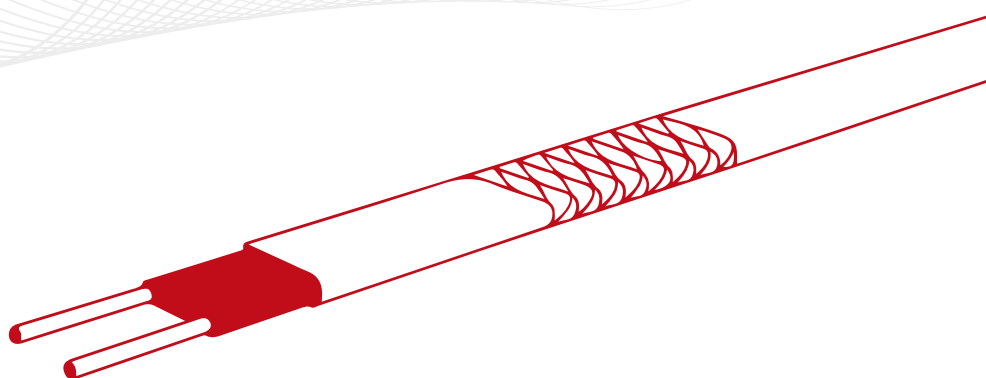


INSTALLATION MANUAL



ELSR-Ex

Installation and operation
self-regulating trace heaters
in hazardous area per EN 60079-30-2

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QAA-085
Rev.16
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IMPORTANT INFORMATION

- RETAIN FOR LATER USE



Please follow these instructions for proper and safe use of the self-regulating trace heater system ELSR-Ex.
Please retain these instructions for later reference purposes (for example in the system documentation).

- FOR DISPOSAL



The WEEE logo indicates that this product must not be disposed of with residential waste.
Further information about disposal and recycling of old electrical and electronic devices and where to find collection points is available from your local disposal company or from the manufacturer from which you bought the product.



ATTENTION

Refers to a potentially dangerous situation.
If it is not prevented, there is a risk of damage or malfunction.



DANGER

Refers to an extremely dangerous situation. If it is not prevented there is risk of death or at least a high risk of serious injuries.



NOTE

Important information and instructions for safe, effective and environmentally compatible usage.



WARNING

Refers to a dangerous situation. If it is not prevented there is risk of injury or at least a high risk of material damage.

Proviso

We reserve the right to make technical changes. Changes, errors or misprints shall not form the basis for any claim to compensation for damages. Comply with the applicable and currently valid standards and regulations for safety-related components and systems.

eltherm GmbH Ernst-Heinkel-Str. 6-10 57299 Burbach T.: +49 2736 4413-0 F.: +49 2736 4413-50 info@eltherm.com	Document: 8643040200EXX		Installation manual of self-regulating trace heaters ELSR in hazardous area per EN 60079-30-2	
	Author:	Peter Schmidt	Date:	04.07.2012
	Revision: 16	Jonas Schmidt	Date:	11.11.2025

1 Description and Technical Data

1.1 Application

The Ex Heat Tracing System ELSR-Ex is suitable for industrial use on pipes, vessels and related equipment in areas with combustible gas or dust, (Equipment Group IIC and IIIC, Category 2, equipment protection level Gb and Db (T-Class see separate Table 1)) according to EN 60079-0:2018/AC:2020-02, EN 60079-7:2015/A1:2018, EN 60079-30-1:2017 and EN 60079-31:2014. Due to the self-regulating behaviour, the system ELSR-Ex can be operated within the associated T-Class without additional temperature limitation.

In T-Classes with more restrictive temperature limits, the system can be operated in stabilized or in controlled design when a maximum sheath temperature determination has been made by eltherm or via the software tool "eltherm designer" and the result is safe.

The electrical connection needs to be made to junction box ELAK-Ex-R with associated mounting post Ex-It, to another suitable junction box approved for Hazardous Areas (by means of eltherm Ex power connection kits) or outside the Hazardous Area.

1.2 System Components

The Ex Heat Tracing System ELSR-Ex comprises the following components:

- Trace heater ELSR-N, -LS, -H, -QH, -H+, -SH, -SH+ or -SHH...
- End Cap EL-ECL, -ECN or -ECSH (optional)
- Plastic Gland M25 0X80100 and EL-GSR 40X8045000 (optional)
- Ex d Cable gland Peppers A8F20RM20, A8BFNP25M25, A8BF20M20, A8BF20M25 and A8BF25M25 (optional)
- Cable joint Ex-Con SR (0X81125; optional)
- Temperature sensor ELTF-PTEx (optional, for controllers without intrinsically safe sensor terminals)
- Temperature sensor ELTF-PT.15 (optional, for controllers with intrinsically safe sensor terminals)
- Mounting Post Ex-It (optional)
- Junction Box ELAK-Ex-R for use with Ex-It mounting post (mandatory, when mounting post Ex-It is used)

