



PRODUCT MANUAL

Resistance temperature sensor with thermowell and connector type 210

APPLICATION

- For remote measurement of temperature of steady and running liquids (gases and fluids), for which the properties of the thermowell of the sensor are suitable; measurement is possible up to the temperature and pressure given by the thermowell resistance.

DESCRIPTION

The sensor consists of measuring resistance firmly located in the stem with the connecting screw and connector. The stem with the screw create the protective thermowell.

For temperature measurement a defined change of resistance of the sensor is used in dependence on the change of ambient temperature.

TECHNICAL DATA

Sensor design according to EN 61140 as electric equipment of protection class III for the application in network with category of overvoltage in installation II and pollution grade 2 according to the EN 61010-1, follow-up (evaluation) device shall comply with Article 6.3 the said standards.

- Measuring range:** -40 to 150 °C
Electric strength according to the EN 61010-1, Article 6.8.3: 500 V eff
Electric isolation resistance according to the EN 60751: min. 100 MΩ at 15 to 35°C, max. 80 % relative humidity, min 100 V DC
Nominal pressure of thermowell according to the ČSN 13 0010: PN 40
Ingress protection according to the EN 60529: IP 65
Operation position:

discretionary, the outlet shall not be situated upwards

Type of operation: continuous

Connector: according to the EN 175301-803.

Standardly the grounding terminal is not conductively connected with the metal stem (frame) of the sensor.

Sensor weight

Nominal length L [mm]	weight [g]
50	cca 110
100	cca 130
120	cca 140

Applied materials:

Thermowell	steel 1.4541
Connector	plastic material
Internal conducting	Cu

OPERATION CONDITIONS

The environment defined by the group of parameters and their severity grades IE 36 according to the EN 60721-3-3 and the following operation conditions.

Ambient temperature: (allowed surface temperature of the connector and outlet): - 40 to 90°C

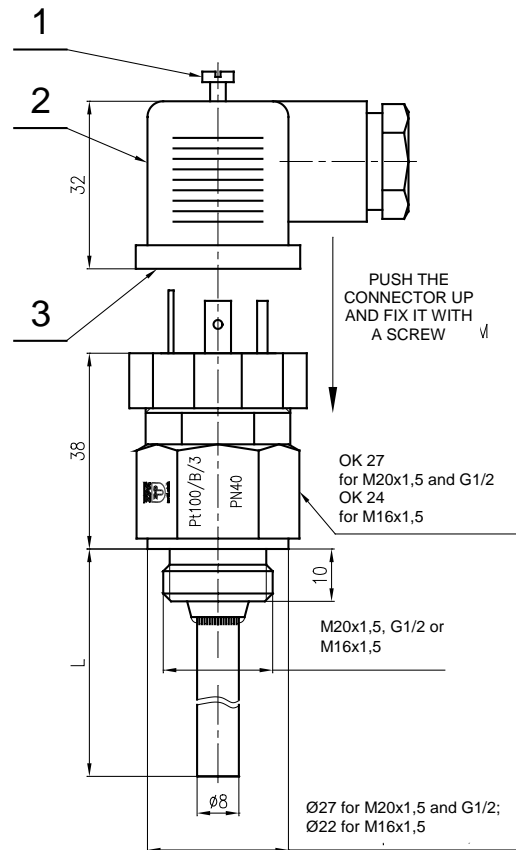
Relative ambient humidity: 10 to 100 % with condensation, with upper level of water content 29 g H₂O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

Maximum speed of liquids flow:
 Air and gass 30 m/s
 water 5 m/s

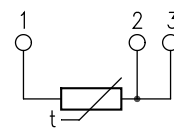
Vibrations

Nominal length L [mm]	50, 100, 120	
Frequency range [Hz]	5 to 8,6	8,6 to 150
Deflection amplitude [mm]	10	0,35
Acceleration amplitude [ms ⁻²]	29,4	49,0

