



FOR DESIGN WITH CONVERTER A MANUAL IS ENCLOSED TO THE RELEVANT CONVERTER

L 250 0.44 kg

APPLICATION

- For remote measurement of temperature of steady and running liquids (gases and fluids), for which properties of the heat sink of the sensor are suitable; measurement may be realized up to the temperature determined by heat sink resistance and nominal pressure PN 16.
- As pressure equipment of category III pursuant to the Decree of the Government 26/2003 Coll. (compliance assessment module B+D)
- For environment requiring seismic resistance from 1 Hz to 33 Hz, acceleration 3g, protocol ČKD Blansko (design without converter)
- In design with converter
 - o To convert signal of the resistance sensor to unified output signal 4 to 20mA or digital signal (converter with HART protocol)
 - o In explosive environment pursuant to the type of the converter EExi (refer to enclosed manual)

The sensors are rated products pursuant to the Act No. 22/1997 Coll. and the following Compliance Certificate is issued for them: **EC-112800** for sensors without converter and **EC-11280P** for sensors with converter.

DESCRIPTION

The sensor consists of a heat sink with adapter and screw-joint for the connection of the sensor to the sleeve of the piping (technological equipment and is firmly connected with the heat with the terminal board or installed two-wire converter (insulated or non-insulated, even in design EExi). The head is provided with a lid and sealing outlet for the connection wiring. The stem tube, into which the measuring resistor with internal wiring is inserted, is welded with the tube of the sleeve in the place of the connecting screw-joint and, as a unit, it forms the heat sink of the sensor. The sensor has no replaceable measuring insert; therefore, it is forbidden to turn the head and dismantle it.

The sensor with converter is supplied from an external source. The installed converter is set-up to the required range at the sensor manufacturer.

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

TECHNICAL DATA

The sensor is designed pursuant to ČSN EN 61140 ed. 2 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 ČSN EN 61010-1, the follow-up (evaluation) device shall comply with Article 6.3 thereof.

Measuring range: -70 to 400°C

In case of application without overpressure, the sensor with internal wiring from a special alloy may be used up to 600°C.

Measuring range of the sensor with converter is given by the range of the selected converter.

Electric strength pursuant to ČSN EN 61010-1 Article 6.8.4: 500 V eff

(only sensor without converter or design with insulated converter)

Electric insulation resistance pursuant to ČSN IEC 751, Article 4.2.1:

min. 100 MΩ, at 15 to 35°C, max. 80 % relative humidity

Power supply of converter:

DC 24 V from source SELV, e.g. INAP 16, INAP 901

Other data of converter: refer to enclosed manual

Nominal pressure pursuant to ČSN 13 0010: PN 16

Ingress protection pursuant to ČSN EN 60529: IP 65

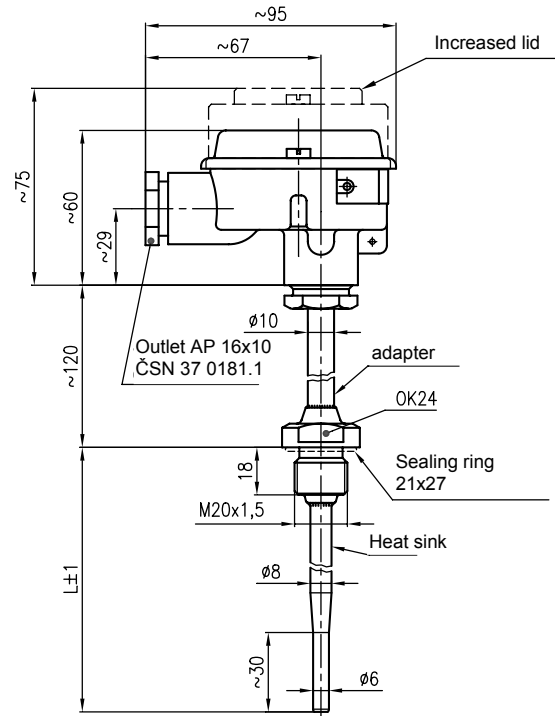
Sensor weight: L 160 approx. 0.42 kg

Operation position:

discretionary; the outlet shall not be situated upwards

Type of operation:

continuous



Applied materials:

Heat sink	steel 1.4541
Adapter	steel class 11 zinc plated
Head	chromated aluminium alloy and painted with aluminium paint
Head clamps of terminal board	brass with Ni surface
Internal wiring without converter)	Ag or special alloy (Ag only for design without converter)

OPERATION CONDITIONS

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

Ambient temperature for sensor head:

for design without converter max. 150 °C
 for design with converter pursuant to the type of converter (refer to enclosed manual)

Relative ambient humidity:

10 to 100 % with condensation, with upper limit of water content 29 g H₂O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

Maximum speed of flow of liquids:

Air and gas: 25 m/s
 Water: 3 m/s

Vibrations:

For nominal length of heat sink L 160 mm	L 250 mm
Frequency range: 10 to 500 Hz	10 to 500 Hz
Drift amplitude 0.2 mm	0.15 mm
Acceleration amplitude 29.4 ms ⁻²	19.6 ms ⁻²

METROLOGICAL DATA

Sensing unit: measuring resistor Pt 100 single or double pursuant to the scheme of connection and table of designs,
 $\alpha = 0.00385 [K^{-1}]$, tolerance class B (or A only for 4 wire) pursuant to ČSN IEC 751

Internal wiring resistance at 20 °C:

Ag	0.053 Ω/m ± 10 %
special alloy	2.45 Ω/m ± 5%

The measured resistance value of internal wiring is specified on the label of the sensor for the design without converter.

Maximum current load of measuring resistor: 5 mA

Recommended measuring current: 1 mA

Output signal of the converter (linear with measured temperature): 4 to 20 mA (+ digital for HART protocol)

Calibration depth of immersion: 100 mm

Temperature response time pursuant to ČSN IEC 751 in

whirling water (characteristic value):	$\tau_{0,5}$	4.5 s
	$\tau_{0,9}$	12.7 s

DESIGNATION:**Data on head label**

- Trademark of the manufacturer
- Made in Czech Republic
- Type of resistance sensor, nominal value R_0 / tolerance class / configuration of wires of internal wiring *)
- Resistance value of internal wiring (for design without converter)
- Measuring range or pre-set converter range
- Product ordering number
- Ingress protection
- Production time code
- Output signal 4 to 20 mA (design with converter)
- Designation of non-explosiveness and number of the EC-Type Examination Certificate (design with converter EExi)
- *) Configuration of wires of internal wiring is not specified for the converter

Data on converter label

- Type of sensor
- Pre-set temperature range

Data on sensor head

- CE mark 1015
- CE mark with identification number of notified person (for converter EExi)

CERTIFICATION**112 80**

- Pressure equipment pursuant to the Decree of the Government 26/2003 Coll., EC-Type Examination Certificate SZÚ Brno

112 80/P

- Pressure equipment pursuant to the Decree of the Government 26/2003 Coll., EC-Type Examination Certificate SZÚ Brno
- Non-explosiveness EExi, EC-Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. (pursuant to the converter type)

DELIVERY

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Sensor pursuant to the purchase order
- Sealing ring 21x27 TDP 62-014-91.21
- Suitable weld-on piece ordered independently from the catalogue of accessories, type 991;
- Optional accessories to the sensor with programmable converter
 - o Configuration (parameterization) programme pursuant to the required converter
 - o Communication modem (for serial port RS 232C) pursuant to the required converter
- Accompanying technical documentation in Czech
 - o Product quality and completeness certificate, which also serves as the warranty certificate
 - o EC Declaration of Conformity
 - o Calibration sheet (for uncertified 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

- Copy of the Inspection Certificate 3.1 for the heat sink material with the casting number
- Copy of the EC-Type Examination Certificate pursuant to the Decree of the Government 26/2003 Coll.
- Copy of the EC-Type Examination Certificate pursuant to the Decree of the Government 23/2003 Coll. (for design with converter EExi)
- Copy of protocol of test results for certification of seismic capability pursuant to ČSN IEC 980.

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 pursuant to 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 pursuant to ČSN 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).

