Resistance temperature sensor with thermowell PN 10, with connecting cable
Surface resistance temperature sensor, with connecting cable
Type 112 21

PRODUCT MANUAL

APPLICATION

Sensor with thermowell

- for remote measurement of temperature of steady and flowing liquids (gases and fluids), for which the properties of the thermowell of the sensor are suitable, up to nominal pressure PN 10, especially in the pipelines of small inner diameters or in places with lacking space

Surface sensor

- for measurement of temperature of the surface of warm-water and other pipelines and other similar applications, e.g. for food packaging machines

Sensors can be used

- For the environment, where mechanical resistance is required pursuant to EN 60068-2-6 (class AH2) and seismic capability of the electrical equipment of the safety system of the nuclear power stations pursuant to IEC 980 (MVZ level SL-2)

DESCRIPTION

Sensor with thermowell

The sensor consists of the sensor body with firmly connected cable. The body is provided with attachment screw joint and thermowell, in which the probe is sealed.

Surface sensor

The probe of the sensor is sealed in cylindrical metallic casing. The sensor has no attachment screw joint; the installation method depends on the specific application of the sensor.

To measure temperature is uses a defined change of the sensor resistance in dependence on the change of the temperature of the measured environment.

TECHNICAL DATA

The sensor is designed pursuant to EN 61140 as an electrical equipment of protection class III for the application in networks with the category of overvoltage in the installation II and pollution grade 2 pursuant to EN 61010-1, the follow-up (evaluation) device shall comply with, Article 6.3 thereof.

Measuring range: -50 to 200 °C

Electric strength pursuant to EN 61010-1 Article 6.8.3:
500 V eff

Electric insulation resistance pursuant to EN 60751:
min. 100 MΩ, at 15 to 35 °C, max. 80 % of relative humidity, min 100 V DC

Nominal pressure of thermowell pursuant to ČSN 13 0010:
PN 10

Cover pursuant to EN 60529.: IP 65

Operation position: discretionary

Weight of sensor with cable 1.5 m:

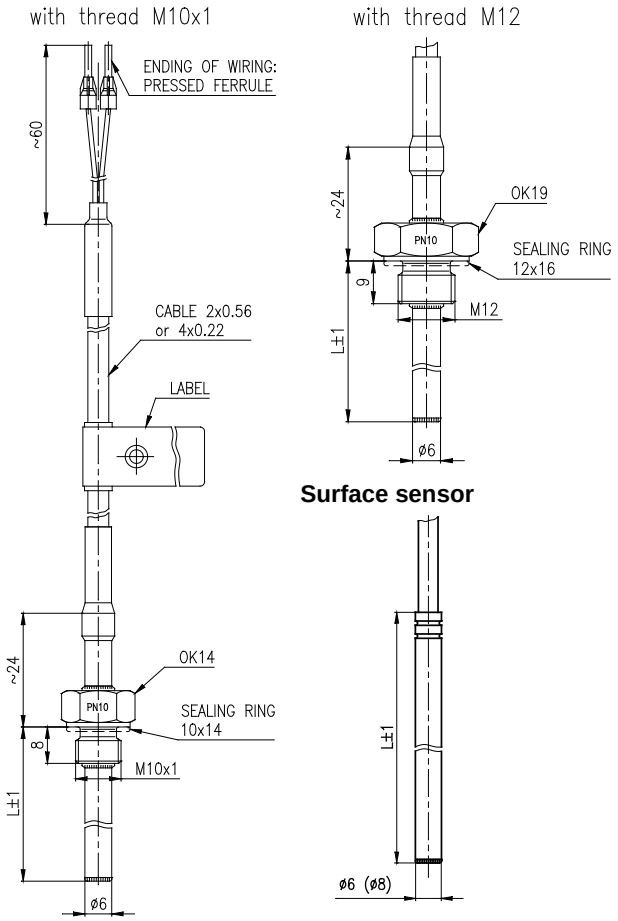
with fastening thread M10×1	approx. 100 g
with fastening thread M12	approx. 120 g
surface sensor	approx. 70 g

Type of operation continuous

Applied materials:

sensor body and thermowell of sensor	steel 1.4541
housing of surface sensor	steel 1.4541 or brass with galvanic coating of nickel
connecting cable	Cu cores with insulation from fluoroplastic material, external insulation from silicon, shielding with Cu wire
sealing rings	see table 3

Sensor with thermowell

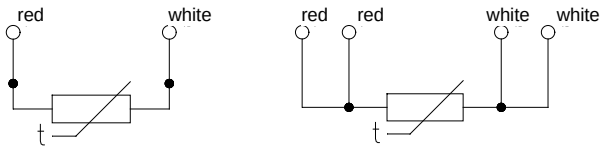


Surface sensor

Connection scheme

with a simple measuring resistor

in two-wire connection (Pt 100/B/2)	in four-wire connection (Pt 100/ /4)



