Spatial resistance temperature sensor without converter or with converter type 211

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

APPLICATION

- For remote measurement of temperature of indoor and outdoor areas
- Design for interior only for remote measurement of temperature of indoor areas
- Design with converter to convert signal of the resistance sensor to unified output signal 4 to 20 mA
- In the environment with the explosive atmosphere Zone 1 and Zone 2 pursuant to EN 60079-10-1, when using Ex ia converter or when connected to Ex ib circuit pursuant to EN 60079-25

The sensors with converter are rated products pursuant to the Directive 2014/34/EU of the European Parliament and the Council and EU Declaration of Conformity **EU -211000** is issued for them.

DESCRIPTION

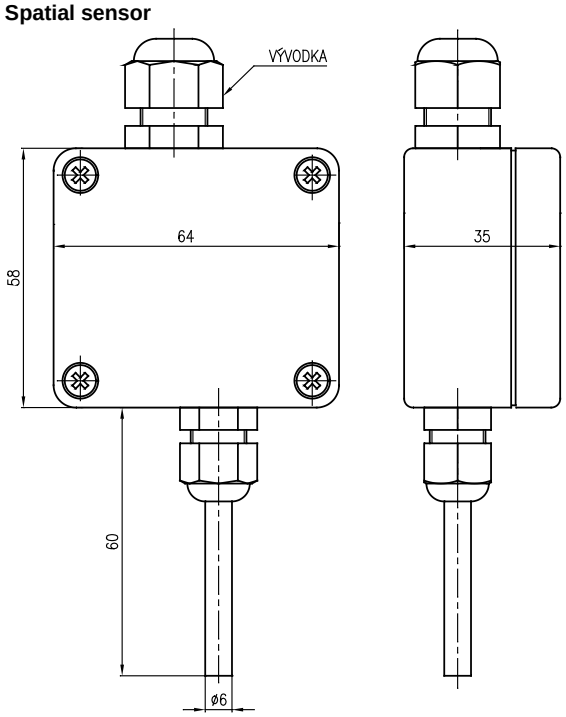
Spatial sensor consists of a stem with a plastic connecting head. The sensor probe (measuring resistor) is located in the stem and is sealed with a special sealing substance. The plastic head is provided with a terminal board or two-wire converter (even in design Ex ia) and outlet for connecting wiring with Ø 4÷8 mm.

The spatial sensor for interior consists of a plastic connecting head with holes enabling flow of air. The sensor probe (measuring resistor) is located inside the head close to holes for air flow. The plastic head is provided with a terminal board and, in the rear part, there is a hole with Ø 10 mm for passing the connecting cable.

The sensor with converter is supplied from an external source. The installed converter is adjusted 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.

Spatial sensor



Spatial sensor for interior

TECHNICAL DATA

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

Measuring range: -30 to 80 °C
Measuring range of the sensor with converter is established by the range of the selected converter.

Electric strength pursuant to EN 61010-1, Article 6.8.3:
500 V eff (only sensor without 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 or INAP 901

Other data of converter: refer to enclosed manual

Ingress Protection pursuant to EN 60529:

in spatial design	IP 65
in spatial design for interior	IP 20

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

Type of operation: continuous

Sensor weight: 89 g
design for interior 70 g

Weight is identified without including weight of converter.

Applied materials:

Stem tube	steel 1.4541
Head	polycarbonate
Head outlet	PA6 + Neoprene sealing
Internal wiring	Cu

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.

