



PRODUCT MANUAL

Spatial temperature resistance sensor without converter type 112 12 with converter type 112 12/P

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

APPLICATION

- For remote measurement of temperature of air in indoor and outdoor areas
- Design without converter
 - o For environment requiring seismic resistance from 1 Hz to 33 Hz, acceleration 3g, protocol ČKD Blansko
- 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 converter manual)

The sensors are rated products pursuant to the Act No. 22/1997 Coll. and the Compliance Certificate **EC-11212P** is issued for them.

DESCRIPTION

The sensor consists of a replaceable measuring insert, head and sealing screw-joint. The measuring insert consists of a stem tube with a flange, in which measuring resistor and terminal board or converter (isolated or non-isolated, even in design EExi) are built. The installed converter is set-up to the required range at the sensor manufacturer.

The sensor shall be connected onto the wall by means of a holder.

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: -40 to 150 °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 measuring insert 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:

from source SELV, e.g. INAP 16, INAP 901

Other data of converter: refer to enclosed manual

Ingress protection pursuant to ČSN EN 60529: IP 65

Operation position:

discretionary; the outlet shall not be situated upwards

Weight: approx. 0.4 kg

Type of operation: continuous

Applied materials:

Stem tube of measuring insert steel 1.4541
 Holder steel class 11 painted with synthetic baking enamel
 Head chromated aluminium alloy and painted with aluminium paint
 Internal wiring Cu
 Head terminals of terminal board brass with Ni surface

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 design without converter -40 to 150 °C

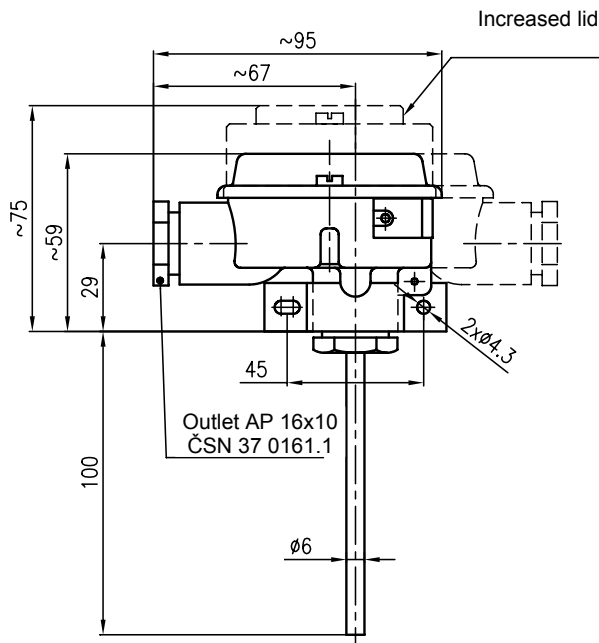
for design with converter pursuant to the converter type (refer to enclosed converter manual)

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 air flow: 25 m/s



Vibrations:

Frequency range 10 to 55 Hz

Drift amplitude 0.15 mm

Acceleration amplitude 19.6 ms⁻²

METROLOGICAL DATA

Sensing unit: measuring resistor Pt single or double in the connection 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
 measuring resistor Ni single or double in the connection pursuant to the scheme of connection and table of designs, $\alpha = 0.00618 [K^{-1}]$, tolerance class B pursuant to DIN 43 760

Internal wiring resistance at 20°C: 0.025 Ω ± 10%

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

Maximum current load of measuring resistor: 3 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 still air (characteristic value):

$\tau_{0.5}$	2.2 min
$\tau_{0.9}$	10.5 min

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 (*)
- Measuring range or pre-set converter range
- Product ordering number
- Ingress protection

- Production time code
- Output signal 4 to 20 mA (design with converter)
- Mark of non-explosiveness and No. of EC-Type Examination Certificate for converter EExi

*) Configuration of wires of internal wiring is not specified for the converter

Data on converter label

- Type of sensor
- Set-up temperature range

Data on head of sensor with converter

- CE mark or CE mark with identification number of notified body (for converter EExi)

DELIVERY

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Sensor pursuant to the purchase order
- 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 Compliance Certificate (for converter EExi)
 - 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:

- EC Compliance Certificate
- Copy of EC-Type Examination Certificate pursuant to the Decree of the Government No. 23/2003 Coll. (for converter EExi)
- Copy of the Inspection Certificate 3.1 for the stem tube material with the casting number
- Copy of protocol of test results for verification of seismic capability pursuant to ČSN IEC 980

CERTIFICATION

112 12/P

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

TABLE 1 - DESIGN OF TEMPERATURE SENSORS, TYPE 112 12

SPECIFICATION				ORDERING NUMBER				
				112 12	5	x	x	x
Measuring resistor	Single in four-wire connection					7		
	Double in two-wire connection					8	B	
	Tolerance class	Pt pursuant to ČSN IEC 751	B				B	
			A *) **)				A	
			Ni (refer to the following table)	B *)			B	
	Pt 100						1	
	Pt 500 *)							2
	Pt 1000 *)							3
	Ni 100 *)							4
	Ni 500 *)							5
Ni 1000 *)							6	

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

**) Tolerance class A only in four-wire connection

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

Class	Tolerance [°C (K)]		ZPA designation
	t < 0 °C	t > 0 °C	
DIN 43760	0.4 + 0.028 t	0.4 + 0.007 t	B

TABLE 3 - DESIGN OF TEMPERATURE SENSORS, TYPE 112 12/P

SPECIFICATION					ORDERING NUMBER						
					112 12	9	7	x	1	/xxxx	
Measuring resistor Pt 100, tolerance class pursuant to ČSN IEC 751								B			
								A			
Type of converter		Galvanic separation	Increased sensor lid	EEx	Range [°C]						
Analogue	INPAL 420				0 to 50						/15
	APAQ-HRF				-30 to 70						/55
	APAQ-HRFX			•	Adjustable range						/HRF /HRFX
Programmable	TK-L				Programmable range						/TKL
	TK-L-ex			•							/TKLX
	TK	•									/TK
	TK-ex	•		•							/TKX
	IPAQ-H	•									/IPAQH
	IPAQ-HX	•		•							/IPAQHX
HART protocol	MINIPAQ-HLP										/MINIPAQ
	TK-H	•									/TKH
	TK-H-ex	•		•							/TKHX
	MESO-H	•									/MESOH
Other *)				•							/99
Without converter (for converter installation 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 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 85°C .

ORDERING

The purchase order shall specify

- Name
- Product ordering number
- Measuring range (for another range)
- If calibration is required and in what temperature points
- If optional accessories to the sensor with programmable converter are required
- Other (special) requirements
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

1. Spatial temperature resistance sensor
112 125 7B1 - 6 pcs
2. Spatial temperature resistance sensor with converter
112 129 7B1/15 - 6 pcs

Special request:

1. Spatial temperature resistance sensor
112 125 7A1 - 6 pcs
2. Spatial temperature resistance sensor with converter
112 129 7A1/15 - 6 pcs

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

It 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.

INSTALLATION AND CONNECTION

The sensors can be connected onto the wall with two screws by means of a holder. The sensor can be turned inside the holder by 180° .

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.

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 mm^2). Seal the cable outlet of the sensor properly. In the environment with interfering signals, it is recommended using shielded cables in the power supply circuit.



WARNING
(it applies to the sensor with converter EExi)
EExi 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 zone, the sensor shall have electrostatic grounding.

Programmable converter may not be connected to a computer or a HART communicator, if the converter is located in explosive environment.

COMMISSIONING

After the installation of the sensor and connection of 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

Spare parts shall be delivered by the manufacturer.

Relevant measuring inserts or a head can be ordered pursuant to the offered price list of spare parts.

Measuring inserts in the tolerance class A are only delivered upon a special request.

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.