OPERATION CONDITIONS

The environment is defined by the group of parameters and their degree of severity IE 36 pursuant to EN 60721-3-3 and the following operation conditions:

Temperature at cable outlet from the sensor:
permanently -50 to 180 °C

Relative ambient humidity:
10 to 100 % with condensation, with upper limit of water content 29 g H_2O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

Maximum speed of flow:
water steam and air: 15 m/s
water: 5 m/s

Vibrations:

Frequency range	10 to 55 Hz
Drift amplitude	0.35 mm
Acceleration amplitude	49.0 ms^{-2}

METROLOGICAL DATA

Sensor: single measuring resistor in connection pursuant to the connection scheme and table of designs
Platinum: Pt 100, Pt 500 or Pt 1000, α = 0.00385 [K^{-1}], tolerance class B (or A only for 4-wire) pursuant to EN 60751
Nickel: Ni 100, Ni 500 or Ni 1000, α = 0.00618 [K^{-1}] tolerance class B pursuant to DIN 43 760
Internal wiring resistance at 20 °C

2 x 0.56 mm^2:	2×0.033 Ω/m
4 x 0.22 mm^2:	4×0.087 Ω/m

Maximum current load of measuring resistor:

Pt 100 or Ni 100	3 mA
Pt 500 or Ni 500	1 mA
Pt 1000 or Ni 1000	1 mA

Recommended measuring current:

Pt 100 or Ni 100	1 mA
Pt 500 or Ni 500	0.5 mA
Pt 1000 or Ni 1000	0.3 mA

Calibration depth of immersion: 120 mm
Time of temperature response pursuant to EN 60751 in whirling water (characteristic value): $\tau_{0.5}$ 8 s

DESIGNATION

Data on aluminium label connected to the cable
- trade mark of the manufacturer
- made in Czech Republic
- type of resistance sensor, nominal value R_0 / tolerance class / configuration of wires of internal wiring (tolerance class is not marked for Ni resistors)
- measuring range
- cover
- time code or serial number (serial number for calibrated design and for design with tolerance class A)

Data on hexagon of the thermowell
- nominal pressure

DELIVERY

Unless agreed otherwise with the customer, each delivery includes
- delivery note
- sensor pursuant to the purchase order
- sealing ring with the sensor with thermowell
- Accompanying technical documentation in Czech:
  - o product manual
  - o certificate of product quality and completeness, which also serves as the warranty certificate
  - o calibration sheet (for calibrated design)

If it is established in the purchase contract or agreed otherwise, the following documentation may be also delivered with the product:
- copy of the Inspection Certificate 3.1 for the material of the thermowell with the heat number
- supplier´s declaration of conformity pursuant to EN ISO/IEC 17050-1
- Test report about the seismic and the vibration qualification

ORDERING

The purchase order shall specify
- name
- product ordering number
- if is required calibration and in what temperature points
- other (special) requirements
- number of pieces

PURCHASE ORDER EXAMPLE

Standard design:
1. Resistance temperature sensor with thermowell PN 10, with connecting cable
   112 211 111
   15 pcs

Special requirement:
1. Resistance temperature sensor with thermowell PN 10, with connecting cable
   112 212 149
   nominal length 100 mm, cable length 2.5 m
   6 pcs
2. Surface resistance temperature sensor, with connecting cable
   112 211 351
   nominal length 50 mm
   6 pcs

TABLE 1 - DESIGN OF TEMPERATURE SENSORS

SPECIFICATION				ORDERING NUMBER 112 21	x	x	x	x
Measuring resistor	platinum pursuant to EN 60751 tolerance class B or A*) ***)	Pt 100/B/2 or Pt 100/ /4 *)			1			
		Pt 500/B/2 *) or Pt 500/ /4 *)			2			
		Pt 1000/B/2 *) or Pt 1000/ /4 *)			3			
	nickel pursuant to DIN 43760 tolerance class B (refer to the following table)	Ni 100/B/2 or Ni 100/B/4 *)			5			
		Ni 500/B/2 *) or Ni 100/B/4 *)			6			
		Ni 1000/B/2 *) or Ni 1000/B/4 *)			7			
Fastening thread		M10×1				1		
		M12 *)				2		
Nominal length L [mm]		36					1	
		63 *)					2	
		80 *)					3	
		100 *)					4	
		Other (36 to 120 mm) *)					9	
Surface sensor *)	material 1.4541 or brass	diameter / nominal length L	Ø 6 mm / 35 to 125 mm **)			3	5	
			Ø 8 mm / 25 to 125 mm **)			3	6	
Length of the connecting cable		1.5 m						1
		other *)						9

