

## DESCRIPTION AND APPLICATION

These resistance-type temperature sensors of serie MINI are designed for temperature measurements of liquid or gaseous substances in the temperature range -30 °C to 150 °C. They are produced in two variants: with the outlet for cable or with the connector (smaller head - description K). The sensor with the outlet for cable is produced also with the output 4 to 20 mA. The stem of the sensor is 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.

Standard delivery contents central plastic holder. Sensors with the output 4 to 20 mA are delivered with the cable of the length 2, 5 or 10 m.

As accessory can be delivered: the stainless steel thermowell JS130, central metal holder and for the version with connector the lead-in connector ELKA4012, the lead-in cable with straight connector RKT or rectangular connector RKWT. The variant with central holder is designed for temperature measurement for example in air condition ducts. The version of sensor with thermowell is established for temperature measurements in pipes. The sensors can be used for all control systems which are compatible with the sensor elements mentioned in the table of specifications.

The sensors meet ingress protection IP 65 according to EN 60 529 and are designed to be operated in a chemically non-aggressive environment.



## SPECIFICATIONS

### BASIC DATA

Sensor type (K – with connector)	MINI N 120 MINI N 120K	MINI N 121 MINI N 121K	MINI N 122 MINI N 122K	MINI N 320 MINI N 320K	MINI N 321 MINI N 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 (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)	MINI N 123 MINI N 123K	MINI P 120 MINI P 120K	MINI P 220 MINI P 220K	MINI P 320 MINI P 320K	MINI H 120 MINI H 120K
Type of sensing element	Ni 2226	PT 100/3850	PT 500/3850	PT 1000/3850	thermistor NTC 20 kΩ
Measuring range	-30 to 100 °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

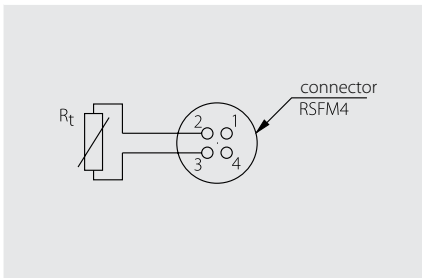
Sensor type	MINI N 520	Note
Type of sensing element	Pt 1000/3850	
Output signal	4 to 20 mA	
Measuring ranges	-30 to 60 °C 0 to 35 °C 0 to 100 °C 0 to 150 °C	Connection head ambient temperature -30 to 80 °C
Power supply (U <sub>NAP</sub> )	10 to 30 V DC	Recommended value 24 V DC
Maximum voltage ripple U <sub>NAP</sub>	0,5 %	
Load resistance R <sub>Z</sub>	50(U <sub>NAP</sub> -9) Ω	
Output signal - sensing element break	> 24 mA	
Output signal - sensing element short	< 3 mA	

## OTHER PARAMETERS:

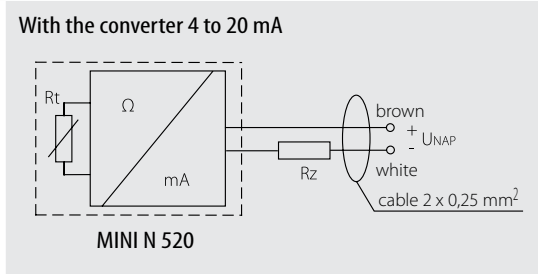
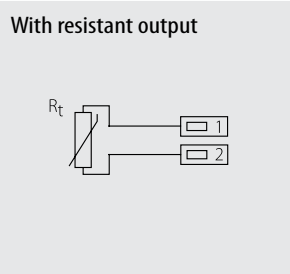
Accuracy class	Ni sensing elements: B class, $\Delta t = \pm (0,4 + 0,007t)$ , for $t \geq 0$ ; $\Delta t = \pm (0,4 + 0,028 t )$ , for $t \leq 0$ in °C; Pt sensing elements: B class according to IEC 751, $\Delta t = \pm (0,3 + 0,005 t )$ in °C NTC 20 k $\Omega$ : $\pm 1$ °C for the range 0 to 70 °C
Measuring error (MINI N 520)	< 0,6 % of the range, minimum 0,5 °C
Sensor connection	according to the wiring diagram
Standard length of the 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 <sup>-1</sup> )
Type of terminal board - sensors with grommet	Weco 951-A-LFDS, maximum wire cross section 1,5 mm <sup>2</sup>
Type of connector - sensors with connector	RSFM4 – Lumberg, M12
Type of lead-in cable - sensors with the output 4 to 20 mA	2 x 0,25 mm <sup>2</sup> , PVC shielded, up to 80 °C
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 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 or PVC cable relative humidity: max. 85 % (at the ambient temperature 25 °C) atmospheric pressure: 87 to 107 kPa
Mass	MINI approximately 60 g, MINI K 35 g