Maximum current load of measuring resistor:

Pt 100 or Ni100	3 mA
Pt 500 or Ni 500	1 mA
Pt 1000 or Ni 1000	1 mA

Recommended measuring current:

Pt 100 or Ni100	1 mA
Pt 500 or Ni 500	0.5 mA
Pt 1000 or Ni 1000	0.3 mA

Output signal of the converter (linear with measured temperature): 4 to 20 mA

Calibration depth of immersion: 40 mm

Temperature response time pursuant to EN 60751 in whirling water:

without converter with Pt100 $\tau_{0.5}$ 8.0 s

DESIGNATION:

Data of 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 converter)
- Output signal 4 to 20 mA (design with converter)
- Designation of non-explosiveness and EU-Type Examination Certificate number (for design with converter Ex ia)
- CE mark (design with converter) or CE mark with identification number of notified person (for converter Ex ia)

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

Data on converter label

- Sensor type
- Pre-set temperature range

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

CERTIFICATION

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

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
  - Configuration (parameterization) programme pursuant to the required converter
  - Communication modem (for serial port RS 232C) pursuant to the required converter
- Accompanying technical documentation in Czech
  - Product manual
  - Product quality and completeness certificate, which also serves as the warranty certificate
  - EU Declaration of Conformity (for converter Ex ia)
  - 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 the stem tube material with the heat number
- EU Declaration of Conformity for design with converter
- Copy of EU-Type Examination Certificate pursuant to the Directive No 2014/34/EU for design with converter Ex ia

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 effects).

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11 pursuant to EN 60721-3-1 (i.e. in places with uninterrupted temperature control from 5 to 40 °C and with humidity from 5 to 85%, 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.)

TABLE 1 - DESIGN OF TEMPERATURE SENSORS TO THERMOWELL

SPECIFICATION				ORDERING NUMBER				
				211	x	x	x	/xxxx
Temperature spatial sensor					P			
Temperature spatial sensor for interior ***)					I			
Measuring resistor	Platinum pursuant to EN 60751 tolerance class B or A*) **)	Pt 100/ /4 or 2x Pt 100/B/2				1		
		Pt 500/ /4 or 2x Pt 500/B/2 *) ***)				2		
		Pt 1000/ /4 or 2x Pt 1000/B/2 *) ***)				3		
	Nickel pursuant to DIN 43760 tolerance class B (refer to the table 2)	Ni 100/B/4 or 2x Ni 100/B/2 *) ***)				4	B	
		Ni 500/B/4 or 2x NI 500/B/2 *) ***)				5	B	
		Ni 1000/B/4 or 2x Ni 1000/B/2 *) ***)				6	B	
Tolerance class		A **)					A	
		B					B	
Configuration of wires of internal wiring ***)		Single four-wire						/J4
		Double two-wire					B	/D2
Type of converter		Ex ia	Range [°C]					
Analogue	INPAL 420		-30 to 70			1		/55
			0 to 50			1		/15
			Other *)			1		/99
	APAQ-HRF		Adjustable range			1		/HRF
	APAQ-HRFX *)	●						/HRFX
Programmable	TH 100		Programmable range					/TH100
	TH 100-ex	●						/TH100X
	MINIPAQ-HLP							/MINIPAQ

Standard design

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

**) Measuring resistor in tolerance class A only in four-wire connection

***) Only for design without converter

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 measuring range for converters APAQ and programmable converters 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 –30°C, the upper limit of the range is 80°C.

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

Class	Tolerance [ºC (K)]		Designation ZPA
	t < 0 ºC	t > 0 ºC	
DIN 43760	0.4 + 0.028 | t |	0.4 + 0.007 | t |	B

ORDERING TEMPERATURE SENSORS

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 is required
- Other (special) requirements
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

1. Spatial resistance temperature sensor without converter
   211 P1B/J4
   6 pcs
2. Spatial resistance temperature sensor with converter
   211 P1B/TH100X
   6 pcs

Special requirement:

Spatial resistance temperature sensor without converter
211 P1A/J4
6 pcs

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.

INSTALLATION AND CONNECTION

SENSOR INSTALLATION

Install the temperature sensor on the wall with two screws inserted into the holes for installation, which are accessible after removing the lid.
The operation position of the sensors is discretionary (the position with the outlet facing upwards is recommended).