1.3 Marking of Ex Heat Tracing System ELSR-Ex

eltherm GmbH Burbach ELSR-Ex 230VAC

manufacturing date and specific output W/m at 10°C: see trace heater print

 II 2G <ignition protection type gas*1> IIC Gb T<appropriate T-Class>
 II 2D Ex 60079-30-1 <ignition protection type dust*2> IIIC Db IP65 T<appropriate max. surface temp.>°C
 <certificate No.> **CE**0637
 -60°C / -45°C / -40°C / -32°C / -20°C ≤ Ta ≤ 50°C;

Max. operating temp. <max. operating temp> °C (energized) / <max. exposure temp> °C (power off)

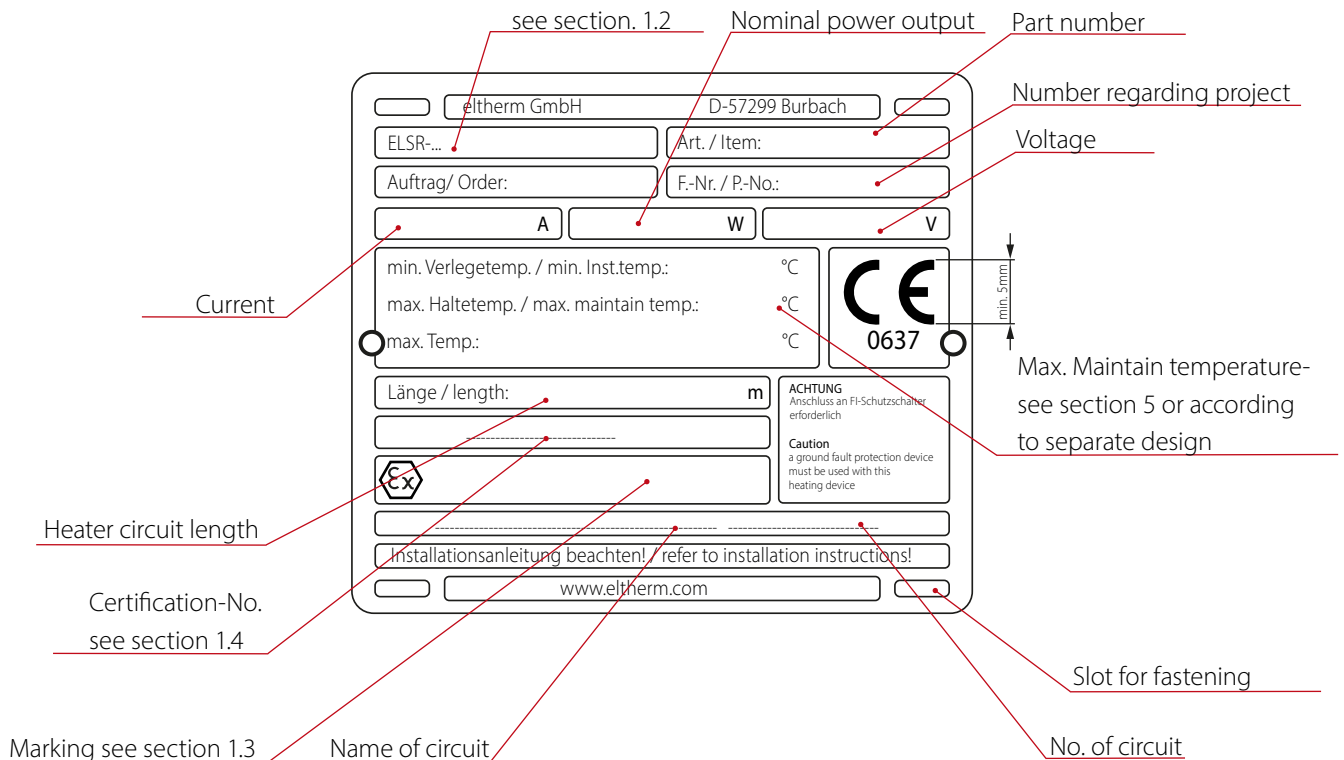
1.4 Certificate Numbers

- | | |
|--------------------|-----------------|
| • EPS19ATEX1013X | for ELSR-H, -QH |
| • EPS24ATEX1125X | for ELSR-H+ |
| • IBExU09ATEX1047X | for ELSR-LS |
| • EPS19ATEX1014X | for ELSR-N |
| • EPS18ATEX1020X | for ELSR-SH |
| • EPS17ATEX1169X | for ELSR-SHH |
| • FM24ATEX0011X | for ELSR-SH+ |

