

**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
  - o To convert signal of the resistance sensor to unified output signal 4 to 20 mA
  - o In explosive environment pursuant to the type of the converter EExi (refer to enclosed converter manual)

The sensors with converter are rated products pursuant to the Act No. 22/1997 Coll. and Compliance Certificate **EC-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 EExi) and outlet for connecting wiring with  $\varnothing 4-8$  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  $\varnothing 10$  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.

### TECHNICAL DATA

The sensor is designed pursuant to ČSN 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 ČSN EN 61010-1, Article 6.8.4:  
500 V eff

(only sensor without converter)

**Electric insulation resistance** pursuant to ČSN IEC 751, Article 4.2.1:  
min. 100 M $\Omega$ , at 15 to 35°C, max. 80 % relative humidity

**Power supply of converter:**  
from source SELV, e.g. INAP 16, INAP 30, INAP 31 or INAP 901

**Other data of converter:** refer to enclosed manual

**Coverage** pursuant to ČSN 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:** design I – 70 g, design P – 89 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

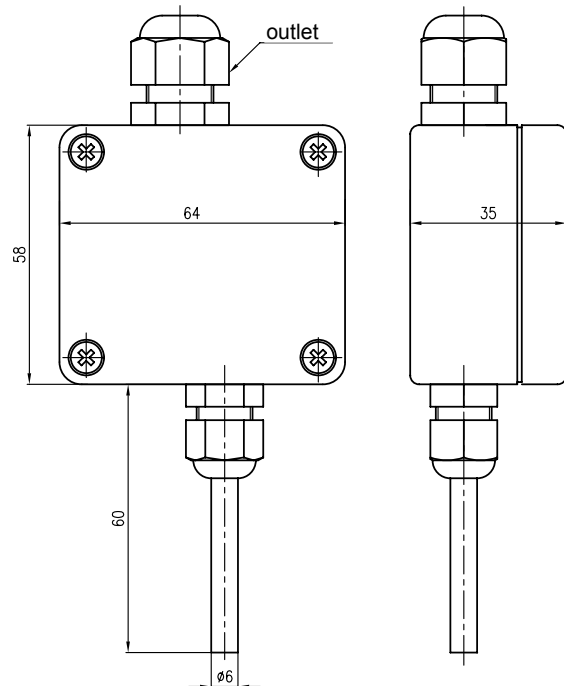
### OPERATION CONDITIONS

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

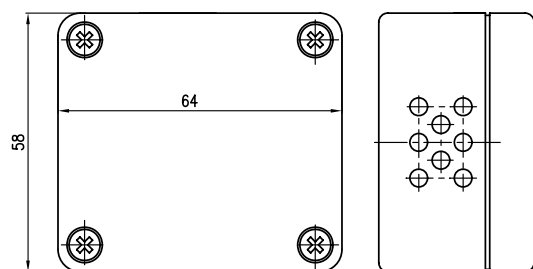
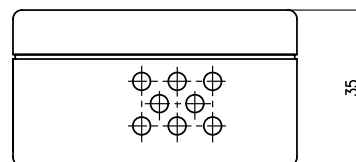
**Ambient temperature** (permitted surface temperature of head and outlet): -30 to 80°C

### Relative ambient humidity:

10 to 100 % with condensation, with upper limit of water content 29 g H<sub>2</sub>O/kg of dry air



**Spatial sensor for interior**



**Atmospheric pressure:**

70 to 106 kPa

### Vibrations:

Frequency range [Hz]	10 to 500
Drift amplitude [mm]	0.2
Acceleration amplitude [ms <sup>-2</sup> ]	30

### METROLOGICAL DATA

**Sensor:** measuring resistor Pt single or double in connection pursuant to scheme of connection and table of designs,  
 $\alpha = 0.00385$  [K<sup>-1</sup>], tolerance class B (or A only for 4-wire) pursuant to ČSN IEC 751

measuring resistor Ni single or double in connection pursuant to 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 0.012  $\Omega$

**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:** 50 mm

**Temperature response time** pursuant to ČSN IEC 751 in whirling water:

without converter  $\tau_{0.5}$  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
- Coverage
- Production time code
- Output signal 4 to 20 mA (design with converter)
- Designation of non-explosiveness and No. of EC Certificate of type test (design with converter EExi)
- CE mark (design with converter) or CE mark with identification number of notified person (for converter EExi)

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

**Data on converter label**

- Sensor type
- Pre-set temperature range

**CERTIFICATION**

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

**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

- Copy of the Inspection Certificate 3.1 for the stem tube material with the casting number
- EC Compliance Certificate for design with converter
- Copy of EC Certificate of type test pursuant to the Decree of the Government 23/2003 Coll. for design with converter EExi

**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 effects).

**STORAGE**

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11 pursuant to ČSN 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.)

**DESIGN OF TEMPERATURE SENSORS TO HEAT SINK**

SPECIFICATION			ORDERING NUMBER				
			211	x	x	x	/xxxx
Temperature spatial sensor				P			
Temperature spatial sensor for interior ***)				I			
Measuring resistor	Platinum pursuant to ČSN IEC 751 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 following table)	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		EExia					
		Range [°C]					
Analogue	INPAL 420	-30 to 70			1		/55
		0 to 50			1		/15
		Other *)			1		/99
	APAQ-HRF APAQ-HRFX *)	•			Adjustable range	1	/HRF /HRFX
Programmable	TK-L						/TKL
	TK-L-ex *)	•			Programmable range		/TKLX

\*) 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  $-30^{\circ}\text{C}$ , the upper limit of the range is  $80^{\circ}\text{C}$ .

