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
- For explosive environment in premises Zone 2, Zone 1 and Zone 0 pursuant to EN 60079-10 when using the converter Ex ia or in case of connection to Ex ia circuit
- In design with converter for transfer of resistance sensor signal to unified output signal 4 to 20 mA or digital signal (converter with HART protocol)
- 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)

The sensors with converter are rated products pursuant to the Directive, 2014/30/EU of the European Parliament and the Council and EU Declaration of Conformity **EU-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 Ex ia) 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 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: -40 to 150 °C
Measuring range of the sensor with converter is given by the range of the selected converter.

Electric strength pursuant to EN 61010-1 Article 6.8.3:
500 V eff (only measuring insert without converter or design with insulated converter)

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

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 EN 60529: IP 65

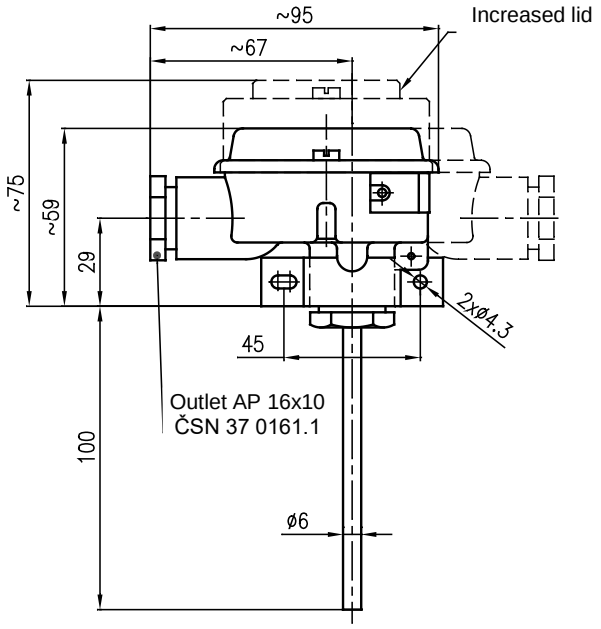
Operation position:
discretionary; the outlet shall not be situated upwards

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 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 H_2O/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,
α = 0.00385 [K^{-1}], tolerance class B (or A only for 4-wire) pursuant to EN 60751
measuring resistor Ni single or double in the connection pursuant to the scheme of connection and table of designs,
α = 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 EN 60751 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
- Time code (Serial number for calibrated design, design with tolerance class A, design with converter)
- Output signal 4 to 20 mA (design with converter)
- Mark of non-explosiveness
  and No. of EC-Type Examination Certificate for converter Ex ia

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

Data on converter label

- Trademark
- Type of sensor
- Set-up temperature range
- Designation of non-explosiveness and EU-Type Examination Certificate number (for design with converter Ex ia)
- CE mark with identification number of the notified person (for design with converter)

Data on head of sensor with converter

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

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 manual
  - o Product quality and completeness certificate, which also serves as the warranty certificate
  - o EU Declaration of Conformity (for converter Ex ia)

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 stem tube material with the casting number
- Calibration sheet (for calibrated design)
- EU Declaration of Conformity
- Copy of EU-Type Examination Certificate pursuant to the Directive No 2014/34/EU (ATEX). for design with converter Ex ia
- Test report about the seismic and the vibration qualification

CERTIFICATION

112 12/P

- Non-explosiveness Ex ia, EU-Type Examination Certificate pursuant to the 2014/34/EU, (pursuant to the type of the converter)

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 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 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

Reliability indicators in operation conditions and ambient conditions specified herein

- Mean time of operation between failures 96 000 hours (inf. 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 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.

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 EN 60751	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 [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 - 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 EN 60751					B				B		
					A *)				A		
Type of converter		Galvanic separation	Increased sensor lid	Ex ia	Range [°C]						
Analogue	INPAL 420				0 to 50						/15
					-30 to 70						/55
	APAQ-HRF				Adjustable range						/HRF
	APAQ-HRFX			●							/HRFX
Programmable	TH100				Programmable range						/TH100
	TH100-ex			●							/TH100X
	TH200										/TH200
	TH200-ex	●		●							/TH200X
	IPAQ-H	●									/IPAQH
	IPAQ-HX	●		●							/IPAQHX
	MINIPAQ-HLP										/MINIPAQ
	IPAQ C330	●									/C300
	IPAQ C330X	●									/C300X
HART protocol	TH300	●									/TH300
	TH300-ex	●		●							/TH300X
	MESO-H	●									/MESOH
	MESO-HX	●		●							/MESOHX
	248 HA NA	●									248HANA
	248 HA I1	●									248HAI1X
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.