*) only as a special requirement after an agreement with the manufacturer
**) nominal length must be given in words
***) measuring resistor in tolerance class A only in four-wire connection or in connection with auxiliary loop

TABLE 2 - TOLERANCE CLASS OF NICKEL MEASURING RESISTORS PURSUANT TO DIN 43760

class	tolerance [ºC (K)]		ZPA designation
	t < 0 ºC	t > 0 ºC	
DIN 43760	0.4 + 0.028 | t |	0.4 + 0.007 | t |	B

TABLE 3 - OVERVIEW OF THE SEALING RINGS OF TYPE 991 SUPPLIED FOR THE TEMPERATURE SENSORS WITH THERMOWELL

EXTERNAL FIXING THREAD OF TEMPERATURE SENSOR	SEALING RING			
	DIMENSION [mm] Ød × ØD × t	MATERIAL	NUMBER	ORDERING NUMBER
M10 × 1	10 × 14 × 1.5	copper 42 3005.11 thermally insulating insert	1 pcs	991 TK 10
M12	12 × 16 × 1.5	copper 42 3001.11		991 TK 12

The sealing ring is supplied to each sensor by default. The sealing ring can also be ordered separately using ordering number.

PACKING

Sensors and accessories are delivered in a packing ensuring resistance to the impact of thermal effects and mechanical effects pursuant to controlled packing regulations.

TRANSPORT

The sensors may be transported on conditions corresponding to the set of combinations of classes IE 21 pursuant to EN 60721-3-2 (i.e. by airplanes and trucks, in premises that are ventilated and protected against atmospheric conditions).

STORAGE

The products may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 pursuant to EN 60721-3-1 (i.e. in places with temperature from -5 to 45 °C and humidity from 5 to 95 %, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand.)

RELIABILITY

Indicators of reliability in operation conditions and conditions of the environment specified in this manual

- mean time of operation between failures 96 000 hours (information value)
- expected service life 10 years

CALIBRATION

It is realized pursuant to TPM 3342-94 and in compliance with EN 60751, usually in three temperature points evenly distributed in the operation range of the sensor or in the points according to the requirement of the customer. Calibration sheet with measured data is issued for calibrated sensors.

INSTALLATION AND CONNECTION

INSTALLATION OF SENSOR WITH THERMOWELL

Put the enclosed sealing ring on the thermowell of the sensor. Then screw the sensor into the weld-on piece on the piping (technological equipment) or into the relevant hole with a thread. During the installation, tightening torque of 40 Nm is recommended. With respect to maintaining metrological properties and the longest possible service life, it is not recommended to install the sensors in places with high turbulence of the medium, which is caused e.g. by a rapid transition from a small diameter of the piping to a larger one (when failure to comply with the required shape and dimensions of diffuser behind the flow meter). Recommended distance of the temperature sensor from the installation flange of the flow meter is min. 1 m.

INSTALLATION OF SURFACE SENSOR

Connect the surface sensor to the piping surface e.g. by wrapping with a metal tightening stripe or a special shim. We recommend ensuring due heat insulation of the connected sensor. One of many other ways of the installation is the insertion of the surface sensor into the bore in the body (e.g. of a packing machine of food).

ELECTRICAL CONNECTION

The electrical connection may be only realized by qualified workers.

WARNING

The cable of sensor shall be protected against the impact of oil substances and organic solvents!

COMMISSIONING

After the installation of sensor and connection of the follow-up (evaluation) device to the supply voltage, the equipment is prepared for operation.

OPERATION AND MAINTENANCE

The sensor does not require any operation and maintenance.

SPARE PARTS

The design of the sensor does not require any delivery of spare parts.

WARRANTY

The warranty period is 24 months from the receiving of the product by the customer, unless established otherwise in the purchase contract or other document.
The rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and serial number, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.
The warranty shall not apply to defects caused by unauthorized intervention into the device, its forced mechanical damage or failure to comply with operation conditions of the product and the product manual.

REPAIRS

The sensor must not be disassembled and therefore can not be repaired.

DISABLING AND LIQUIDATION

The product and its package do not include any parts that could impact the environment.
Products that are withdrawn from operation, including their packages (with the exception of products marked as electrical equipment for the purposes of return withdrawal and separate salvage of electrical waste), may be disposed of to sorted or unsorted waste pursuant to the type of waste.
The manufacturer realizes free return withdrawal of marked electrical equipment (from 13.8.2005) from the consumer and points out the danger connected with their illegal disposal.
The package of the sensor can by recycled completely.
Metal parts of the product are recycled, non-recyclable plastic materials and electrical waste shall be disposed of in accordance with applicable legislation.

June 2018

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