

# TEMPERATURE SENSORS WITH A STEM AND PLASTIC CONNECTION HEAD



## DESCRIPTION AND APPLICATION

These resistance-type sensors are intended for contact temperature measurements of liquid or gaseous substances. The plastic connection head is provided with a cable outlet ending (the terminal board is placed in the connection head) or a connector. The sensor-central holder combination is suitable for temperature measurements in air condition ducts. The sensor-thermowell combination is suitable for temperature measurements in tubing. The sensor variant with welded thread is ideal for direct measuring of mediums in ducts. The standard operating temperature range is -30 to 150 °C. By using a sensor with a longer stem the upper limit of allowable temperature can be extended up to 250 °C. The sensors can be utilised for any control systems that are compatible with sensing element output signals or output signals quoted in the table of sensing element types. Easy mounting of the temperature sensor is ensured by the unique "S head" design invented by Sensit s.r.o. The sensors are designed to be operated in a chemically non-aggressive environment.



## ACCESSORIES

- The central plastic holder – it is part of the sensor
- The thermowell JS 130
- The metal central holder K120
- For the version with connector:
  - led-in connector ELKA 4012 or RKCS 4/9
  - connection cable with the straight-type RKT connector
  - connection cable with the rectangular-type RKWT connector.

## DECLARATION, CERTIFICATES, CALIBRATION

**Declaration of Conformity** – in accordance with EN ISO/IEC 17050-1 standard as amended for sensors with resistance output.

**EC Declaration of Conformity** – in accordance with Act No. 22/1997 Coll. as amended for sensors with an output of 4 to 20 mA, 0 to 10 V and frequency.

**Calibration** – we perform standard calibration of resistance temperature sensors in accordance with EN ISO/IEC 17025 standard in the temperature range of the stated type of sensor.

## SPECIFICATIONS

### BASIC DATA

Sensor type (K – with connector)	NS 120 NS 120K	NS 121 NS 121K	NS 122 NS 122K	NS 320 NS 320K	NS 321 NS 321K
Type of sensing element	Ni 1000/5000	Ni 1000/6180	Ni 891	Ni 10000/5000	Ni 10000/6180
Measuring range	-30 to 150 °C				
Maximum measuring DC current	1 mA	1 mA	1 mA	0.3 mA	0.3 mA

Sensor type (K – with connector)	NS 123 NS 123K	PTS 120 PTS 120K	PTS 220 PTS 220K	PTS 320 PTS 320K	HS 120 HS 120K
Type of sensing element	T1 = Ni 2226	PT 100/3850	PT 500/3850	PT 1000/3850	thermistor NTC 20 kΩ
Measuring range	-30 to 150 °C	-50 to 150 °C (connection head ambient temperature -30 to 100 °C)			-30 to 150 °C
Maximum measuring DC current	0.7 mA	3 mA	1.5 mA	1 mA	10 mW *)

\*) maximum power consumption

Sensor type (K – with connector)	NS 520 NS 520K	NS 720 NS 720K	NS 820 NS 820K	Note
Type of sensing element	Pt 1000/3850	Pt 1000/3850	Pt 1000/3850	
Output signal	4 to 20 mA	0 to 10 V	1 to 5 kHz 2 to 10 kHz 3 to 15 kHz	
Measuring ranges	-50 to 50 °C -30 to 60 °C 0 to 35 °C 0 to 100 °C 0 to 150 °C 0 to 200 °C 0 to 250 °C	-30 to 60 °C 0 to 35 °C 0 to 100 °C 0 to 150 °C 0 to 200 °C 0 to 250 °C	Any measuring range, minimum span 50 °C	Connection head ambient temperature -30 to 80 °C; for NS 820(K) -30 to 70 °C
Power supply (V <sub>cc</sub> )	11 to 30 V DC	15 to 30 V DC	8 to 30 V DC	Recommended value 24 V DC; Recommended power supply for NS 820(K) 12 V DC Axima AXSP3P02012
Maximum voltage ripple V <sub>cc</sub>	0.5 %	0.5 %	0.5 %	
Load resistance	50(V <sub>cc</sub> -10) Ω	> 50 kΩ	> 1 kΩ	
Output signal - sensing element break	> 24 mA	> 10.5 V	Adjustable (< low range or high range>)	
Output signal - sensing element short	< 3.5 mA	~ 0 V		

