

DESCRIPTION AND APPLICATION

These resistance-type sensors are intended for contact temperature measurements of liquid or gaseous substances. The sensor consists of a metal measuring stem and a plastic connection head. All metal component parts are made of the stainless steel EN X5CrNi18-10 (DIN 1.4301). The basic lengths of the measuring stems are 70, 120, 180, 240, 300, 360 and 420 mm. The plastic connection head is provided with a cable outlet ending (the terminal board is placed in the connection head) or a connector. All these sensor types meet the IP 65 ingress protection requirements according to the EN 60 529 standard. The plastic holder is a part of the sensor. As accessory can be delivered: stainless steel thermowell JS 130, metal central holder for temperatures over 150 °C, and for the versions with connector the lead-in connector ELKA 4012 or connecting cables with the straight-type RKT connector or the rectangular-type RKWT 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 sensors can be utilised for any control system that is compatible with sensing element types or output signals quoted in the specification table. 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. For the HS 120 and HS 120K thermistor sensors, the upper limit of allowable temperature is 150 °C. For the NS 122 and NS 122K sensors, this upper limit is 200 °C. The sensors are designed to be operated in a chemically non-aggressive environment.



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	Ni 2226	PT 100/3850	PT 500/3850	PT 1000/3850	thermistor NTC 20 kΩ
Measuring range	-30 to 150 °C (connection head ambient temperature -30 to 100 °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	Note
Type of sensing element	Pt 1000/3850	Pt 1000/3850	
Output signal	4 to 20 mA	0 to 10 V	
Measuring ranges	-30 to 60 °C	-30 to 60 °C	Connection head ambient temperature -30 to 80 °C
	0 to 35 °C	0 to 35 °C	
	0 to 100 °C	0 to 100 °C	
	0 to 150 °C	0 to 150 °C	
	0 to 200 °C	0 to 200 °C	
Power supply (U _{NAP})	11 to 30 V DC	15 to 30 V DC	Recommended value 24 V DC
Maximum voltage ripple U _{NAP}	0,5 %	0,5 %	
Load resistance	50(U _{NAP} -10) Ω	> 50 kΩ	
Output signal - sensing element break	> 24 mA	> 10,5 V	
Output signal - sensing element short	< 3,5 mA	~ 0 V	

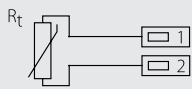
OTHER PARAMETERS:

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 Ω : ± 1 °C for the range 0 to 70 °C
Measuring error for NS 520 and NS 720	< 0,6 % of the measuring range, minimum 0,5 °C
Sensor connection	according to the wiring diagram
Standard length of stem L1	70, 120, 180, 240, 300, 360, 420 mm
Time response	$\tau_{0.5} < 9$ s (in streaming water at 0,4 m.s ⁻¹)
Recommended wire cross section - sensors with the grommet	0,35 to 1,5 mm ²
Type of connector in the head - sensors with connector	RSFM4 - Lumberg
Insulation resistance	> 200 M Ω 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 EN X5CrNi18-10 (DIN 1.4301)
Material of the connection head	POLYAMID
Operating conditions	ambient temperature: -30 to 100 °C; -30 to 80 °C with a converter relative humidity: max. 85 % (at the ambient temperature 25 °C) atmospheric pressure: 87 to 107 kPa
Mass	approximately 0,15 kg

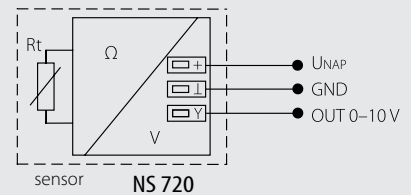
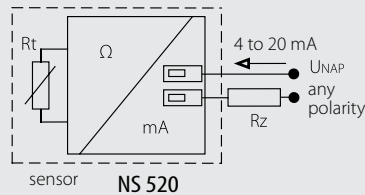
WIRING DIAGRAM

SENSOR WITH THE GROMMET:

With resistance-type output

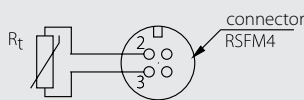


With the converter

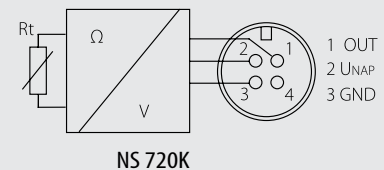
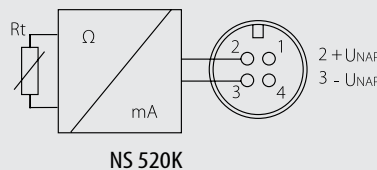


SENSORS WITH THE CONNECTOR:

With resistance-type output

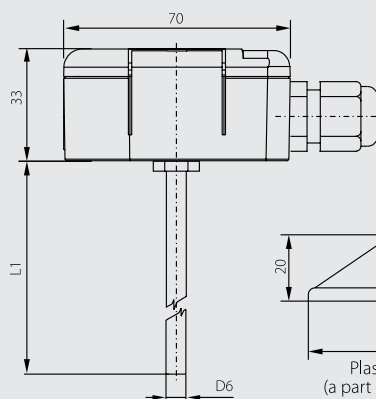


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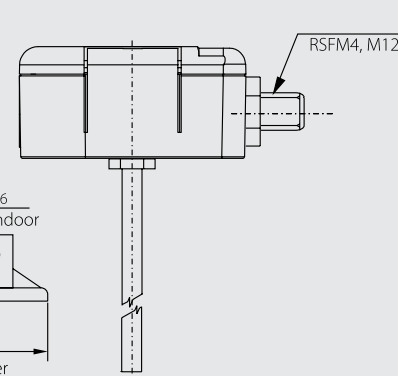


