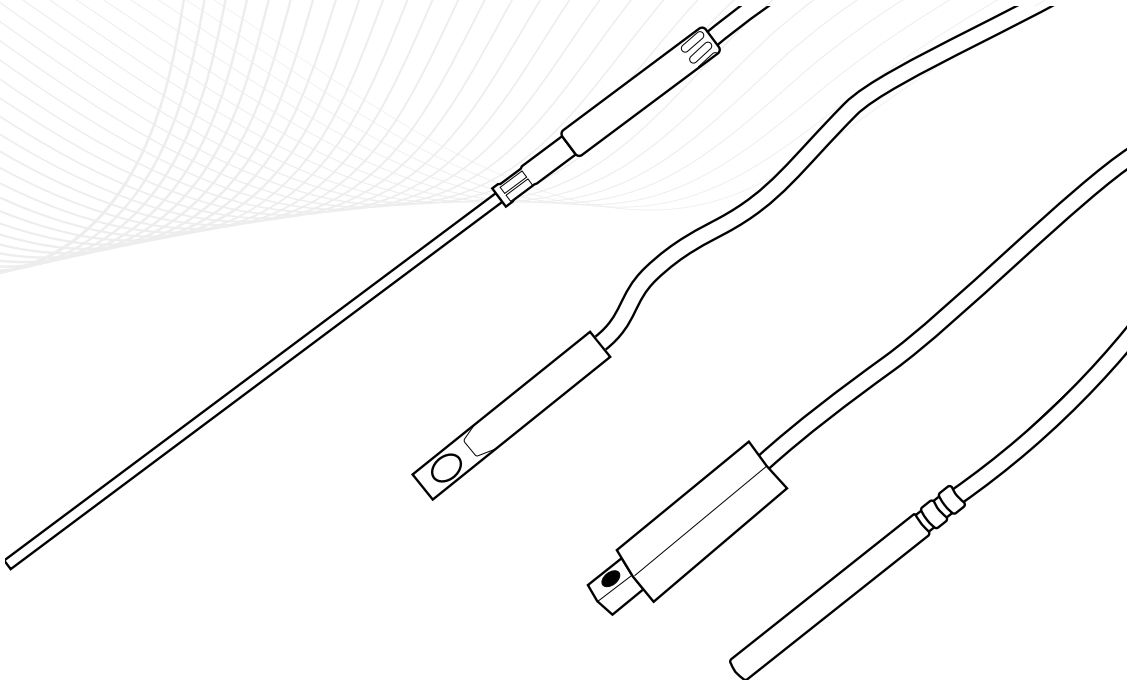
eltherm®

# OPERATING-MANUAL



# Temperature sensor type ELTF

Operation, assembly and data

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**BU 135**

# CONTENT







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|---|---|---|---|
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| | Revision: 0 | 09.02.2023_je | 09.02.2023 |

# BASIC INFORMATION

## GENERAL DISPLAY CONVENTIONS

**DANGER**
indicates an extremely dangerous situation. If it is not avoided, there is a danger to life or at least a high risk of serious injury.

**WARNING**
indicates a dangerous situation. If it is not avoided, there is a risk of injury or at least a high risk of damage.

**CAUTION**
indicates an potential dangerous situation. If it is not avoided, there is a risk of damage or malefunction.

**NOTE**
important information and instructions for safe, effective and environmentally compatible use.

### Importance of Retention

Follow these instructions for proper and safe use.

Retain for future reference.

## GOODS RECEIPT

Check the goods on receipt for transport damage or mechanical damage. Damaged temperature sensors must not be used. Compare the information on the temperature sensor with the information on the delivery bill to ensure that the correct material was delivered.

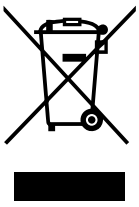
### Scope of delivery

The scope of delivery of the article includes:
One temperature sensor type ELTF-PT or ELTF-Te

## STORAGE

**NOTE** Storage should be in a dry place at an ambient temperature of 0°C to 50°C.
To maintain the electrical properties of the connection points and connecting leads, thermocouples must not be stored in high humidity or in aggressive environments.

## DISPOSAL



**NOTE** The WEEE logo (shown above) indicates that this product should not be disposed of with your household waste.
More information on disposal and restoration of electrical and electronic
You can obtain old devices and collection points from your local waste disposal company or from the manufacturer where you purchased the product.

# DESCRIPTION & TECHNICAL DATA

## DESCRIPTION

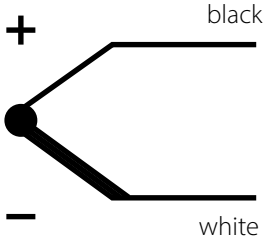
The eltherm Pt100 temperature sensors and type K & J thermocouples are suitable for a wide range of applications and temperatures. All temperature sensors are an optimal and perfectly matched complement to the eltherm temperature controllers and temperature limiters.
Even in demanding operating conditions, our products have a long service life.

## TECHNICAL DATA THERMOCOUPLES ELTF-TE

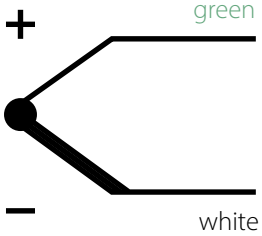
| 0660003 | ELTF-Te.1 |
|---|---|
| Thermocouple | Type J, Fe-CuNi |
| Dimensions sensor sleeve | 3 x 250mm |
| Material of sensor sleeve | Mat.No. 2.4816 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | Silicone |
| Color of connecting cable | black |
| Diameter of single wires | 2 x 0,22mm$^2$ |
| Insulation of single wires | Silicone |
| Color of single wires | black-white |
| Operating temperature sensor sleeve | -40 to +520°C |
| Operating temperature connecting cable | -90 to +200°C |
| Protection class | IP 54 |
| Tolerance | DIN IEC 584.1-2 class I |