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.

FIGURE 4- VIEW INTO SENSOR HEAD

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.

In case of the sensor with HART protocol converter, the maximum length of wiring is defined by the arrangement of wires of the connecting cable. The total length of wiring may be up to 1500 m. It requires a twisted two-wire with shared shielding with the cross section of the core min. 0.5 mm^2. HART communicator is connected to the supply loop of the converter pursuant to Figure 3. To achieve reliable communication, total load resistor of min. 250 Ω shall be in the circuit of the output loop.

INSTALLATION OF THE SENSOR WITH CONVERTER Ex i IN CONDITIONS WITH EXPLOSIVE GASEOUS ATMOSPHERE

In environment with explosive gaseous atmosphere a sensor without converter or sensor with Ex ia converter can be installed.
The sensor installation in conditions with explosive gaseous atmosphere shall comply with the requirements of EN 60079-14.

The sensor without converter can be used as a simple device pursuant to EN 60079-11 Article 5.7 in an intrinsically safe circuit Ex ia pursuant to EN 60079-25. For a simple device, the maximum temperature can be determined from the value of the P0 of the connecting device and the temperature class is determined.

The sensor with converter Ex ia may be used in case of compliance with the parameters Ex ia of the converter according to the enclosed converter manual**.**

Only insulated cables must be used in intrinsically safe circuits which is able to withstand the electrical strength test with a voltage equal to twice the voltage in the intrinsically safe circuit, or 500 V eff (DC 750 V), taking greater of the values.

In case of installation of intrinsically safe circuits, including cables, the maximum permitted inductance, capacity or ratio L/R and surface temperature may not be exceeded. Permitted values can be found out in the documentation of the follow-up equipment or label with the designation. Locate the follow-up equipment outside of the dangerous area. An intrinsically safe source must be always used that is approved for power supply of intrinsically safe equipment in the sense of EN 60079-11.

WARNING

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

Shielding of the cable of the intrinsically safe circuit must be grounded in the same place as the intrinsically safe circuit, the connection must be outside the dangerous area
For the installations in dangerous areas, mutual interconnection is required (bringing to the same potential). To achieve it, terminals on the sensor head can be used.
The sensor need not be connected to the system of mutual interconnection separately if it is installed firmly and has metal interconnection with the structural parts or the piping, which is connected to the system of mutual interconnection.

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.

WARNING

After finish installation of the sensor in the environment with explosive gaseous atmosphere the default device revision and installation must be performed in EN 60079-17.

OPERATION AND MAINTENANCE

The sensor does not require any operation and maintenance.
For the sensor with converter Ex ia maintenance and following regular periodic revisions or continuous supervision of professional personnel are carried out compliance with EN 60079-17.

SPARE PARTS

Spare parts shall be delivered by the manufacturer.
Relevant measuring inserts ore 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

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.

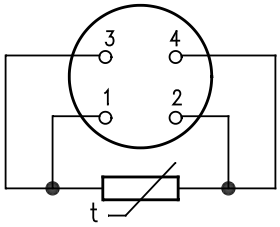
DISABLING AND LIQUIDATION

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 products are recycled, non-recyclable plastic materials and electrical waste shall be disposed of accordance with applicable legislation.