CALIBRATION

The calibration is realized pursuant to TPM 3342-94 and in compliance with ČSN IEC 751, usually in three temperature points evenly distributed within the operation range of the sensor or in the points according to the requirement of the customer. Calibration sheets with measured data are issued for calibrated sensors.

ORDERING TEMPERATURE SENSORS

The purchase order shall specify

- Name
- Product ordering number
- Measuring range (for a different range)
- If calibration is required and in what temperature points
- If a delivery of a weld-on piece pursuant to the type 991 is required for the sensor as accessories
- If optional accessories to the sensor with programmable converter are required
- Other (special) requirements
- Number of pieces

PURCHASE ORDER EXAMPLE**Standard design:**

Resistance temperature sensor with heat sink PN 16, with high mechanical resistance 112 805 712 - 6 pcs

We request a delivery of the confirmation about rated gauge certification

Special request:

Resistance temperature sensor with heat sink PN 16, with high mechanical resistance 112 805 699, L = 200 mm - 6 pcs

ORDERING WELD-ON PIECES

The purchase order shall specify

- Name
- Ordering number of weld-on piece
- Number of pieces

ORDERING NUMBERS OF WELD-ON PIECES, TYPE 991

Weld-on piece, direct - 991 NVP3 M20 13 (material 11 353.0)

Weld-on piece, angular- 991 NVS3 M20 13 (material 11 353.0)

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK PN 16, TYPE 112 80

SPECIFICATIONS			ORDERING NUMBER					
			112 80	5	x	x	x	
Measuring range -70 to 400 °C internal wiring Ag	Measuring resistor pursuant to ČSN IEC 751, tolerance class B	Pt 100/B/2			7	1		
		2 x Pt 100/B/2			8	1		
Measuring range -70 to 400 °C internal wiring of special alloy (when using the sensor without overpressure to 600°C)		Measuring resistor pursuant to ČSN IEC 751, tolerance class A	Pt 100/B/4			6	2	
			Pt 100/B/4C			7	2	
2 x Pt 100/B/2					8	2		
Pt 100/A/4 *)					6	9		
Nominal length L [mm]	Pt 100/A/4C *)				7	9		
	100 *)						1	
	160						2	
	250						3	
		Other, max. 1000 mm *)					9	

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

DESIGN OF TEMPERATURE SENSORS WITH HEAT SINK PN 16 WITH CONVERTER, TYPE 112 80/P

SPECIFICATIONS				ORDERING NUMBER						
				112 80	9	x	0	x	/xxxx	
Measuring resistor pursuant to ČSN IEC 751, tolerance class B or A		Pt 100/B			B					
		Pt 100/A *)			A					
Nominal length L [mm]		100 *)					1			
		160					2			
		250						3		
		Other, max. 1000mm*)						9		
Type of converter	Galvanic separation	Increased lid	EExia	Range [°C]						
Analogue	INPAL 420			-50 to 50				/07		
				-30 to 70				/55		
				0 to 50				/15		
				0 to 100				/18		
				0 to 150				/19		
				0 to 200				/20		
				0 to 250				/21		
				0 to 400				/23		
	APAQ-HRF			Adjustable range				/HRF		
	APAQ-HRFX		•					/HRFX		
Programmable				Programmable range				/TKL		
								TK-L-ex	•	/TKLX
								TK	•	/TK
								TK-ex	•	/TKX
								IPAQ-H	•	/IPAQH
								IPAQ-HX	•	/IPAQHx
								MINIPAQ-HLP		/MINIPAQ
HART protocol								/TKH		
								TK-H-ex	•	/TKHX
								MESO-H	•	/MESOH
								MESO-HX	•	/MESOHX
Other *)		•						/99		
Without converter (for installation of converter by customer)			•					/00		

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

Note: As a default, the sensors are delivered with converter INPAL 420 and specified default ranges. When another range is required, converter APAQ-HRF is used as a default. Specify the required temperature range for in the purchase order in wording. Minimum range of measured temperature shall be entered pursuant to the parameters of the converter. The lower limit of the temperature range is – 40°C, the upper limit of the range is 600°C.