## Wiring diagrams ELTF-Te

Type J




Type K




| 0670021 | ELTF-Te.4 |
|---|---|
| Thermocouple | Type K, NiCr-Ni |
| Dimensions sensor sleeve | 1,5 x 300mm |
| Material of sensor sleeve | Mat.No. 2.4816 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | Fluoropolymer |
| Color of connecting cable | green |
| Diameter of single wires | 2 x 0,22 mm$^2$ |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | green-white |
| Operating temperature sensor sleeve | -40 to +920°C |
| Operating temperature connecting cable | -90 to +200°C |
| Protection class | IP 54 |
| Tolerance | DIN IEC 584.1-2 class I |

| 0670019 | ELTF-Te.41 |
|---|---|
| Thermocouple | Type K, NiCr-Ni |
| Dimensions sensor sleeve | 1,5 x 400mm |
| Material of sensor sleeve | Mat.No. 2.4816 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | Silicone |
| Color of connecting cable | green |
| Diameter of single wires | 2 x 0,22mm$^2$ |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | green-white |
| Operating temperature sensor sleeve | 0 to +1.100°C |
| Operating temperature connecting cable | -50 to +180°C |
| Protection class | IP 54 |
| Tolerance | DIN IEC 584.1-2 class I |

## TECHNICAL DATA PT100 ELTF-PT

| 0650000 | ELTF-PT.33 |
|---|---|
| Dimensions sensor sleeve | 6 x 6 x 46mm/ Hole 4,2mm |
| Material of sensor sleeve | Mat.No. 1.4301 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | Fluoropolymer |
| Color of connecting cable | white |
| Diameter of single wires | 2 x 0,35mm$^2$ |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | red-white |
| Operating temperature sensor sleeve | -50 to +260°C |
| Operating temperature connecting cable | -50 to +260°C |
| Protection class | IP 65 / water vapor tight |
| Tolerance | DIN IEC 60751 "1/3B" |

| 0650001 | ELTF-PT.1 |
|---|---|
| Dimensions sensor sleeve | 5 x 50mm |
| Material of sensor sleeve | Mat.No. 1.4571 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | PVC |
| Color of connecting cable | black |
| Diameter of single wires | 2 x 0,25mm$^2$ |
| Insulation of single wires | PVC |
| Color of single wires | red-white |
| Operating temperature sensor sleeve | -50 to +80°C |
| Operating temperature connecting cable | -50 to +80°C |
| Protection class | IP 65 |
| Tolerance | DIN IEC 60751 "B" |

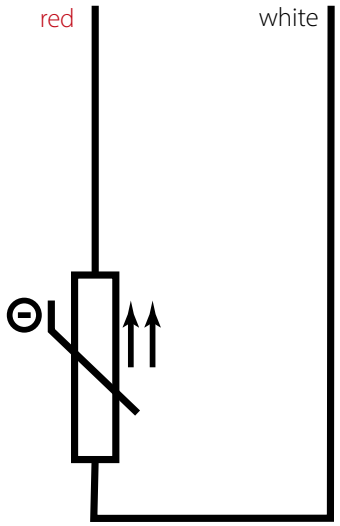
| 0650002 | ELTF-PT.3.1 |
|---|---|
| Dimensions sensor sleeve | 5 x 50mm |
| Material of sensor sleeve | Mat.No. 1.4571 |
| Length of connecting cable | 3,0m |
| Sheath of connecting cable | Fluoropolymer |
| Color of connecting cable | white |
| Diameter of single wires | 3 x 0,25mm$^2$ |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | red-red-white |
| Operating temperature sensor sleeve | -50 to +250°C |
| Operating temperature connecting cable | -50 to +250°C |
| Protection class | IP 65 |
| Tolerance | DIN IEC 60751 "B" |

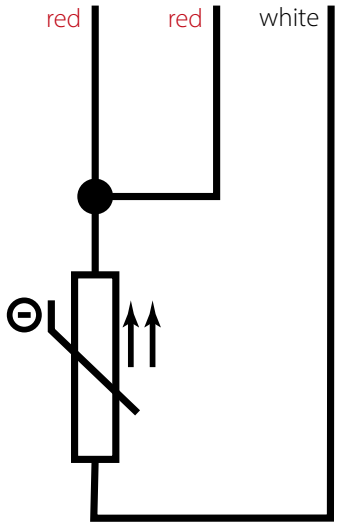
| 0650003 | ELTF-PT.3 |
|---|---|
| Dimensions sensor sleeve | 5 x 50mm |
| Material of sensor sleeve | Mat.No. 1.4571 |
| Length of connecting cable | 3,0m |
| Sheath of connecting cable | Fluoropolymer |
| Color of connecting cable | white |
| Diameter of single wires | 2 x 0,35mm$^2$ |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | red-white |
| Operating temperature sensor sleeve | -50 to +260°C |
| Operating temperature connecting cable | -50 to +260°C |
| Protection class | IP 65 |
| Tolerance | DIN IEC 60751 "B" |

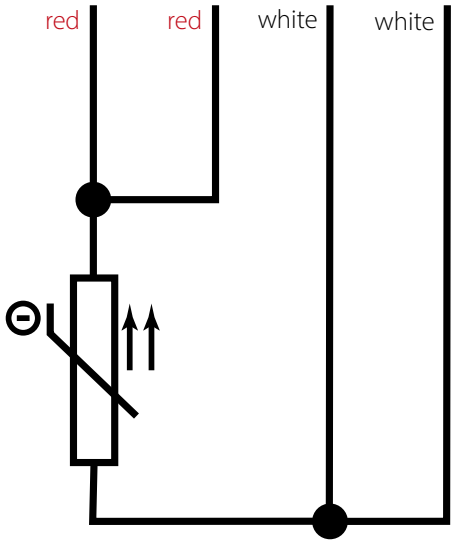
| 0650022 | ELTF-PT.5 |
|---|---|
| Dimensions sensor sleeve | 4 x 50mm |
| Material of sensor sleeve | Mat.No. 1.4571 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | Fluoropolymer |
| Color of connecting cable | white |
| Diameter of single wires | 4 x 0,22mm² |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | red-red-white-white |
| Operating temperature sensor sleeve | -50 to +250°C |
| Operating temperature connecting cable | -50 to +250°C |
| Protection class | IP 65 |
| Tolerance | DIN IEC 60751 "1/3 B" |