VIEW INTO SENSOR HEAD

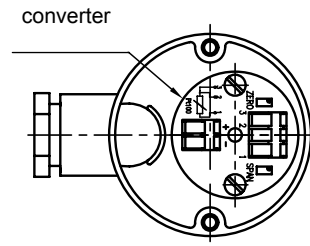
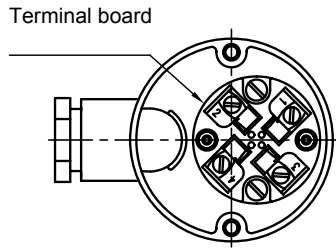
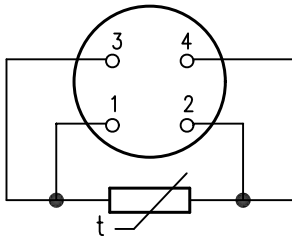
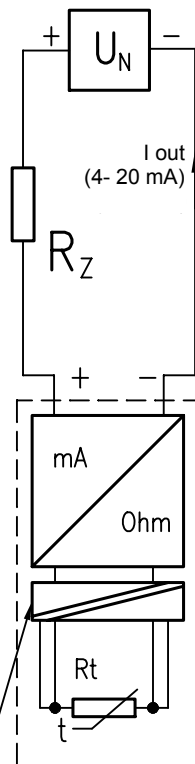
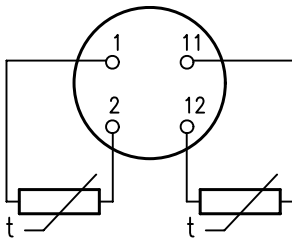


Figure 4 - SCHEME OF CONNECTION OF TEMPERATURE SENSORS
without converter with converter

with single measuring resistor
in four-wire connection
(e.g. Pt 100/B/4)

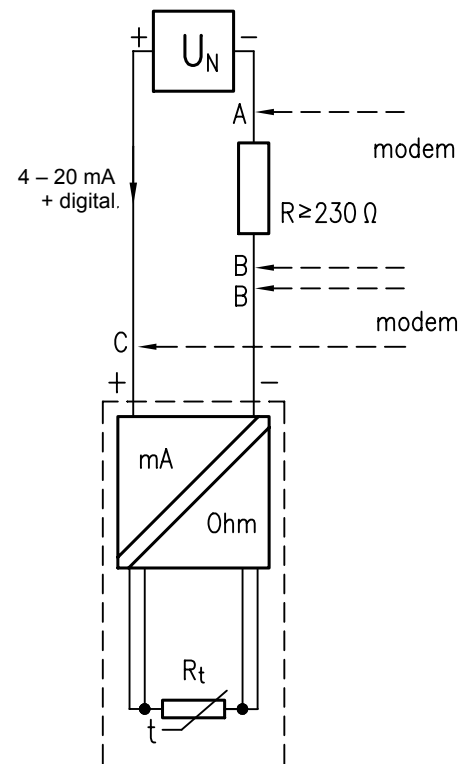


with double measuring resistor
in two-wire connection
(e.g. 2 x Pt 100/B/2)



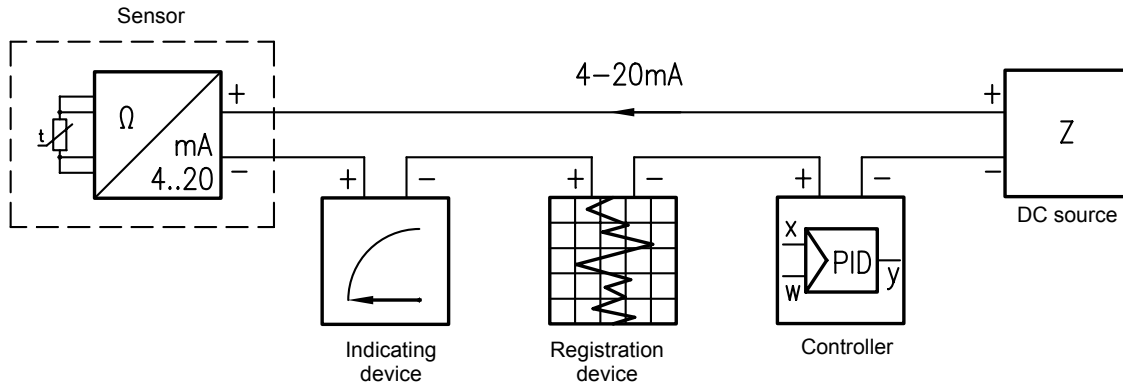
Galvanic separation
pursuant to the converter

with converter
with HART protocol



A-B and B-C options of connection of the control
unit (HART modem, HART communicator)

Figure 5 - EXAMPLE OF OPERATION CONNECTION of temperature sensor with converter in loop 4 - 20 mA



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