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APPLICATION

- For remote measurement of temperature of steady and running liquids (gases and fluids), for which the properties of the thermo well of the sensor are suitable; measurement is possible up to the temperature and pressure given by the thermo well resistance.
- As pressure equipment of category I according to the Decree of the Government 26/2003 Coll. (compliance assessment module A)

The sensors are rated products according to the Act No. 22/1997 Coll. and Declaration of Conformity **ES-210000** is issued for them.

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 thermo well.

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 ČSN EN 61140 ed.2 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 ČSN 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 ČSN EN 61010-1, Article 6.8.4: 500 V eff

Electric isolation resistance according to the ČSN IEC 751, Article 4.2.1: min. 100 MΩ at 15 to 35°C, max. 80 % relative humidity

Nominal pressure of thermo well according to the ČSN 13 0010: PN 40

Ingress protection according to the ČSN EN 60529: IP 65

Operation position: discretionary, the outlet shall not be situated upwards

Type of operation: continuous

Connector: according to the ČSN EN 175301-803 ed.2. Standardly the earthing clip 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:

Thermo well 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 ČSN EN 60721-3-3 and the following operation conditions.

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

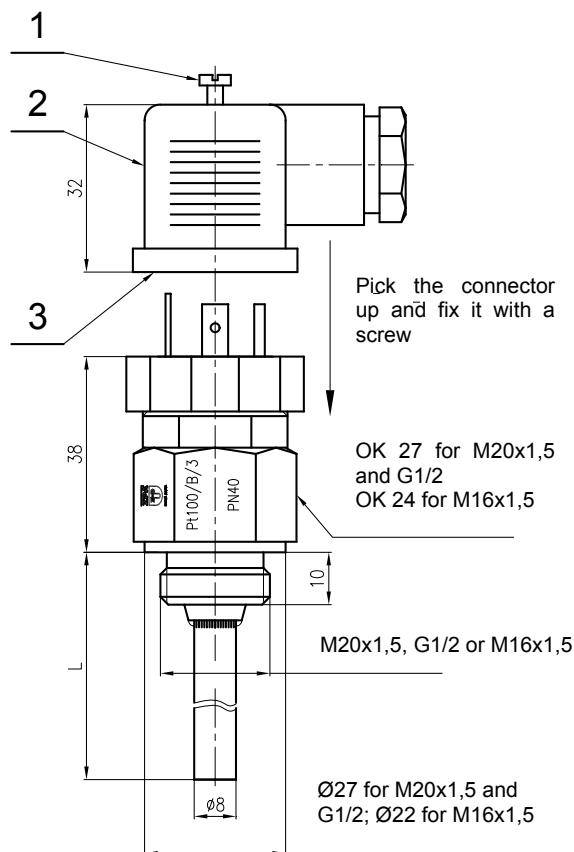
Relativ ambient humidity: 10 to 100 % with condensation, with upper level of water content 29 g H₂O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

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

Vibrations

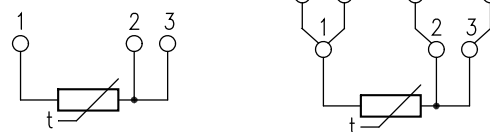
Nominal length L [mm]	50, 100, 120	
Frequency range [Hz]	5 to 8,6	8,6 to 150
Deflection amplitude [mm]	10	0,35
Acceleration amplitude [ms ⁻²]	29,4	49,0



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

Scheme of sensor's connector wiring as 4-wires

Scheme of internal sensor wiring



METROLOGICAL DATA

Detektor: single measuring resistance Pt in connection according to the scheme of connecting and design table, $\alpha = 0,00385 [K^{-1}]$, tolerant class B (or A) according to the ČSN IEC 751

Resistance of internal wiring 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 ČSN IEC 751:	
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
- Manufacturing number
- Nominal pressure of thermo well
- CE mark

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 ½
- suitable welded on piece ordered separately from the catalogue of equipments type 991
- Czech original technician documentation
 - o Product quality and completeness certificate, which is also serves as the warranty certificate
 - o Calibration sheet (for calibrated design)
 - o Product manual

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product.

- A copy of the Inspection Certificate 3.1 for the thermo well material with the casting number.

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.

TRANSPORT

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

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 according to the ČSN 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).

RELIABILITY

Indicators of reliability in service conditions and in environmental conditions mentioned in this product manual.