| 0650040 | ELTF-PT.61 |
|---|---|
| Dimensions sensor sleeve | 3 x 200mm |
| Material of sensor sleeve | Mat.No. 1.4571 |
| Length of connecting cable | 5,0m |
| Sheath of connecting cable | Fluoropolymer |
| Color of connecting cable | white |
| Diameter of single wires | 2x0,35mm² |
| Insulation of single wires | Fluoropolymer |
| Color of single wires | red-white |
| Operating temperature sensor sleeve | -50 to +500°C |
| Operating temperature protective sleeve | -50 to +80°C |
| Operating temperature connecting cable | -50 to +180°C |
| Protection class | IP 65 |
| Tolerance | DIN IEC 60751 "B" |

## Wiring diagrams ELTF-PT



# SPECIAL CONDITIONS

**CAUTION**
The sensor cables must be shielded when extended; the shielding must be grounded on one side near the controller. The cable must not be laid parallel to lines carrying mains voltage. The total line resistance must not exceed 10 ohms.

**CAUTION**
- Electrical connection / commissioning must be carried out by a qualified electrician.
- The relevant local safety regulations must be observed.

**DANGER**
Before starting work on heating or connection lines or terminals, make sure that the corresponding circuit is switched off and secured against unintentional re-connection

**NOTE**
The temperature sensor should be checked for compatibility with the control equipment before starting installation.

**CAUTION**
- Persons involved in installations and testing of electrical trace heating systems should be appropriately qualified to perform the required actions
- Electrical heat-tracing systems should be installed under the direction of a qualified electrician who has completed supplemental training on electrical heat-tracing systems
- Critical work, such as making connections or terminations, should be performed only by qualified personnel

**NOTE**
The temperature sensors should be completely free of physical damage.

**NOTE**
The suitability of the system components for the operating temperatures and environmental conditions should be checked. Furthermore, it should be checked whether they are protected as required against corrosion and the ingress of moisture and foreign particles.

# INSTALLATION

## SPECIAL INSTRUCTIONS INSTALLATION

**CAUTION**
- Before and during installation, keep the ends of heating elements and kit parts dry.
- The surface on which the temperature probe is to be mounted must be free of rust, grease, oil, etc.
- Any sharp imperfections, such as welding beads, cement splashes, etc. should be removed.
- Make sure that the crimp terminals are the correct size and are approved for the conductor. Also make sure that the crimping tool is suitable and in good condition.
- Make sure the terminals are the correct size and rating to accept the conductors.

- Ensure that connections and terminations are arranged in such a way that they are protected from external damage and the ingress of water or other contaminants that may adversely affect suitability.
- Avoid damage, tensile stress, kinking and torsion of the connected cables.
- When routing wires out, make sure they exit the insulation without allowing moisture or foreign objects to enter.
- When selecting the mounting location, observe the IP protection class and the permissible operating temperature.

**NOTE**
Diameter and length of the temperature sensor can influence the temperature measurement

## CHOICE OF INSTALLATION POSITION

If a installation position of the temperature sensor has not already been defined, the following points should be taken into account when determining the installation position:

- Temperature sensors should be mounted in locations that are representative of the holding temperature.
- If temperature sensors are used for ambient temperature measurement, they should be mounted at the most unprotected location.
- If two or more heating cables meet or are connected, sensors should be installed at a distance of 1 m to 1.5 m from the contact or junction point.
- If a system contains heat sinks or heat sources, sensors should be mounted on a section of pipe at a distance of 1 m to 1.5 m from the heat sinks and heat sources..
- If a heating circuit runs through areas with different ambient temperatures, two sensors and associated controls may be required to suitably control the pipe temperatures.
- The temperature sensors should be arranged for temperature control in such a way that direct temperature effects from heating pipes, external heat radiation, solar radiation or heated adjacent buildings are avoided.
- If temperature control as well as temperature limiting is required, temperature sensors for control must be placed at least 90° away from the heating cable with respect to the circumference of the pipeline. The temperature sensor for the upper temperature limit must also be located 90° from the heating pipe, relative to the circumference of the pipe, but not adjacent to other temperature sensors..
- In the case of temperature control with pipe contact sensors, it is recommended to arrange the sensors 90° offset from the heat tracing elements..

**NOTE**
In complex systems, the flow behavior of the product under all possible conditions should be evaluated before the installation position of the probes is selected.

## INSTALLATION OPTIONS

**CAUTION**
Not each of the following procedures are applicable to every installation. Every aspect of the installation should be reviewed upon completion.

**CAUTION**
The sensor should be protected so that no thermal insulation can be trapped between the sensor and the heated surface.

**CAUTION**
When installing any type of temperature sensor, be sure to install the sensor cable firmly, protected and without tension.