INSTALLATION AND CONNECTION

SENSOR INSTALLATION

Put the enclosed sealing ring on the heat sink of the sensor and install the sensor by screwing into the weld-on piece on the piping (technological equipment). During the installation, torque of 70 Nm is recommended.

Recommended applications of weld-on pieces:

- Direct weld-on piece
 - for piping DN 65 to DN 250 (vertical installation)
- Angular weld-on piece
 - for piping ≤ DN 50 (angular installation or installation in bent)

Examples of weld-on piece applications are provided in Figure 1.



WARNING

The sensor has no replaceable measuring insert; therefore, during the installation and operation of the sensor the head and the heat sink of the sensor may not be turned towards each other – possibility of interruption of internal wiring!

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. 1 m.

ELECTRICAL CONNECTION

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

The terminal board of the sensor (converter) is accessible after the removal of the lid of the head, which is connected with two screws. During the installation, it is necessary to remove the metal label with internal wiring resistance value of sensors with internal wiring made of a special alloy; the label is connected on one of the terminals in the head of the sensor.

Connect the evaluation devices to the sensor with a cable with double insulation with outer diameter from 5 to 12 mm (internal wires with Cu core with cross section 0.5 to 2.5 mm²). Seal the cable outlet of the sensor properly.

In the environment with interfering signals, use shielded cables in the supply circuit. Unless influencing measurement can be excluded, ground the wiring.



WARNING for sensor with converter EExi



Ex parameters shall be complied with pursuant to the enclosed converter manual.

To ensure safety, an intrinsically safe source shall be always used pursuant to the converter manual, e.g. INAP 901, ordering number 901 000 101.

Surface temperature of the converter may not exceed maximum surface temperature for that particular temperature class.

If the converter is installed in a dangerous area, the sensor shall be grounded electrostatically usually via metal grounded piping.

The programmable converter may not be connected to a computer or a HART communicator if the converter is located in environment with a threat of explosion.

COMMISSIONING

After the installation of the sensor and connecting the follow-up (evaluation) device to the supply voltage (and the settlement period of the converter), 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

Pursuant to § 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. 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 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 sensors shall be repaired by the manufacturer. They shall be sent for repair in the original or equal package without accessories.

DISABLING AND LIQUIDATION

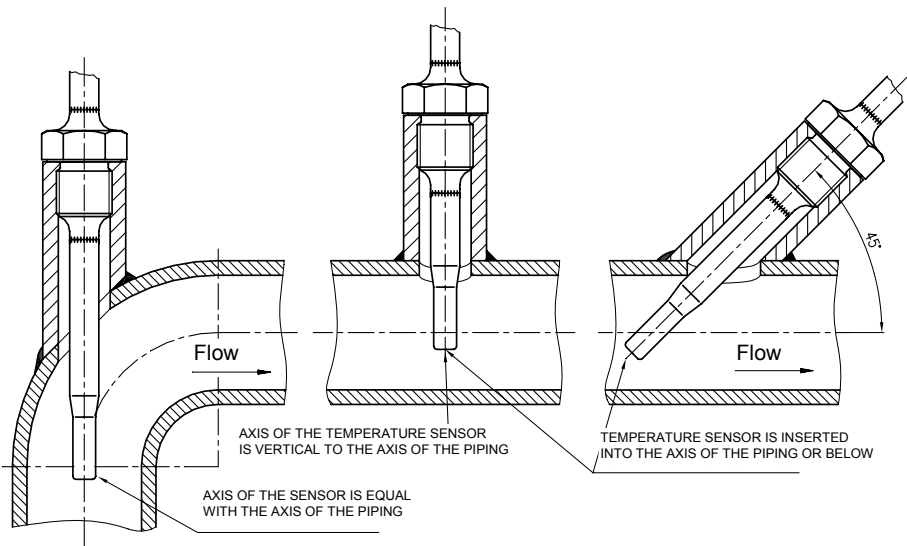
They shall be realized in compliance with the Waste Act No. 106/2005 Coll.

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 be recycled completely. Metal parts of the products are recycled, non-recyclable plastic materials 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 PURSUANT TO ČSN EN 1434-2



WARNING

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

FIGURE 2 – VIEW INTO THE SENSOR HEAD

