

## DESCRIPTION AND APPLICATION

These resistance-type sensors are intended for contact surface temperature measurement. The sensor consists of a plastic connection head, and a metal measuring case inserted in a metal protecting case made of SILIKON and SILAMID. The metal case is made of brass. The plastic connection head is provided with a cable outlet grommet (the terminal board is encased in the head) or connector. These sensors meet the IP 65 ingress protection requirements according to the EN 60 529 standard. The connector ELKA 4012 or connecting cables with the straight-type RKT connector or the rectangular-type RKWT connector can be delivered as accessories for the version with the connector.

The sensors, which are available including the fastening strap and a closing device are suitable for temperature measurements on piping. The proper sensing element is constructed to be isolated from the ambient influence. The sensors can be utilised for any control system that is compatible with sensing element output signals or active output signals quoted in the specifications table.

The standard temperature range in which the sensors are allowed to be utilised is -30 to +130 °C. The sensors are designed to be operated in a chemically non-aggressive environment.



## SPECIFICATIONS

### BASIC DATA

| Sensor type (K – with connector) | NS 140<br>NS 140K   | NS 141<br>NS 141K | NS 142<br>NS 142K | NS 340<br>NS 340K | NS 341<br>NS 341K |
|----------------------------------|---|-------------------|-------------------|-------------------|-------------------|
| Type of sensing element          | Ni 1000/5000  | Ni 1000/6180      | Ni 891            | Ni 10000/5000     | Ni 10000/6180     |
| Measuring range                  | -30 to 130 °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 143<br>NS 143K   | PTS 140<br>PTS 140K | PTS 240<br>PTS 240K | PTS 340<br>PTS 340K | HS 140<br>HS 140K    |
|----------------------------------|---|---------------------|---------------------|---------------------|----------------------|
| Type of sensing element          | Ni 2226   | PT 100/3850         | PT 500/3850         | PT 1000/3850        | thermistor NTC 20 kΩ |
| Measuring range                  | -30 to 130 °C (connection head ambient temperature -30 to 100 °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)        | NS 540<br>NS 540K          | NS 740<br>NS 740K | 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       |  |
| Power supply (U <sub>NAP</sub> )        | 11 to 30 V DC              | 15 to 30 V DC     | Recommended value 24 V DC                        |
| Maximum voltage ripple U <sub>NAP</sub> | 0,5 %                      | 0,5 %             |  |
| Load resistance                         | 50(U <sub>NAP</sub> -10) Ω | > 50 kΩ           |  |
| Output signal - sensing element break   | > 24 mA                    | > 10,5 V          |  |
| Output signal - sensing element short   | < 3,5 mA                   | ~ 0V              |  |

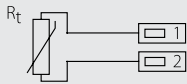
## OTHER PARAMETERS:

|  |   |
|--|---|
| 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;<br>Pt sensing elements: class B according to IEC 751, $\Delta t = \pm (0,3 + 0,005 t )$ in °C<br>NTC 20 k $\Omega$ : $\pm 1$ °C for the range 0 to 70 °C |
| Measuring error for NS 540 and NS 740                        | < 0,6 % of the measuring range, minimum 0,5 °C  |
| Sensor connection  | according to the wiring diagram   |
| Time response  | $T_{0,5} < 3$ s (in streaming water at 0,4 m.s <sup>-1</sup> )  |
| Recommended wire cross section<br>- sensors with the grommet | 0,35 to 1,5 mm <sup>2</sup>   |
| Type of connector in the head<br>- 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 case   | brass 423223.31   |
| Material of connection head                                  | POLYAMID  |
| Material of protection case                                  | SILICON and SILAMID   |
| Standard strap length  | 40 cm   |
| Minimum pipe diameter  | 20 mm   |
| Operating conditions   | ambient temperature: -30 to 100 °C; -30 to 80 °C with a converter<br>relative humidity: max. 85 % (at the ambient temperature 25 °C)<br>atmospheric pressure: 87 to 107 kPa   |
| Mass   | approximately 0,15 kg   |