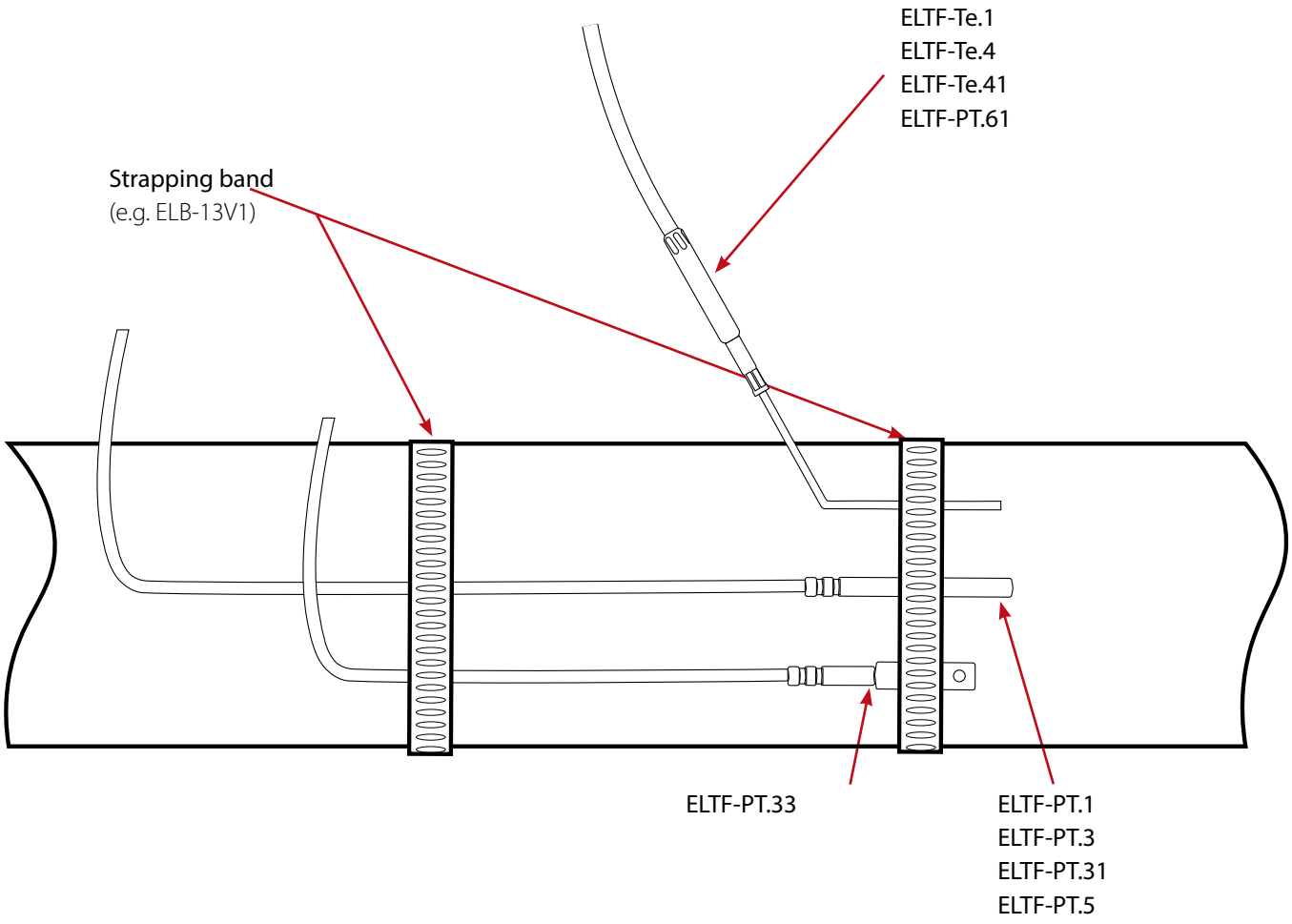
**NOTE**
When assembling temperature sensors, make sure that there is effective thermal contact between the surface and the temperature sensor. A suitable thermally conductive sheath made of temperature-resistant metal foil or another suitable material can be used for this purpose.

**CAUTION**
When using aluminum tape, be careful not to create a thermal path between the heating cable and the temperature sensor.

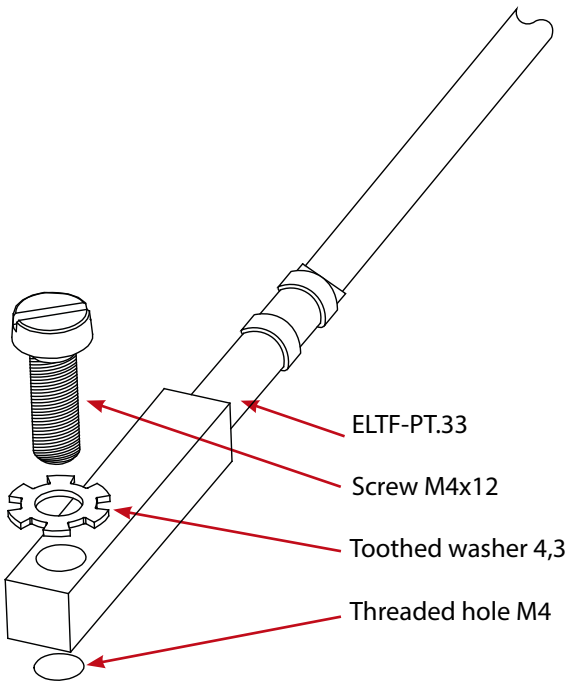
All temperature sensor types on one tube with strapping band

**CAUTION**

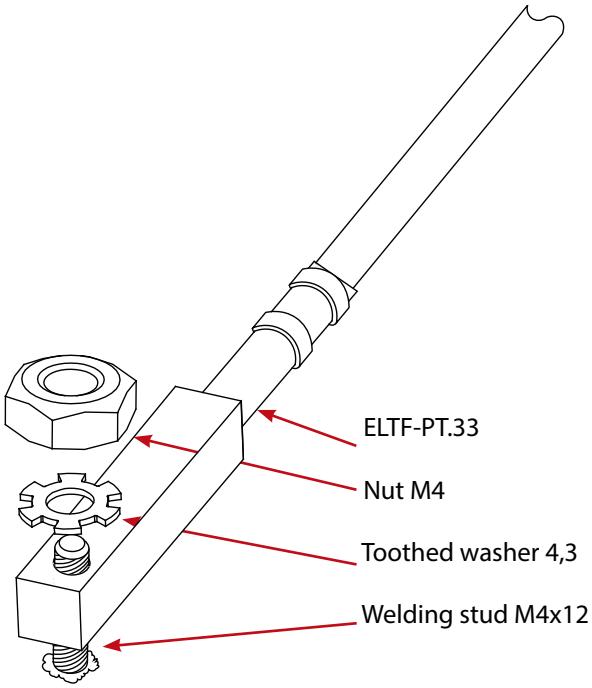
When using this type of fastening, make sure that the maximum temperatures of the connection line specified under "TECHNICAL DATA" allow the connection line to be fastened to the pipe or that the line must be led out directly.