ELECTRICAL CONNECTION

The electrical connection may be only realized by qualified workers.
The terminal board of the sensor (converter) is accessible after the removal of the lid of the head, which is connected with four screws.
Connect the evaluation devices to the sensor with a cable with double insulation (internal wires with Cu core with cross section 0.5 to 1 mm^2) with outer diameter 4÷8mm. Seal the cable outlet of the sensor properly. In the environment with interfering signals, use shielded cables in the supply circuit. If it is not possible to exclude influencing the measurement, ground the wiring.
In case of the design 1xPt100 - four-wire, the connection with a smaller number of wires (three-wire or two-wire) is solved by non-connecting the applicable clamp(s).
In case of the design 2xPt100 - two-wire, the connection with a bigger number of wires (three-wire or four-wire) is solved by adding the relevant wires from the terminal board of the sensor.

INSTALLATION OF THE SENSOR IN ENVIRONMENT WITH EXPLOSIVE GASEOUS ATMOSPHERE

In environment with explosive gaseous atmosphere, either a sensor without converter (211P) or a sensor with an Ex ia converter can be installed.
The installation of the sensor in the environment with explosive gaseous atmosphere shall comply with the requirements of EN 60079-14.

WARNING

Due to the potential danger of electrostatic charging, the sensor can only be used in zone 1 and 2 of the gas group IIA and IIB.

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 P_0 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**.**

In case of installation of intrinsically safe circuits, including cables, the maximum permitted inductance, capacity or ratio LiR 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

The programmable converter may not be connected to a computer 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.
If the intrinsically safe circuit is isolated from the ground, the shield must be connected in one place to the protective bonding system

COMMISSIONING

After the sensor installation 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 **in the environment with explosive gaseous atmosphere** maintenance and following regular periodic revisions or continuous supervision of professional personnel are carried out compliance with EN 60079-17.

SPARE PARTS

The design of the sensor does not require any delivery of spare parts.

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.

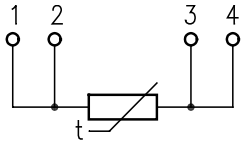
DISABLING AND LIQUIDATION

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 in accordance with applicable legislation.

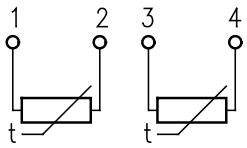
FIGURE 1 - SCHEME OF CONNECTION OF TEMPERATURE SENSORS

without converter **with converter**

with single measuring resistor
in four-wire connection
(Pt 100/ /4)



with double measuring resistor
in two-wire connection
(2 × Pt 100/B/2)



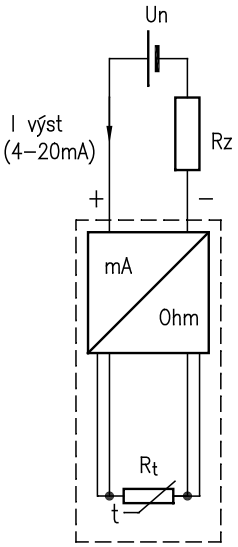


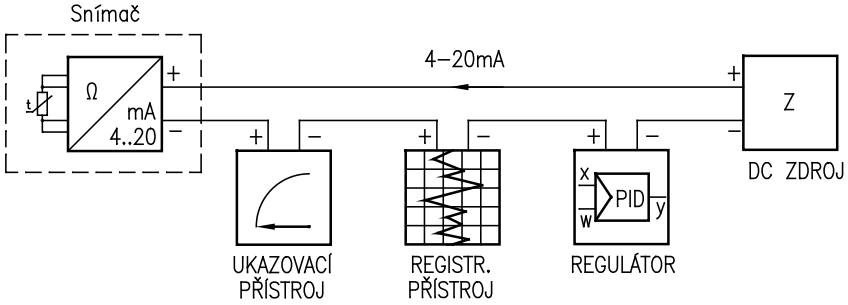
FIGURE 2 - VIEW INTO SENSOR HEAD

without converter **with converter**

v

view into head of sensor for interior

FIGURE 1 – EXAMPLE OF OPERATION CONNECTION of temperature sensor with converter in loop 4 - 20 mA



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