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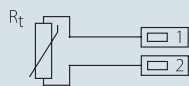
## OTHER PARAMETERS

Accuracy class	Ni sensing elements: class B, $\Delta t = \pm (0.4 + 0.007t)$ , for $t \geq 0$ ; $\Delta t = \pm (0.4 + 0.028 t )$ , for $t \leq 0$ in °C; Pt sensing elements: class B according to IEC 751, $\Delta t = \pm (0.3 + 0.005 t )$ in °C NTC 20 k $\Omega$ : $\pm 1$ °C for the range 0 to 70 °C
Measuring error for NS 520(K), NS 720(K) and NS 820(K)	< 0.6 % of the measuring range, minimum 0.5 °C NS 820(K) 0.5 °C for range with a span < 100 °C, < 0.6 % of the range with a span > 100 °C
Sensor connection	according to the wiring diagram
Standard length of stem L1	70, 120, 180, 240, 300, 360, 420 mm
Time response	$t_{0.5} < 9$ s (in streaming water at 0.4 m.s <sup>-1</sup> )
Recommended wire cross section - sensors with the grommet	0.35 to 1.5 mm <sup>2</sup>
Type of connector in the head - sensors with connector	RSFM4 - Lumberg
Insulation resistance	> 200 M $\Omega$ at 500 V DC, 25° $\pm$ 3 °C; humidity < 85 %
Ingress protection	IP 65 according to EN 60 529
Material of the sensor stem	stainless steel 1.4301
Material of the connection head	POLYAMID
Operating conditions	ambient temperature: -30 to 100 °C; -30 to 80 °C with a converter; -30 to 70 °C with frequency output relative humidity: max. 85 % (at the ambient temperature 25 °C) atmospheric pressure: 87 to 107 kPa
Mass	approximately 0.15 kg

## WIRING DIAGRAM

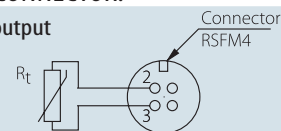
### SENSOR WITH THE GROMMET:

With resistance-type output



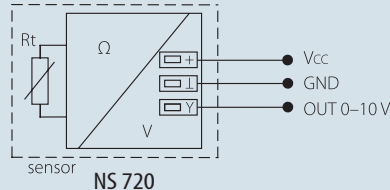
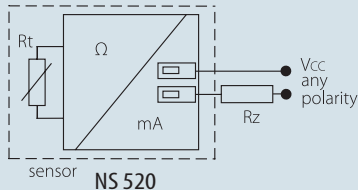
### SENSOR WITH THE CONNECTOR:

With resistance-type output

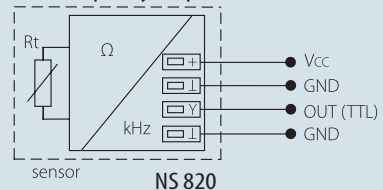


### SENSOR WITH THE GROMMET:

With the converter

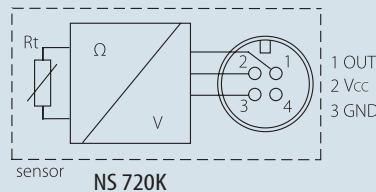
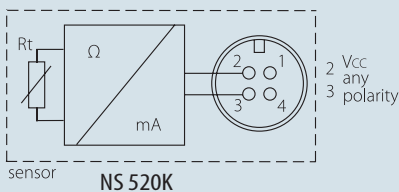