## Contact sensor ELTF-PT.33 with screw M4

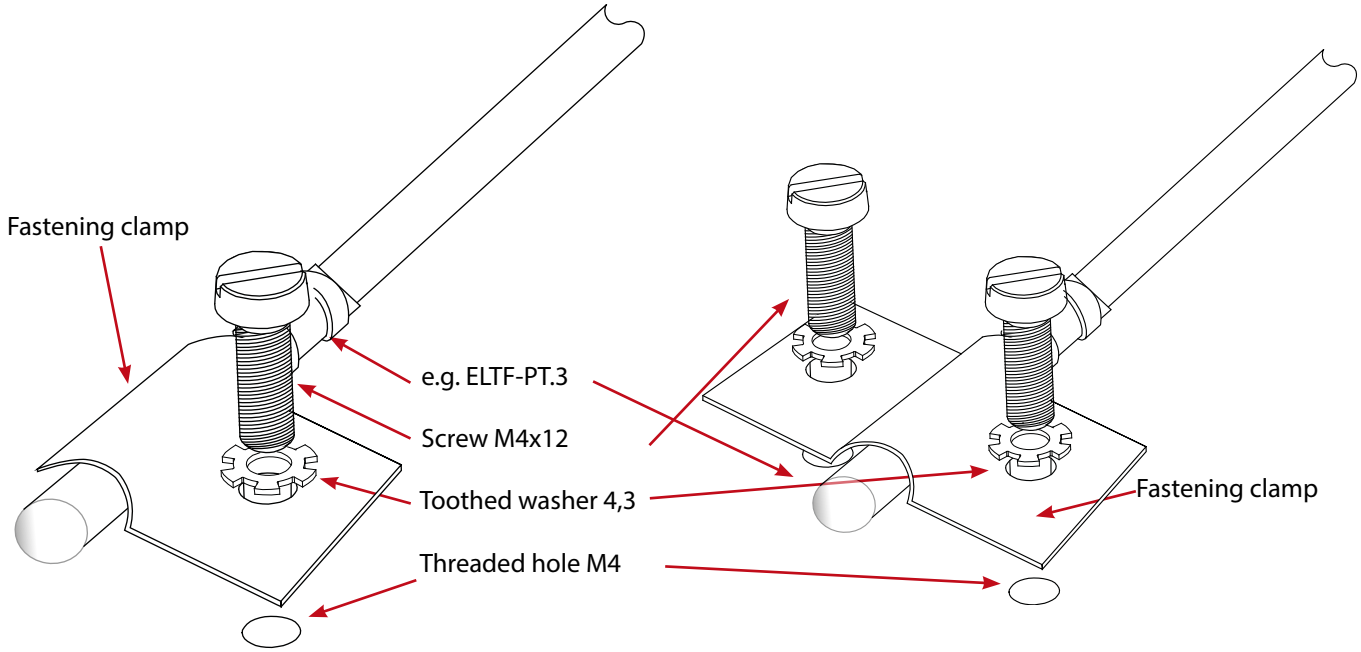



## Contact sensor ELTF-PT.33 with welding stud and nut M4

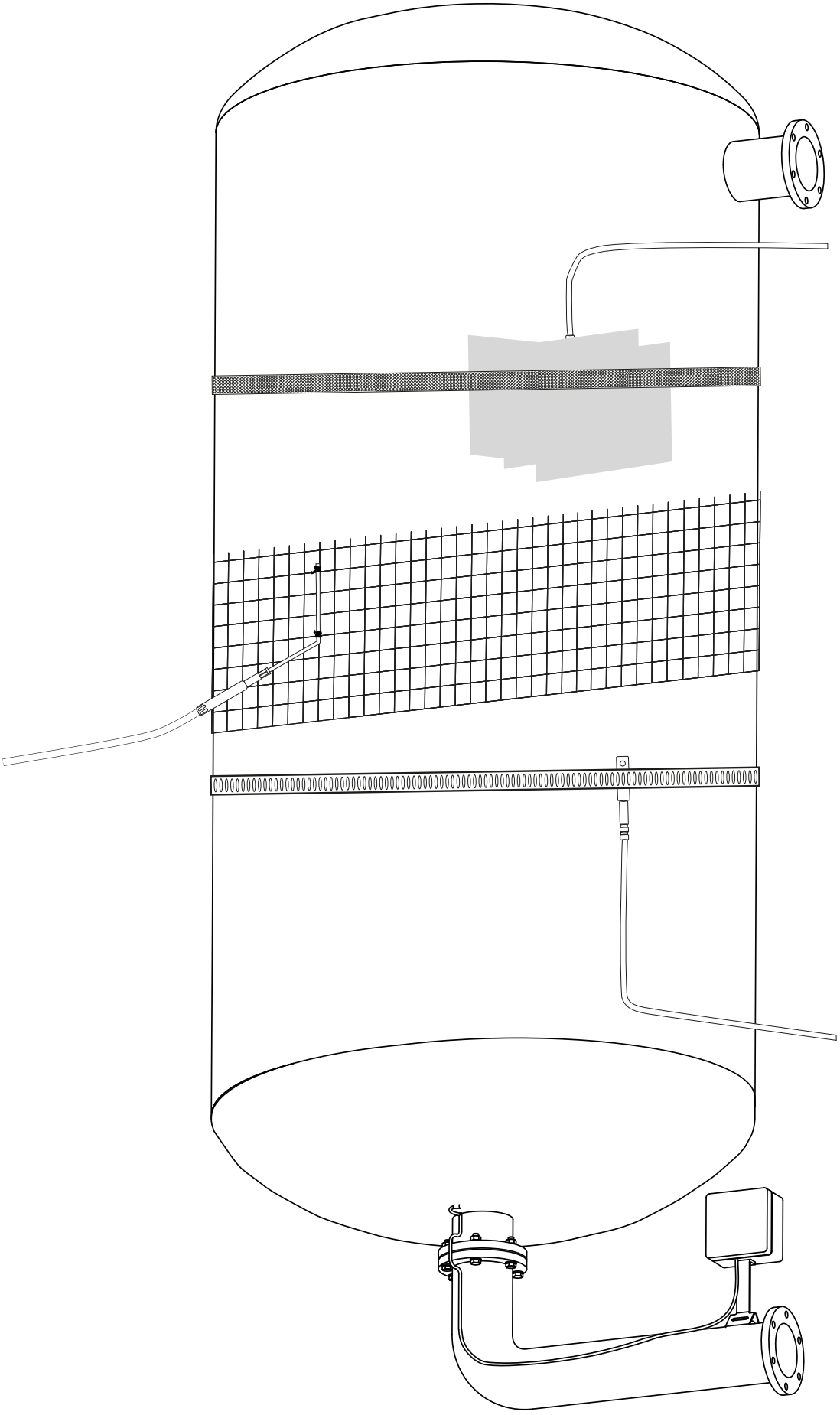


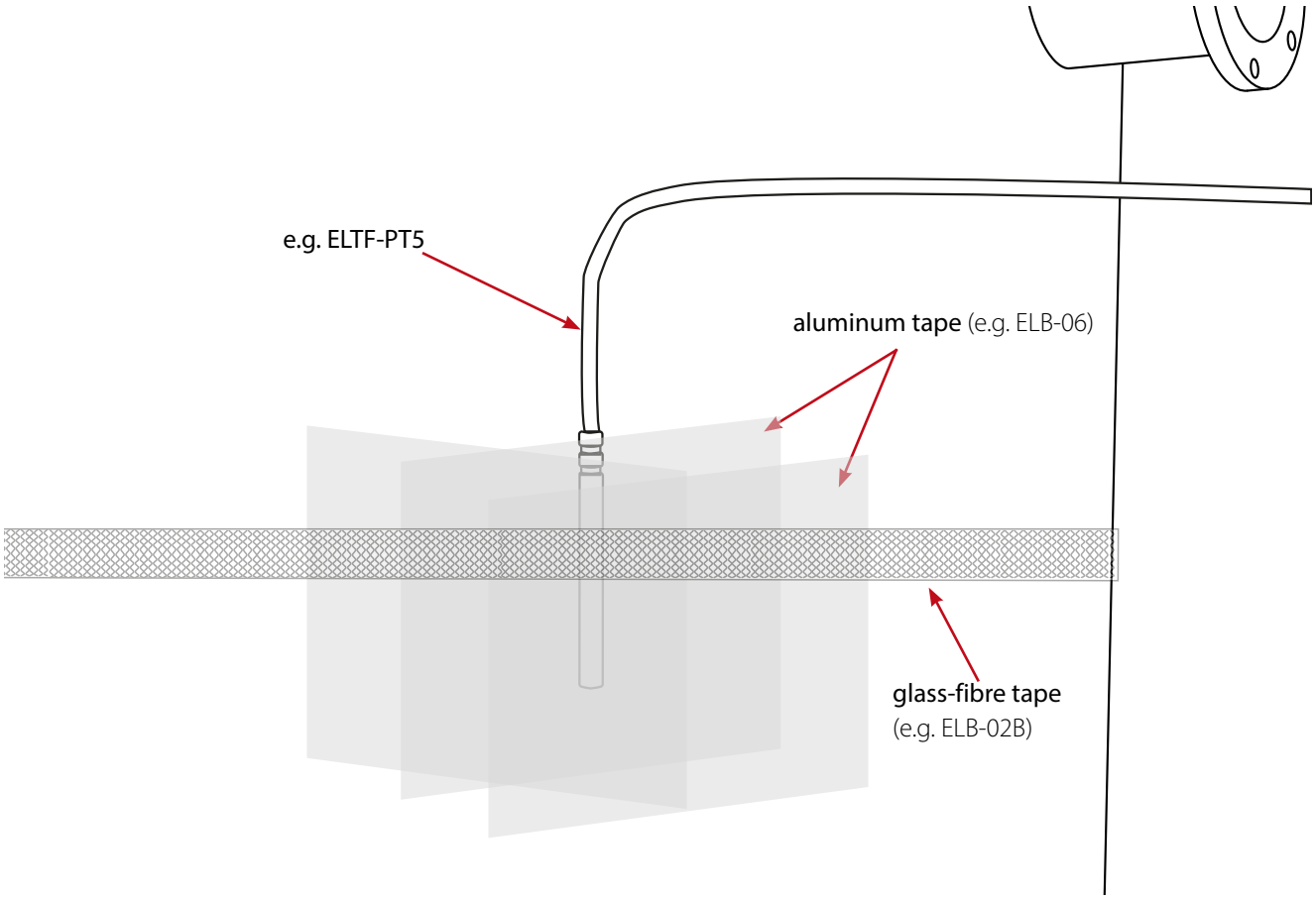

