

## DESCRIPTION AND APPLICATION

These resistance-type sensors are intended for contact measurements of temperatures of liquid and gaseous substances. These sensors are produced in two versions: the small connection head with the resistance-type output and the big connection head with the output 4–20 mA. Furthermore, there are versions with a grommet or a connector. The sensor stem as well as the connection head are made of the stainless steel EN X5CrNi18-10 (DIN 1.4301). The basic lengths of the measuring stems are 70, 120, 180 and 240 mm.

As accessory can be delivered: the stainless steel thermowell JS 130, the metal central holder for temperatures over 150°C and for version with connector the lead-in connector ELKA4012 or lead-in cable with the straight-type RKT connector or rectangular-type RKWT connector.

The sensors are designed to be used in the food-processing industry mainly. The sensor - central holder combination is suitable for temperature measurement in air condition ducts. The sensor - thermowell combination is suitable for temperature measurement in tubing. The sensors can be utilised for any control system that is compatible with sensing elements or output signals quoted in the specification table.

The standard temperature range in which the active sensors are allowed to be utilised is -30 to +150 °C, for the passive sensors the range is -30 to +200 °C. All these sensor types meet the IP 67 ingress protection requirements according to the EN 60 529 standard.

The sensors are designed to be operated in a chemically non-aggressive environment.



## SPECIFICATIONS

### BASIC DATA

Sensor type (K – with connector)	NS 180P NS 180K	NS 181P NS 181K	NS 182P NS 182K	NS 380P NS 380K	NS 381P NS 381K
Type of sensing element	Ni 1000/5000	Ni 1000/6180	Ni 891	Ni 10000/5000	Ni 10000/6180
Measuring range	-30 to 200 °C (connection head ambient temperature -30 to 100 °C)				
Maximum measuring DC current	1 mA	1 mA	1 mA	0,3 mA	0,3 mA

Sensor type (K – with connector)	NS 183P NS 183K	PTS 180P PTS 180K	PTS 280P PTS 280K	PTS 380P PTS 380K	HS 180P HS 180K
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	-30 to 200 °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	1 mW *)

\*) maximum power consumption

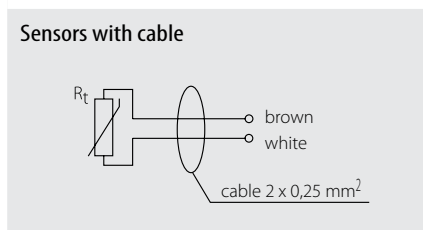
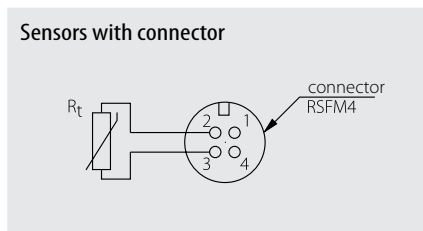
Sensor type (K – with connector)	PTS 580P PTS 580K	Note
Type of sensing element	Pt 1000/3850	
Output signal	4 to 20 mA	
Measuring ranges	-30 to 60 °C 0 to 35 °C 0 to 100 °C 0 to 150 °C	Connection head ambient temperature -30 to 80 °C
Power supply (U <sub>NAP</sub> )	12 to 30 V DC	Recommended value 24 V DC
Maximum voltage ripple U <sub>NAP</sub>	0,5 %	
Load resistance	50(U <sub>NAP</sub> -11) Ω	
Output signal - sensing element break	> 24 mA	
Output signal - sensing element short	< 3,5 mA	