With frequency output

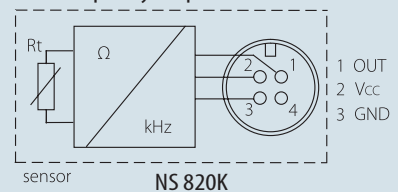


### SENSOR WITH THE CONNECTOR:

With the converter

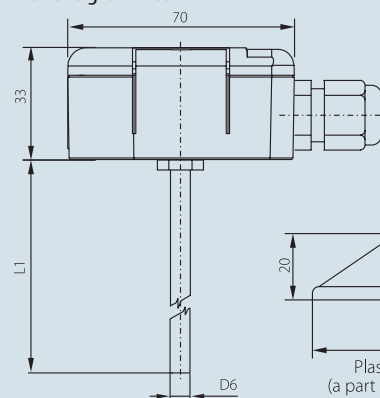


With frequency output

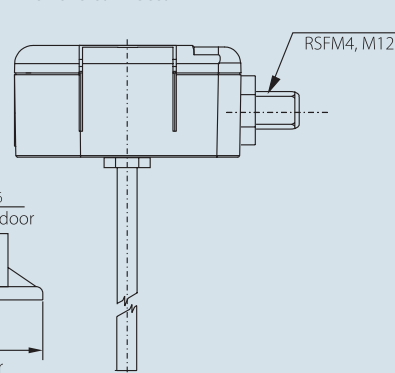


## DIMENSIONAL DRAFT

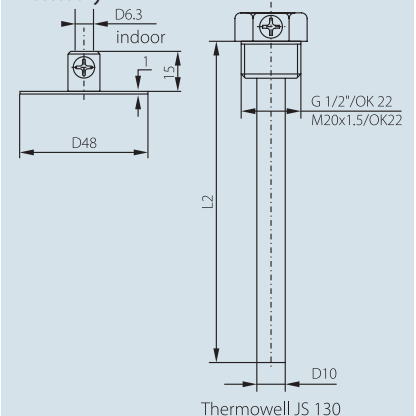
With the grommet



With the connector



Accessory



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### ■ SENSOR INSTALLATION AND SERVICING

#### SENSORS WITH GROMMET:

Before connecting the supply lead-in cable, lift off the lid of the plastic connection head by means of a flat screwdriver. The lead-in cable is connected to the terminals according to the wiring diagram through the loosened grommet. The recommended wire cross section is 0.35 to 1.5 mm<sup>2</sup>, the outer diameter of the circular cross-section cable can range between 4 and 8 mm. To insure the ingress protection value of IP 65, the grommet has to be tightened and the lid has to be put on after connecting the lead-in cable.

#### SENSORS WITH CONNECTOR:

The lead-in cable with connector is connected to the connector RSFM4, which is the part of the sensor head. Optionally the stand-alone connector ELKA 4012, or a lead-in cable of the length of 5 m equipped with a straight-type RKT connector, or with a rectangular-type RKWT connector may be delivered. To insure the ingress protection value of IP 65 the connectors and the lid of sensor have to be tightened and checked.

In case the lead-in cable is laid in the vicinity of high voltage conductors or those supplying equipment creating disturbing electromagnetic field (e.g. inductive load equipment), a shielded cable should be used. In case of using a stainless steel thermowell or a stainless steel holder these accessories should be placed first in the location where the temperature will be measured. Then the sensor is inserted into the holder, or pushed as far as the thermowell bottom, and tightened with a screw. The openings for the plastic clip installation have to be drilled according to the dimensioned sketch on which the opening diameters and the distances of their centres are illustrated.

After installing and connecting the sensor to the sequential evaluating electrical equipment the sensor is ready to use. The sensor does not require any special servicing or maintenance. The device can be operated in any working position, but the grommet must not be directed upwards.

### ■ CUSTOMER SPECIFIC MODIFICATIONS

REGARDING TO SENSORS MANUFACTURED IN A STANDARD VERSION THE FOLLOWING PARAMETERS CAN BE MODIFIED:

- option of encasing two sensors
- option of encasing non-standard temperature sensors (DALLAS, TSic, KTY, SMT, etc.)
- A class precision (with the exception of sensors Ni 10000/5000, Ni 10000/6180, T1 = Ni 2226, thermistor NTC 20 kΩ)
- option of three- or four-wire connection
- variable stem design – L1 length, materials, diameters, option of thread design
- thermowell thread type options