## Temperature sensor round type with clamps

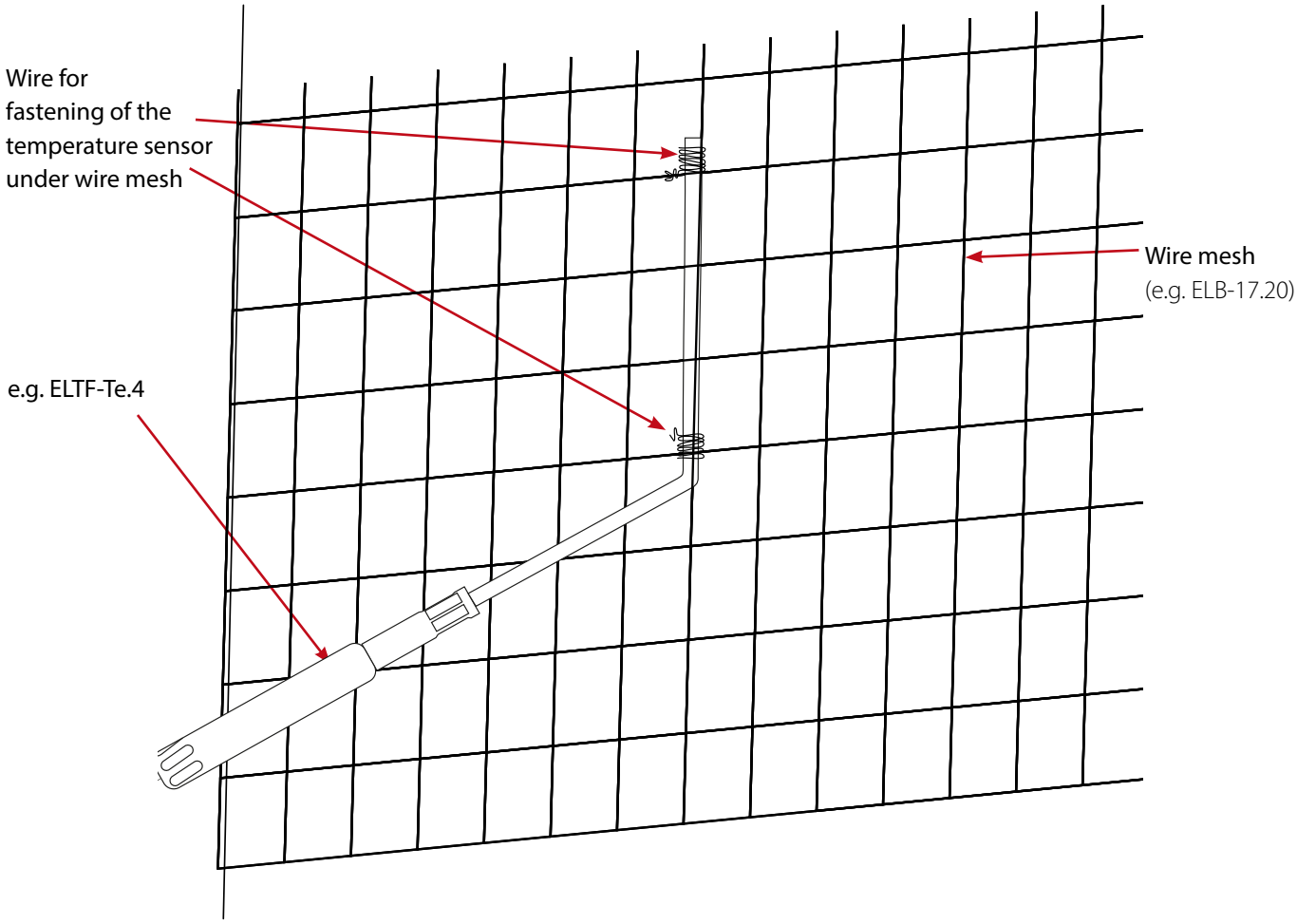
For fastening sensors in round design, fastening clamps in one- or two-hole design with screws or welding studs can be used.

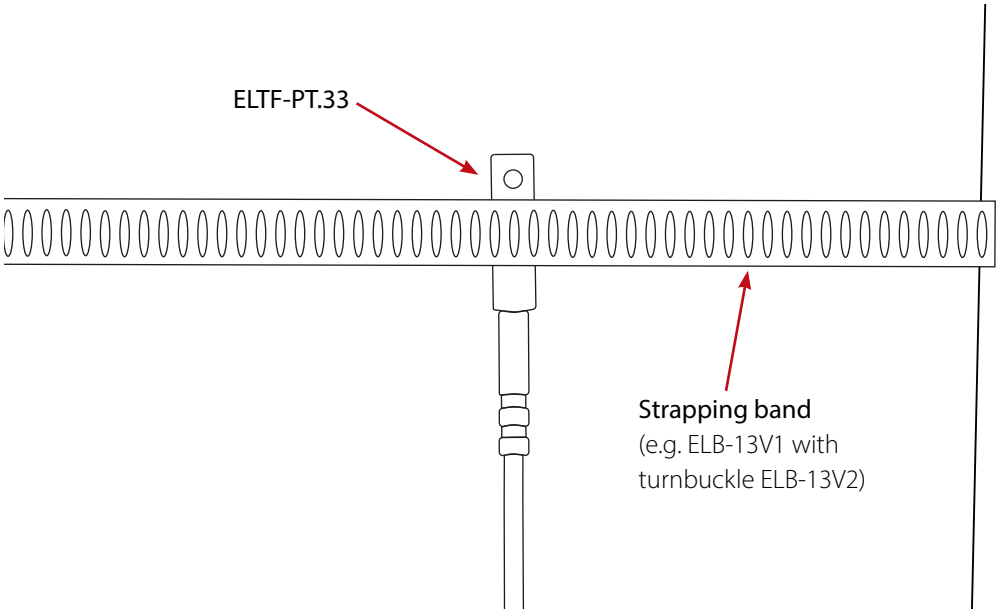


## Various options for vessels




e.g. ELTF-PT5
aluminum tape (e.g. ELB-06)
glass-fibre tape
(e.g. ELB-02B)


Wire for
fastening of the
temperature sensor
under wire mesh
Wire mesh
(e.g. ELB-17.20)
e.g. ELTF-Te.4