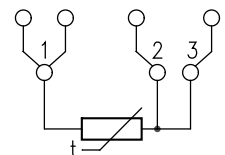


- 1 – fixing screw
 2 - connector
 3 – rubber sealing

SCHEME OF INTERNAL SENSOR WIRING



SCHEME OF CONNECTION SENSOR'S CONNECTOR AS 4-WIRES



METROLOGICAL DATA

Sensing probe: single measuring resistor Pt in connection according the scheme of connecting and design table, $\alpha = 0,00385 [K^{-1}]$, tolerant class B (or A) according to the EN 60751

Internal wiring resistance at 20 °C:

L = 50 mm	0,016 Ω ± 0,01 Ω
L = 100 mm	0,025 Ω ± 0,01 Ω
L = 120 mm	0,030 Ω ± 0,01 Ω

Maximum current load of measuring resistor:

Pt 100	4 mA
Pt 500	2 mA
Pt 1000	1 mA

Recommended measuring current:

Pt 100	1 mA
Pt 500	0,5 mA
Pt 1000	0,3 mA

Calibration depth of immersion: 100 mm

For nominal length L=50mm 65 mm

Temperature response time according to the EN 60751:

In whirling water	$\tau_{0,5}$	10 s
	$\tau_{0,9}$	26 s
in the air (v = cca 1m/s)	$\tau_{0,5}$	2,5 s
	$\tau_{0,9}$	8,6 s

DESIGNATION:

Data on the head label:

- Trade mark of the manufacturer
- Made in the Czech Republic
- Type of resistance sensor, nominal value R_0 / tolerance class / configuration of wires of internal wiring
- Measuring range
- Product ordering number
- Ingress protection
- Serial number
- Nominal pressure of thermowell

DELIVERY

Unless agreed otherwise with the customer, each delivery includes:

- Delivery note
- Sensor pursuant to the purchase order
- Sealing ring
 - o Cu 16 x 22 TPD 62-014-91.21
For connecting screw M16 x 1,5
 - o 21x27 TPD 62-014-91
for connecting screw M20 x 1,5, G 1/2
- suitable welded on piece ordered separately from the catalogue of equipments type 991
- Accompanying technical documentation in Czech
 - o Product manual
 - o Product quality and completeness certificate, which is 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 can be also delivered with the product.

- Copy of the Inspection Certificate 3.1 for material of thermowell with the heat number
- Declaration of Conformity of the supplier pursuant to EN ISO/IEC 17050-1

RELIABILITY

Indicators of reliability in operation conditions and ambient conditions specified herein

- Medium time of operation between failures 96 000 hours (inf. value)

Expected service life 10 years

CALIBRATION

It is realized according to the TPM 3342-94 and in compliance with EN 60751, usually in three points evenly distributed within the operation range of the sensor or in the points according to the requirements of the customer.

PACKING

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

ORDERING OF SENSORS

The purchase order shall specify:

- Name
- Product ordering number
- If calibration is required and in what temperature points
- If the nipple s required according to the type 991
- Other (special) requirements
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Resistant temperature sensor with thermowell and connector
210 221 B
with calibration in points -20, 0 and 30°C
6 pcs

Special request:

Resistant temperature sensor with thermowell and connector
210 921 B, nominal lenght L =80 mm
6 pcs

ORDERING ACCESSORIES

The purchase order shall specify:

- Name
- Product ordering number
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Direct nipple
991 NVP2 M20 13
6 pcs

Special request:

Oblique nipple
991 NS2 999 13, internal tread M16x1,5
6 pcs

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 according to the EN 60721-3-1 (i.e. in places with continuous temperature control 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).