DIMENSIONAL DRAFT

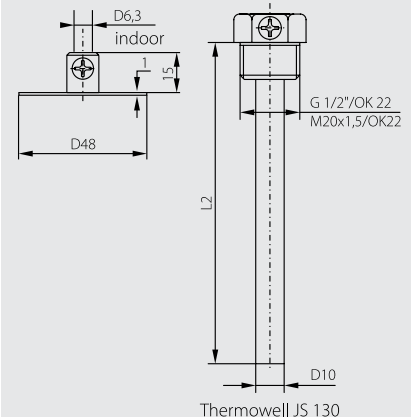
With the grommet



With the connector



Accessory



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 mm², 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 ELKA4012, 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:

- sensor length up to 6 m (from 1 m length the pipe D6 x 1 is used)
- possibility to encapsulate two sensing elements
- possibility to use a 3-wire or a 4-wire connection
- A class of accuracy (except for the Ni 10000/5000, Ni 10000/6180, Ni 2226, and the thermistor NTC 20 kΩ sensing elements)
- change of the stem version (threaded versions, etc.)
- change of the stainless steel material, e.g. to DIN 1.4571
- possibility to encapsulate other resistance-type elements for temperature measurements: KTY, SMT 160 - 30 etc.
- thermowell thread type options

HOW TO ORDER

Temp. sensors featuring a stem and a plastic conn. head	1	A	2	C	C	D	D	0	0	G	G	G	G
plastic connection head	0												
plastic connection head with connector	3												
output 4–20 mA			0	A									
output 0–10 V			0	V									
Ni 1000/5000 (N1), class B			0	1									
Ni 1000/5000 (N1), class A			0	2									
Ni 1000/6180 (N1A), class B			0	3									
Ni 1000/6180 (N1A), class A			0	4									
Pt 100/3850, class B			0	6									
Pt 100/3850, class A			0	7									
Pt 500/3850, class B			0	9									
Pt 500/3850, class A			1	0									
Pt 1000/3850, class B			1	1									
Pt 1000/3850, class A			1	2									
Ni 891			1	4									
NTC 20 kΩ			1	5									
Ni 2226			1	6									
Ni 10000/5000 (N10), class B			1	7									
Ni 10000/6180 (N10A), class B			1	8									
with resistive output			0	0									
-30 to 60 °C			0	1									
0 to 35 °C			0	2									
0 to 100 °C			0	3									
0 to 150 °C			0	4									
0 to 200 °C			0	7									
0 to 250 °C			0	5									
Stem length L1								70 mm	0	0	7	0	
								120 mm	0	1	2	0	
								180 mm	0	1	8	0	
								240 mm	0	2	4	0	
								300 mm	0	3	0	0	
								360 mm	0	3	6	0	
								420 mm	0	4	2	0	

Central holder – Stainless steel, K 120	9	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Thermowell – Stainless steel, JS 130	9	0	0	1	B	B	0	1	0	0	G	G	G	G	
Thread	G 1/2"		0	1											
	M 20 x 1,5		0	3											
Thermowell length L2	50 mm	0	0	5	0										
	100 mm	0	1	0	0										
	160 mm	0	1	6	0										
	220 mm	0	2	2	0										
	280 mm	0	2	8	0										
	340 mm	0	3	4	0										
400 mm	0	4	0	0											

WHEN ORDERING GOODS, THE FOLLOWING DATA ARE REQUIRED:

Required data	Example
Product type	NS 520
Resistance type / 4 to 20 mA / 0 to 10 V	4 to 20 mA
Temperature range	-30 to 60 °C (not necessary to quote in resistance-type sensors)
Stem length	240 mm
Accessories – thermowell (length, thread)	Thermowell JS 130 (220 mm, G 1/2")
– metal holder	NONE

Required data	Example
Product type	NS 520K
Resistance type / 4 to 20 mA / 0 to 10 V	4 to 20 mA
Temperature range	-30 to 60 °C (not necessary to quote in resistance-type sensors)
Stem length	240 mm
Accessories – thermowell (length, thread)	Thermowell JS 130 (220 mm, G 1/2")
– metal holder	NONE
– lead-in connector	NONE

When not agree with the customer otherwise, the accuracy class is B.

DELIVERY

The sensors are packed in the box by 1 or 2 pieces.

Each delivery contains, if not agreed with the customer otherwise: plastic central holder including a drilling template.

In addition, the following accessories and documents may be provided together with the product:

- accessory:
 - thermowell JS 130
 - central holder made of stainless steel, K 120 (for the sensor up to 250 °C)
- lead-in connector ELKA4012
- lead-in cable with the straight connector RKT
- lead-in cable with the rectangular connector RKWT
- calibration sheet
- EU Declaration of Conformity (for the NS 520, NS 520K, NS 720 and NS 720K).