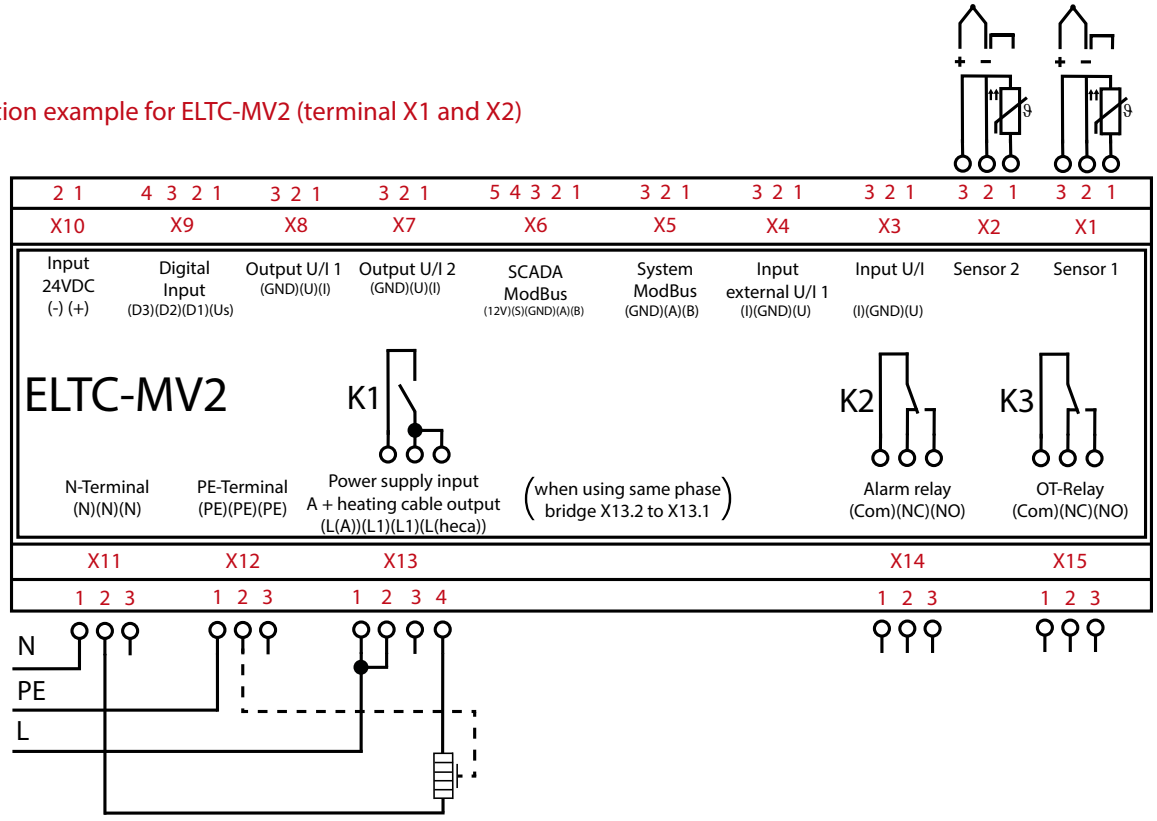



## ELECTRICAL CONNECTION

The respective wire designations of the different temperature sensor types can be found under "TECHNICAL DATA".
The temperature sensor is to be connected exclusively to the intended measuring connections of a suitable electronic temperature controller. The wiring diagrams can be found in the respective instructions for the control equipment. The respective measuring ranges, resolutions and sensor compatibility of the various control devices are also described there.

**CAUTION**
After connecting the temperature sensor, check that the wiring has been done properly and that the connecting cable is not damaged.

### Connection example for ELTC-MV2 (terminal X1 and X2)



# NOTES COMMISSIONING

**WARNING**
When setting the control, make sure that the sheath temperature of the heating element does not exceed the highest limit temperature!

**CAUTION**
The settings of the controller/limiter must be checked during commissioning.

**NOTE**
The temperature control device and the temperature sensor(s) should be calibrated against the factory settings during commissioning if necessary.
The control should be set to the required temperature and if necessary recalibrated by the factory settings.
Perform a functional test by adjusting the temperature settings until it is determined that a heat tracing element has been turned on by the control.
All measured data should be recorded.

# NOTES MAINTENANCE

**CAUTION**
In the case of repair, it is important that the repaired system retains its UV resistance, mechanical properties and weather protection as required. If this cannot be guaranteed, replacement is recommended.

**CAUTION**
During repair work on heated system parts, temperature sensors must be protected against damage. After completion of the repair work, the temperature sensors should be checked again.
Damaged temperature sensors should be replaced immediately.

# MAINTENANCE

**NOTE**
The frequency of an inspection depends on the place of application, the type of heat-tracing system and the type of application.

**NOTE**
When used for frost protection, an inspection before the onset of winter is recommended.

To ensure the reliable function of the temperature sensor, a check should be carried out at regular intervals.
To do this, check:

- the functionality of the temperature sensor and, in case of deviations, carry out a new calibration of the control device.
- check the contacts and terminals to which the temperature sensor is connected for correct seating and possible corrosion..
- the temperature sensor and its connection cable for contamination, damage and correct seating.
- the tightness of cable entries.

# POSSIBLE ERRORS

| Error | Possible cause | Troubleshooting |
|---|---|---|
| Temperature sensor type ELTF-PT only | | |
| Incorrect measured value | Heat dissipation error | Use thermally conductive wrapping, e.g. aluminum band type ELB-06 |
| Temperature display too high | Deviation through the measuring line | Reduce measuring line |
| Temperature sensor type ELTF-Te only | | |
| Only amount of temperature display is correct | Polarity of the thermocouple at the connection reversed | Change polarity |
| Temperature display deviates too much upwards | The polarity of the compensating line is reversed at the connection head | Change polarity |
| | Compensating line type does not match thermocouple type | Replace compensating line |
| Temperature sensor type ELTF-PT and ELTF-Te | | |
| Corrosion of the sensor sleeve/protecti-ve sleeve | Material not suitable for medium | Adapt material to medium |
| Temperature display too low | Moisture penetration in sensor sleeve | Check the protection class of the temperature sensor and replace it with another sensor if necessary. |
| Incorrect measured value | Influence by heat sink or heat source | Changing the installation position of the temperature sensor |
| Inertial time response | Soiling on the sensor sleeve | Cleaning the sensor sleeve |
| | Sensor sleeve diameter too large | Use temperature sensor with smaller diameter |

# DOWNLOADS

You can find helpful downloads for this or other products under the following link:

https://eltherm.com/downloads

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8643050650XX Operating Manual Temperature Sensors Type ELTF EN