TRANSPORT

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

TABLE 1 - DESIGN OF TEMPERATURE SENSORS WITH THERMOWELL AND CONNECTOR – TYPE 210

SPECIFICATIONS		ORDERING NUMBER				
		210	x	x	x	x
Nominal lenght L [mm]	50		1			
	100		2			
	120		3			
	other (max, 500) *)		9			
Connecting thread	M20 x 1,5			1		
	M16 x 1,5			2		
	G1/2			3		
	other *)			9		
Measuring resistance	Platinum according EN 60751 tolerant class B or A*)	Pt 100/ /3				1
		Pt 500/ /3				2
		Pt 1000/ /3				3
Tolerant class		A *)				A
		B				B

*) only at a special request after an agreement with the manufacturer

TABLE 2 - ACCESSORIES - OVERVIEW OF DESIGN RECOMENDED NIPPLES - TYPE 991 (ordered separately)

SPECIFICATION				ORDERING NUMBER				
				991	xxx	x	xxx	xx
Shape	Direct				NVP			
	Oblique (chamfer 45°)				NVS			
Design	Figure 1	PN	40			1		
	Figure 2					3		
	Other *)					9		
Internal thread Z	M20 x 1.5						M20	
	G 1/2						G12	
	Other *)						999	
Material	1.0308 (**)		Maximum operation temperature [°C]	300				13
	1.4541			550				72
	Other *)							99

*) only as a special request after an agreement with the manufacturer

**) surface treatment of nipples: conservation by fat - by oil

FIGURE 1 - DIMENSIONAL DRAWING OF NIPPLES

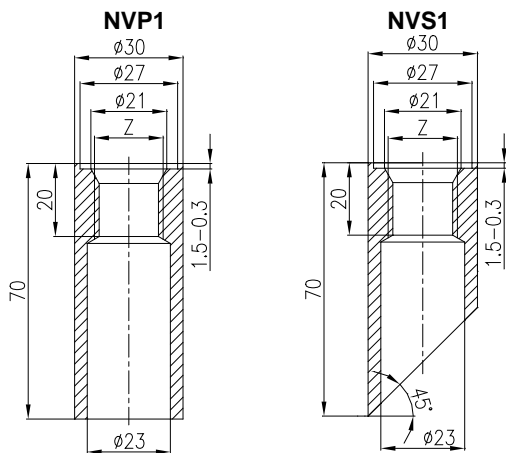


FIGURE 2 - DIMENSIONAL DRAWING OF NIPPLES

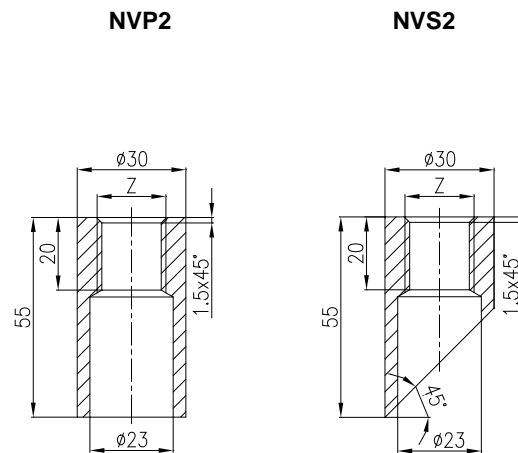


TABLE 3 - OVERVIEW OF THE SEALING RINGS OF TYPE 991 SUPPLIED FOR THE TEMPERATURE SENSORS

EXTERNAL CONNECTING THREAD OF TEMPERATURE SENSOR	SEALING RING			
	DIMENSION [mm] Ød x ØD x t	MATERIAL	NUMBER	ORDERING NUMBER
M20 x 1.5	21 x 27 x 2	copper thermally insulating insert	1 pcs	991 TK 21

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

INSTALLATION AND CONNECTION

SENSOR INSTALLATION

Connect the sensor with screwing into the nipple on the piping or into the appropriate hole fitted with screw. Before connecting put the enclosed sealing ring. During the installation, torque of 70 Nm is recommended. Examples of assembling of direct and oblique nipples you can see on the Figure 1.