## OTHER PARAMETERS:

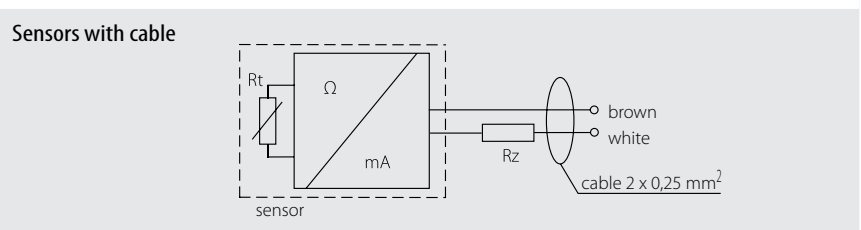
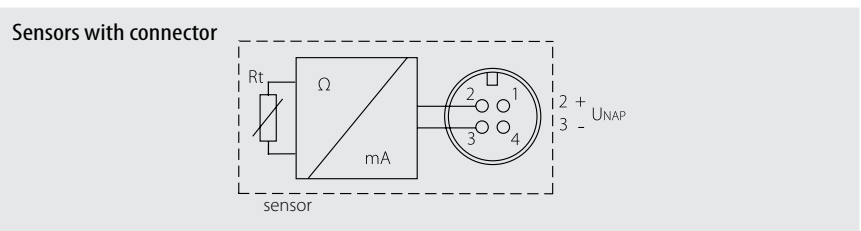
Accuracy class	Ni sensing elements: B class, $\Delta t = \pm (0,4 + 0,007t)$ , for $t \geq 0$ ; $\Delta t = \pm (0,4 + 0,028 t )$ , for $t \leq 0$ in °C; Pt sensing elements: B class according to IEC 751, $\Delta t = \pm (0,3 + 0,005 t )$ in °C NTC 20 k $\Omega$ : $\pm 1$ °C for the range 0 to 70 °C
Measuring error	< 0,6 % of the measuring range, minimum 0,5 °C
Sensor connection	according to the wiring diagram
Standard length of the stem L1	70, 120, 180, 240 mm
Time response	$\tau_{0,5} < 9$ s (in streaming water at 0,4 m.s <sup>-1</sup> )
Lead-in cable – version with cable	PVC shielded 2 x 0,25 mm <sup>2</sup>
Type of connector in the head – sensors with connector	Lumberg RSFM4, M 12
Standard lengths of the cable	1, 2, 5, 10 m
Insulation resistance	> 200 M $\Omega$ at 500 V DC, 25° $\pm$ 3 °C; humidity < 85 %
Ingress protection	IP 67 according to EN 60 529
Material of the stem	stainless steel EN X5CrNi18-10 (DIN 1.4301)
Material of the connection head	stainless steel EN X5CrNi18-10 (DIN 1.4301)
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 0,25 kg

## WIRING DIAGRAM

### SENSORS WITH A RESISTANCE OUTPUT:



### SENSORS WITH CURRENT OUTPUT:



## SENSOR INSTALLATION AND SERVICING

**SENSORS WITH THE GROMMET:** The temperature sensor is positioned in the location of temperature measurement by means of a thermowell or a stainless steel holder, and the lead-in cable is connected to the terminals of the sensing device according to the wiring diagram. To secure the ingress protection value of IP 67 the tightness of the grommet must be checked. This grommet is a component part of the sensor's connection head.

**SENSORS WITH CONNECTOR:** The temperature sensor is positioned in the location of temperature measurement by means of the thermowell or the stainless steel holder. To the RSFM 4 connector, which is a component part of the connection head, the lead-in cable provided with a connector is connected according to the wiring diagram. Optionally the stand-alone connector ELKA, or a lead-in cable of the length of 5 m equipped with a straight connector of RKT type, or with a rectangular connector of RKWT type may be delivered. To secure the ingress protection value of IP 67 the proper tightness of the connectors must be 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. The openings for the stainless steel holder installation have to be drilled according to the attached template, on which the opening diameters are depicted, too. In case of using the stainless steel thermowell or the holder these accessories must first be positioned in the temperature measurement location, then the sensor will be inserted into the holder, or, as the case may be, as far as to the thermowell bottom, and then secured with a screw.

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

## CUSTOMER SPECIFIC MODIFICATIONS

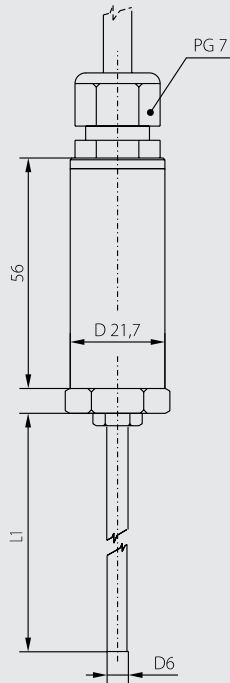
REGARDING TO SENSORS MANUFACTURED IN A STANDARD VERSION THE FOLLOWING PARAMETERS CAN BE MODIFIED:

- changing the sensor cable length – version with grommet
- changing the sensor stem length
- changing the stem design – the fast response version, etc.
- changing the stainless steel type

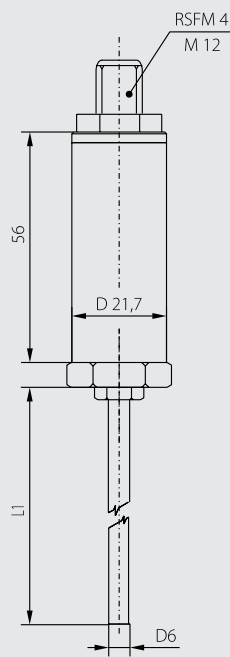
## DIMENSIONAL DRAFT

SENSORS WITH CURRENT OUTPUT:

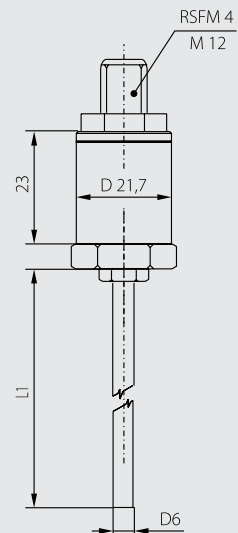
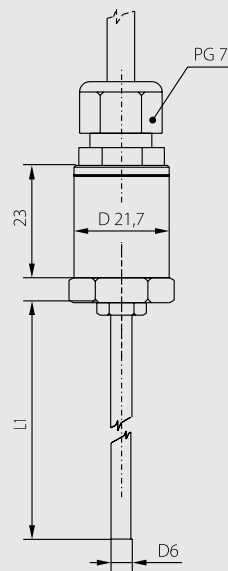
PTS 580P



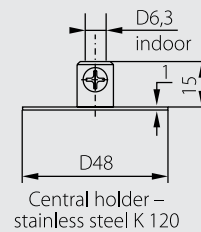
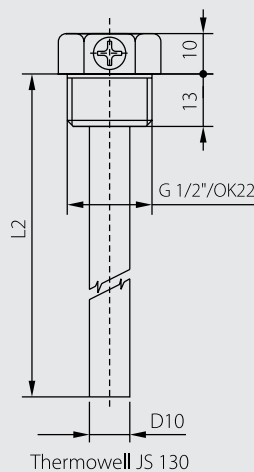
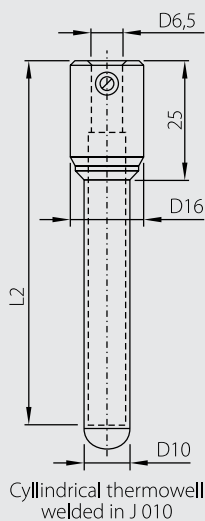
PTS 580K



SENSORS WITH RESISTANCE OUTPUT:



### Accessory



## HOW TO ORDER

Temp. sensors with a stainless steel conn. head	1	2	6	C	C	D	D	E	0	G	G	G	G	H	H
output 4–20 mA				0	A										
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								
with the cable								0							
with the connector								1							
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			
													with the connector	0	0
													with the cable 2 m	0	2

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								
Stem 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		

Central holder – Stainless steel, K 120	9	0	0	0	0	0	0	1	0	0	0	0	0	0
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### WHEN ORDERING GOODS, THE FOLLOWING DATA ARE REQUIRED:

Required data	Example
Product type	PTS 580P
Temperature range	-30 to 60 °C
Length of the stem	120 mm
Cable (length) / connector	cable 2 m
Accessory – thermowell (length, thread)	NO
– central holder	YES

The accuracy class is the B class if not stated otherwise.

## DELIVERY

The sensors are packed in the box by 1 piece including silicone vaseline

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

- thermowell JS 130
- central holder, stainless steel, K120
- lead-in connector ELKA 4012
- lead-in cable with straight connector RKT of the length 5 m
- lead-in cable with rectangular connector RKWT of the length 5 m
- a calibration sheet
- the EU Declaration of Conformity (for the PTS 580 sensors).