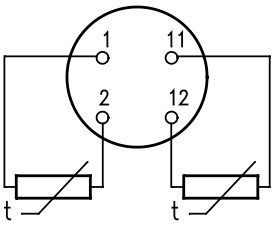
FIGURE 3 – SCHEME OF CONNECTION OF TEMPERATURE SENSORS

WITHOUT 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 × Pt 100/B/2)



WITH CONVERTER

with converter

with converter
with HART protocol

with converter Ex ia

with converter Ex ia
with HART protocol

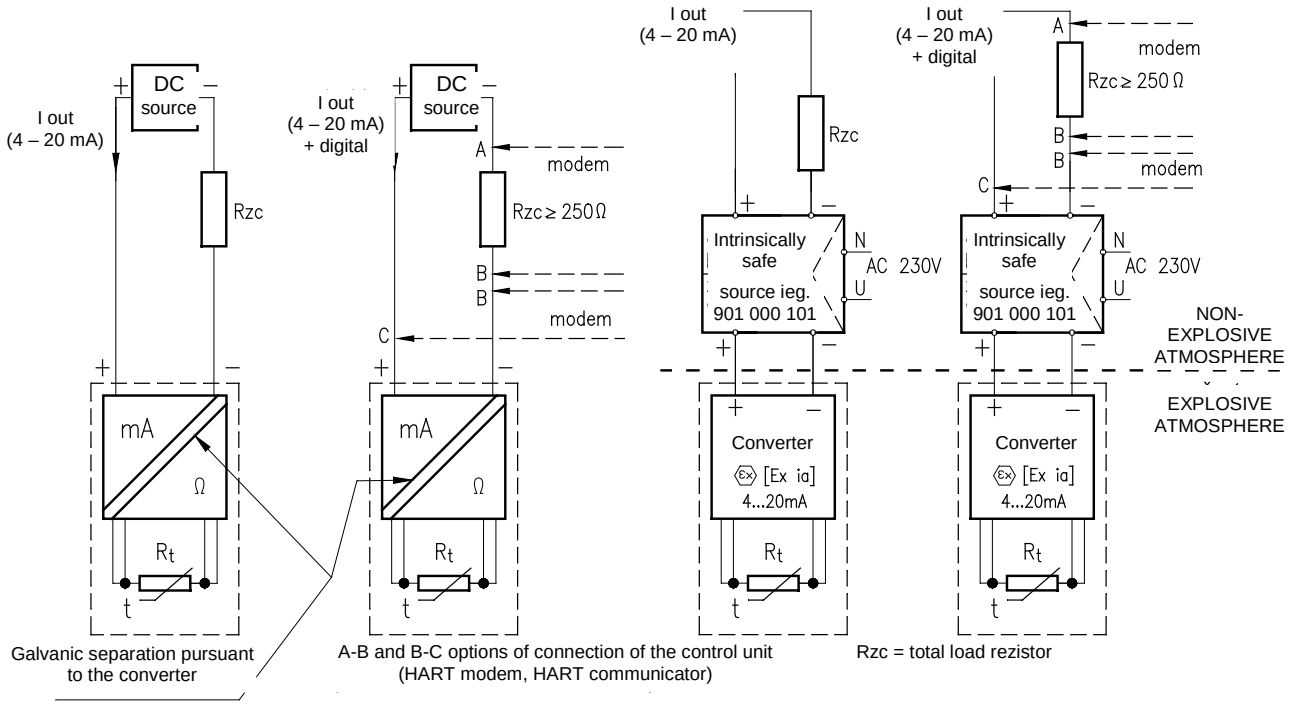
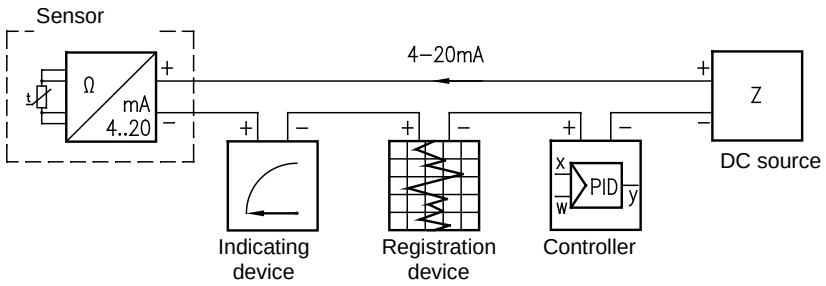


FIGURE 4- EXAMPLE OF OPERATION CONNECTION OF TEMPERATURE SENSOR WITH CONVERTER IN LOOP 4 - 20 mA



Jun 2018

Notified Person No
by Type of Converter

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