## WIRING DIAGRAM

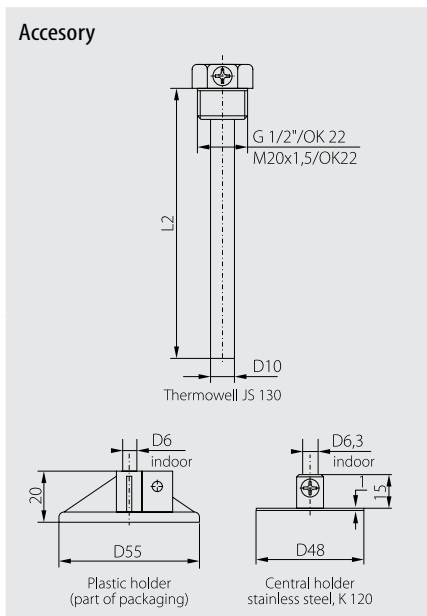
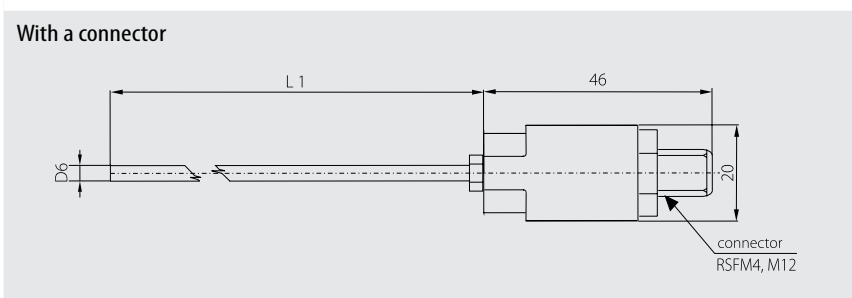
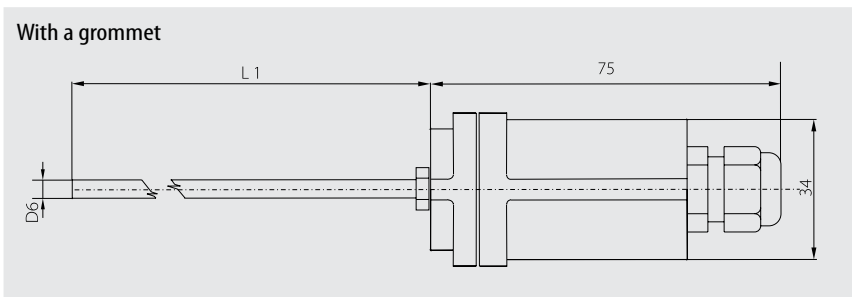
### SENSORS WITH A CONNECTOR:



### SENSORS WITH A GROMMET:



## DIMENSIONAL DRAFT



## SENSOR INSTALATION AND SERVICING

### SENSORS WITH GROMMET

Before connecting the supply lead-in cable the lid of plastic head has to be screwed off. The lead-in cable is connected according to the wiring diagram by pushing it through the loosened grommet. The recommended wire cross section is 0,35 to 1,5 mm<sup>2</sup> and outside diameter of circular-section-cable can be 4 to 8 mm. To insure the ingress protection value of IP 65 the grommet has to be tightened and the lid has to be screwed on after connecting the lead-in cable.

### SENSORS WITH CONNECTOR:

According to the wiring diagram the lead-in cable is connected to the connector RSFM4 which is part of the head of sensor. If required, separate lead-in connector ELKA4012 or lead-in cable of the length of 5 m with direct connector RKT or lead-in cable with rectangular connector RKWT can be delivered. To insure the ingress protection value of IP 65 is necessary to check the right fastening of connectors and sensor-lid.

In case the lead-in cable is laid close the 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 or for stainless steel holder installation have to be drilled according to the enclosed pattern, on which the opening diameters are marked.

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 must not be directed upwards.

## CUSTOMER SPECIFIC MODIFICATIONS

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

- the length of sensor can be up to 6 m (from the length of 1 m the pipe D6 x 1 is used)
- two sensing elements can be encapsulated
- possibility to use 3-wire or 4-wire connection
- A class of accuracy (except for the Ni 10000/5000, Ni 10000/6180, Ni 2226 and thermistor NTC 20 kΩ sensing elements)
- changing of the stem version - variants with thread etc.
- changing of stainless steel material – for example DIN 1.4571
- possibility to encapsulate other resistant-type elements for temperature measurement – KTY, SMT 160 - 30 etc.
- thermowell thread size option

## 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
connection head MINI		4											
connection head MINI K		6											
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						
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		

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	MINI N 520
Resistant-type / 4 to 20 mA	4 to 20 mA
Temperature range	-30 to 60 °C (at the resistant sensors is not necessary)
Length of stem	240 mm
Length of cable – 2, 5, 10 m	5 m
Accessory – thermowell (length, thread)	Thermowell JS 130 (220 mm, G 1/2")

Required data	Example
Product type	MINI N 120K
Length of stem	240 mm
Accessory – thermowell (length, thread)	Thermowell JS 130 (220 mm, G 1/2")
Lead-in connector	NO

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

## DELIVERY

The sensors are packed in the box for 1 to 2 pieces.

When not agree with the customer otherwise, each delivery contains: plastic central holder including drilling pattern

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

- thermowell JS 130
- lead-in connector ELKA 4012
- lead-in cable with the straight-type RKT connector
- lead-in cable with the rectangular-type RKWT connector
- a calibration sheet
- the EU Certificate of Conformity (for the sensor MINI N 520).