### TOLERANCE CLASS OF NICKEL MEASURING RESISTORS PURSUANT TO DIN 43760

Class	Tolerance [ $^{\circ}\text{C}$ (K)]		Designation ZPA
	$t < 0^{\circ}\text{C}$	$t > 0^{\circ}\text{C}$	
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:

Spatial resistance temperature sensor without converter  
211 P1B/J4 - 6 pcs

#### Special requirement:

Spatial resistance temperature sensor with converter  
211 P1B/TKLX - 6 pcs

### 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

#### 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 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 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  $1 \text{ mm}^2$ ) with outer diameter  $4+8\text{mm}$ . 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.



**WARNING for sensor with converter EExi**  
EExi parameters shall be complied with pursuant to the enclosed converter manual.

To ensure safety, a spark-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.**

**The programmable converter may not be connected to a computer if the converter is located in explosive environment.**

### 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.

### 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.

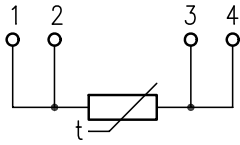
The product and its package do not include any parts that could impact the environment.

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.

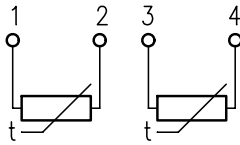
The manufacturer realizes free return withdrawal of marked electrical equipment (from 13.8.2005) from the consumer and points out the danger connected with their illegal disposal. The package of the sensor can be recycled completely. Metal parts of the products are recycled, non-recyclable plastic materials and electrical waste shall be disposed of in compliance with the aforesaid Act.

**FIGURE 2 - SCHEME OF CONNECTION OF TEMPERATURE SENSORS without converter**

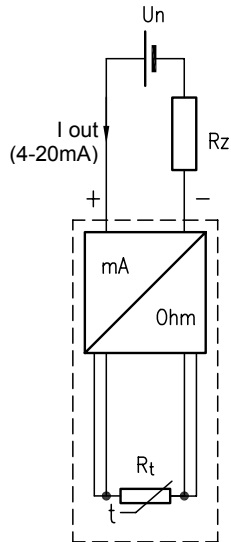
with single measuring resistor in four-wire connection (Pt 100/ I4)



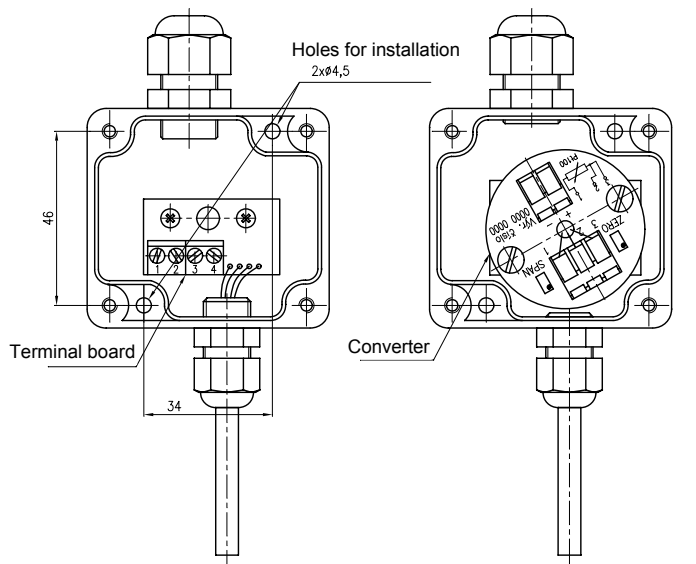
with double measuring resistor in two-wire connection (2 x Pt 100/B/2)



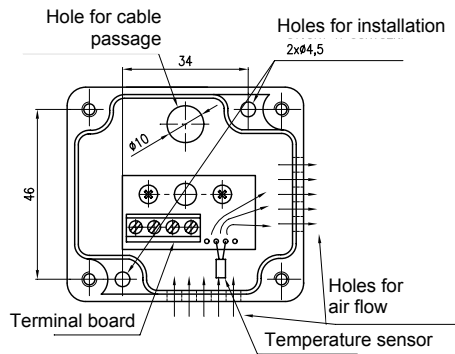
**with converter**



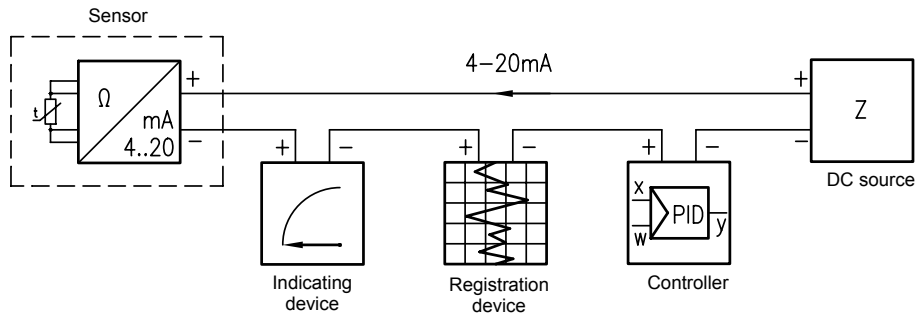
**FIGURE 3 - VIEW INTO SENSOR HEAD without converter**



**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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