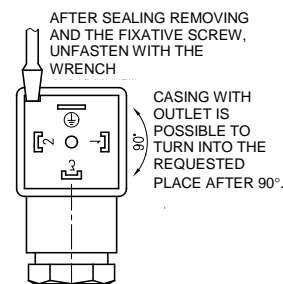
With respect to maintaining metrological properties and the longest possible service life, it is not recommended to install the sensors in places with high turbulence of the medium, which is caused e.g. by a rapid transition from a small diameter of the piping to a larger one (when failing to comply with the required shape and dimensions of diffuser behind the flow meter), etc. recommended distance of the temperature sensor from the installation flange of the flow meter is min. 1m.

ELECTRICAL CONNECTION

The electrical connection may be only realized by qualified workers.

The terminal board of the connecting connector is enterable after unblocking of the central screw of the connector, its removing and terminal board body withdrawal with the wrench according to the picture (terminal board cut).

Connect the evaluation device to the sensor with a cable with double insulation (internal wiring with Cu inside with cross-section about 0,5 to 1,5 mm²). The temperature resistance of insulation of used cable have to agree with allowed temperature of the connector. Fix the cable in the outlet against the release. The outlet is suitable for connecting cable with full diameter 5-9 mm. In the environment with interfering signals, use shielded cables in the power supply circuit. Unless you can exclude the possibility of influencing the measurement, ground the wiring.



From the terminal board of the connector it is possible to connect the sensor with two-, three or four wiring according to the firmness of requirements for resistant elimination internal wiring or resistance of the used cable. The cable outlet on the connector has four possibilities of direction placing of the cable outgoing (after 90°).

WARNING
The grounding terminal in the connector is not standardly connected with the metal thermowell (frame) of the sensor.

COMMISSIONING

After the sensor installation 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 need any operation and maintenance.

SPARE PARTS

The sensor construction does not need any spare parts delivering.

WARRANTY

The warranty period is 24 months from the receiving of the product by the customer, unless established otherwise in the contract. 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 manufacturing numbers, 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 a repair, it shall do so in the original package of the manufacturer and/or in another package insuring 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 sensors shall be repaired by the manufacturer. They shall be sent for repair in the original or equal package without accessories.

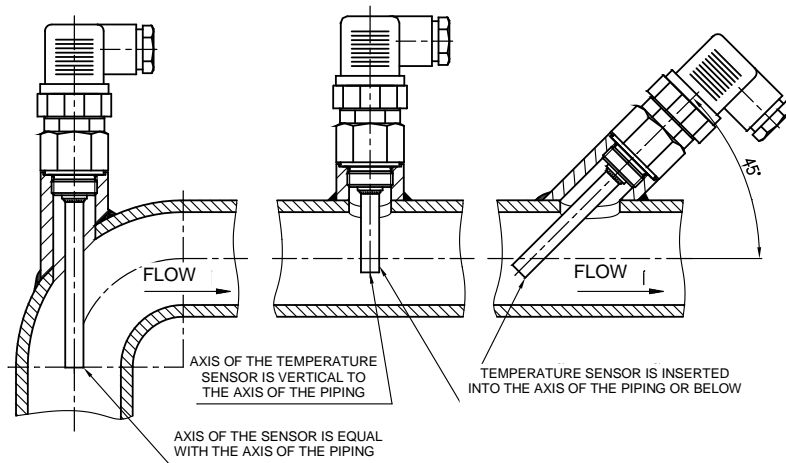
DISABLING AND LIQUIDATION

Both 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 separated collection of electrical waste), may be disposed of to the sorted or unsorted waste according to the type of waste.

The manufacturer ensures 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 be recycled completely. Metal parts of the products are recycled, non-recyclable plastic material and electrical waste shall be disposed of in accordance with applicable legislation.

FIGURE 1 – EXAMPLES OF INSTALLATION OF DIRECT AND OBLIQUE NIPPLES ACCORDING TO EN 1434-2



! WARNING

- When using the sensor with an oblique nipple, locate the sensor with the thermowell at an angle against the direction of flow.
- The sensor may not touch the opposite side of the piping.
- It is also advantageous to use the temperature sensors in the piping elbow. In such a case, locate the sensor with the thermowell against the direction of flow so that the measured medium flows around evenly.

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