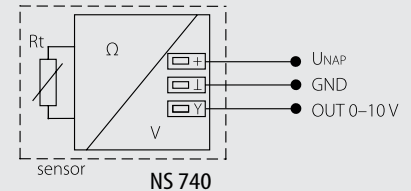
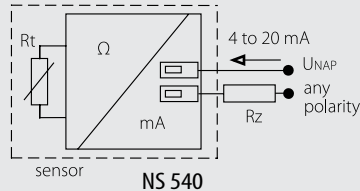
## WIRING DIAGRAM

### SENSORS WITH THE GROMMET:

#### With resistance output

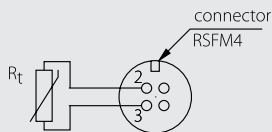


#### With a converter

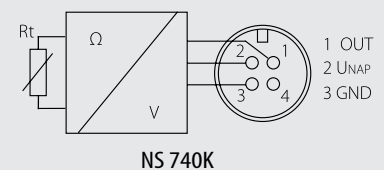
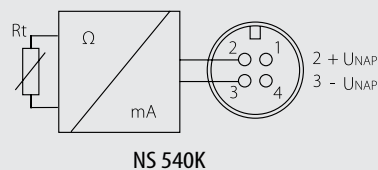


### SENSORS WITH THE CONNECTOR:

#### With resistance output

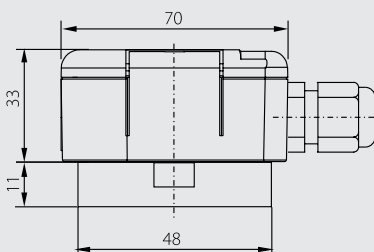


#### With a converter

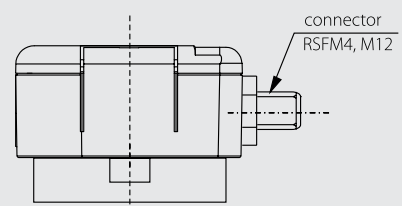


## DIMENSIONAL DRAFT

### Sensors with the grommet:



### Sensors with the connector:



## SENSOR INSTALLATION AND SERVICING

Before connecting the supply lead-in cable fasten the sensor on the pipe by means of the fastening strap.

**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 part of the sensor head according to the wiring diagram. Optionally the stand-alone connector ELKA 4012, or a lead-in cable equipped with a straight connector of RKT type, or with a rectangular connector of RKWT type may be delivered. To insure the ingress protection value of IP 65 the connectors and the lid 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. 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:

- possibility to use a 3-wire or a 4-wire connection (internal sensor wiring as far as the terminal board applies 2-wire connection)
- A class of accuracy (except for the sensing elements Ni 10000/5000, Ni 10000/6180, Ni 2226, and the thermistor NTC 20 kΩ)
- various length of the fastening strap

## HOW TO ORDER

Temperature sensors for contact measurements

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 1 | A | 3 | C | C | D | D | 0 | 0 | 0 | 0 | 0 | 0 |
| 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 |   |   |   |   |   |   |

WHEN ORDERING GOODS, THE FOLLOWING DATA ARE REQUIRED:

| Required data                            | Example      | Required data                 | Example     |
|--|--------------|-------------------------------|-------------|
| Product type                             | NS 540       | Product type                  | NS 540K     |
| Resistance-type / 4 to 20 mA / 0 to 10 V | 4 to 20 mA   | Temperature range             | -30 to 60°C |
| Temperature range                        | -30 to 60 °C | Connector for interconnection | NO          |

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

## DELIVERY

The sensors are packed in boxes by 1 piece.

Each delivery contains, if not agreed with the customer otherwise: the fastening strap, 40 cm long, including closing device

In addition, the following items may be provided together with the product:

- connector for interconnection ELKA4012
- lead-in cable with the straight connector RKT; lead-in cable with the rectangular connector RKWT
- a calibration sheet
- the EU Declaration of Conformity (for the NS 540, NS540K, NS 740 and NS740K).