sensor element most frequently used is a Pt100. It is about a temperature-sensitive measuring resistance made of platinum with a resistance value of 100 Ω at 0 °C. The temperature coefficient is fixed with α = 0.003851 °C.



Design of Pt100

Pt100 resistance thermometers usually exist as a measuring insert which is installed in a connection head and an appropriate protective fitting. The electrical connection is made within the connection head.

As a measuring insert the easily replaceable unit of the thermometer is referred to, which consists of a conduit or cable from suitable material and whose sensitive end contains one or more Pt100 platinum measuring resistors.

Protected by a thermowell, a temperature measuring point can be constructed that enables the

exchange of the thermometer in the event of repair or calibration without interfering with the process.

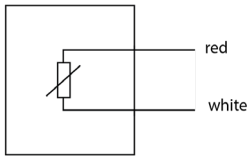
Sensor technology

The electrical resistance of a resistance thermometer's sensor changes with the temperature. As the resistance increases when temperature is raised, refer to it as PTC (Positive Temperature Coefficient). Wire-wound measuring resistors, a very thin platinum wire is encased within a round protective body. This design has been well-established for decades and is accepted worldwide.

The sensor is located at the tip of the measurement insert. The electrical contact at the top end of the measurement insert is made, in the simplest case, by the use of flying leads, a terminal block or a head transmitter. Platinum wire wound around a ceramic core and embedded in mineral isolated stainless-steel sheath. These sensors ensure good long-term stability of their resistance/temperature characteristic in the temperature range of up to 600 °C.

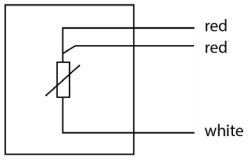
2-wire connection

The lead resistance to the sensor is recorded as an error in the measurement. For this reason, this connection type is not advisable when using Pt100 measuring resistors for tolerance classes A and AA, since the electrical resistance of the connecting cables and their own temperature dependency are fully included in the measuring result and thus falsify it.



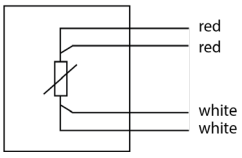
3-wire connection (standard version)

The influence of the lead resistance is compensated as far as possible. The maximum length of the connecting cable depends on the conductor cross-section and the compensation options of the evaluation electronics (transmitter, display, controller or process control system).



4-wire connection

The influence of the connecting cable on the measuring result is completely eliminated since any possible asymmetries in the connecting cable's lead resistance are also compensated.
The maximum length of the connecting cable depends on the conductor cross-section and the compensation options of the evaluation electronics (transmitter, display, controller or process control system).
A 4-wire connection can also be used as a 2-wire or 3-wire connection by disconnecting the unnecessary conductors.



Operating limits and tolerance classes

Wire-wound measuring resistor versions differ in the possible tolerances at the operating temperatures.

Class	Measurement Range (°C)	Accuracy
B	-196 ~ +600	±0.30
A	-100 ~ +450	±0.15
AA	-50 ~ +250	±0.10

Process connections

The process connection is the connection between the process and the thermometer. The following process connections are those most commonly used in the process industries:
Thread : The most commonly used thread types are NPT-, G- and M-threads.
Flange : Flanges are subject to the DIN or ANSI / ASME standards. They are classified according to material, diameter and pressure rating.

Notes: In many cases thermometers cannot be placed directly into the medium but need protection from rough process conditions. Furthermore, the thermowell makes sure that an exchange of the measurement insert is possible without interrupting the process.

Ordering information

Model Number / Sensor Type (Platinum , Nickel , Copper) / Ice Point Resistance / No. of Wires (2,3,4) / Sheath Material / Sheath Size / Mounting Thread Size

For Example:

PEK81-PT100-3-SS316-6-0.5
Model: PEK381
PT : Sensor Type is Platinum
100 : Ice Point Resistance 100 ohm
3 : 3 Wires
SS316 : Material is 316 stainless steel
6 : Sheath Size is 6 mm
0.5 : Mounting Thread Size is 1/2”

Pars Electronic Kish

Unit, No. 20, Qavam pour Alley, North
Sheikh Bahai St, Tehran, Iran

Tel: +9821-88613511
Fax: +9821-88602547
info@parsek.org
www.parsek.org