- mean time of running between failures
96 000 hours (inf.valuation)
- supposed operation time 10 years

ORDERING OF SENSORS

The purchase order shall specify:

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

PURCHASE ORDER EXAMPLE

Standard design:

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

Special request:

Resistant temperature sensor with thermo well and connector
210 921 B, nominal length L =80 mm - 6 pcs

ORDERING OF WELD-ON PIECES

The purchase order shall specify:

- Name
- Product ordering number
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Direct weld-on piece - 991 NVP2 M20 13 – 20 pcs

DESIGN OF TEMPERATURE SENSORS WITH THERMO WELL 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 ČSN IEC 751 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

LIST OF WELD-ON PIECE DESIGNS TYPE 991 – separately ordering

SPECIFICATIONS		ORDERING NUMBER
Direct weld-on piece	Material: carbon steel 11 353.0	991 NVP1 M20 13
	Material: carbon steel 11 353.0	991 NVP1 G12 13
	Material: carbon steel 11 353.0	991 NVP2 M20 13
	Material: corrosion-proof steel 1.4541	991 NVP2 M20 72
Angular weld-on piece	Material: carbon steel 11 353.0	991 NSP1 M20 13
	Material: carbon steel 11 353.0	991 NSP1 G12 13
	Material: carbon steel 11 353.0	991 NSP2 M20 13
	Material: corrosion-proof steel 1.4541	991 NSP2 M20 72

CALIBRATION

It is realized according to the TPM 3342-94 and in compliance with ČSN IEC 751, usually in three points evenly distributed within the operation range of the sensor or in the points according to the requirements of the customer.

INSTALLATION AND CONNECTION

SENSOR INSTALLATION

Connect the sensor with screwing into the weld-on piece on the piping or into the appropriate hole fitted by screw. Before connecting put the enclosed sealing ring. During the installation, torque of 70 Nm is recommended. Examples of assembling of direct and angular weld-on pieces you can see on the picture Nr. 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.

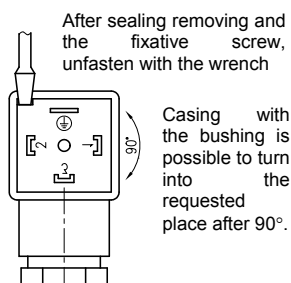
ELECTRICAL CONNECTION

The electrical connection may be only realized by qualified workers according to the § 5 of the Decree 50/1978 Coll.

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 bushing against the release. The bushing 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 resistance elimination internal wiring or resistance of the used cable. The cable bushing on the connector has four possibilities of direction placing of the cable outgoing (after 90°).



WARNING

The earthing clip in the connector is not standardly connected with the metal thermo well of the sensor (bodyframe).

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

According to the § 429 of the Commercial Code and the provisions of § 620 (2) of the Civil Code, the manufacturer warrants for technical and operation parameters of the product specified in the manual. 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

They shall be realized according to the Waste Act. No. 106/2005 Coll.

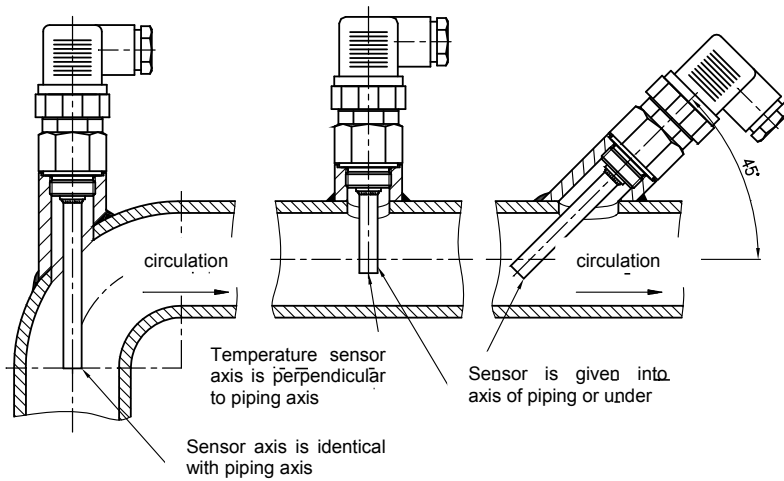
Both the product and its package do not include any parts that could impact the environment.

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 compliance with the aforesaid Act.

FIGURE 1 – EXAMPLES OF INSTALLATION OF DIRECT AND ANGULAR WELD-ON PIECES ACCORDING TO ČSN EN 1434-2



! WARNING

- When using the sensor with an angular weld-on piece, locate the sensor with the thermo well 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 thermo well against the direction of flow so that the measured medium flows around evenly.

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