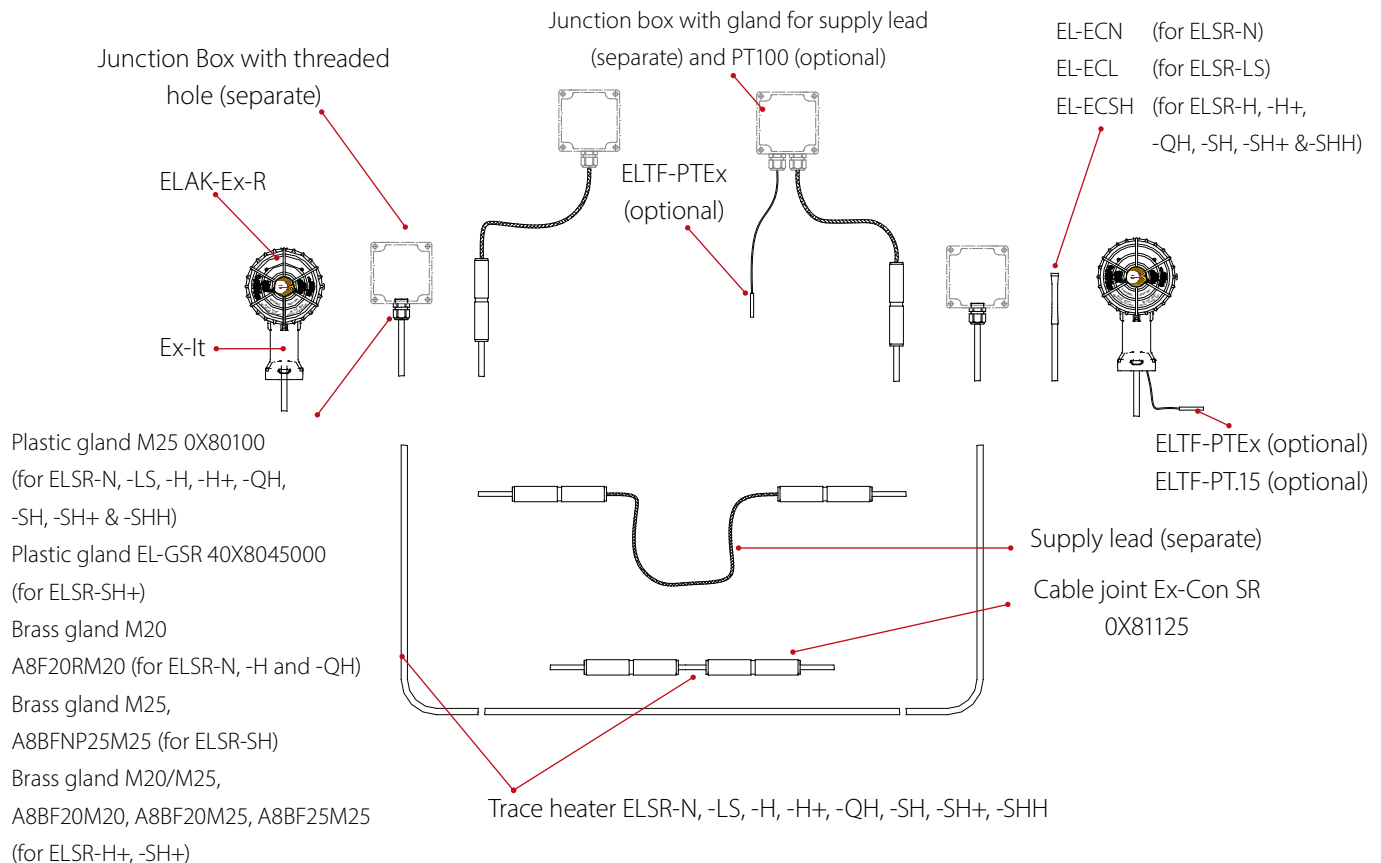
NOTE

Ignition protection type		System component
*1 Gas	*2 Dust	
60079-30-1		for system design without cable gland, but with Ex-Con SR
60079-30-1 eb	60079-30-1 tb	for system design with one of the following components: 0X80100 cable gland, EL-GSR cable gland or Ex-It mounting base
60079-30-1 db eb	60079-30-1 db tb	for system design with Peppers A8(B/S)F20(...) cable gland

1.5 Type plate



2. Possible Combinations



3. Marking of Components

The system components are marked in the following way:

Trace Heater ELSR-LS

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS19ATEX1215U **CE** 0637

Trace Heater ELSR-N

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS18ATEX1133U **CE** 0637

Trace Heater ELSR-H

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS12ATEX1429U **CE** 0637

Trace Heater ELSR-QH

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS12ATEX1429U **CE** 0637

Trace Heater ELSR-H+

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS12ATEX1429U **CE** 0637

Trace Heater ELSR-SH

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS18ATEX1028U **CE** 0637

Trace Heater ELSR-SHH

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db CML20ATEX3171 **CE** 0637

Trace Heater ELSR-SH+

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db FM24ATEX0011X **CE** 0637

End Cap EL-ECL-Ex

eltherm EL-ECL <Lot-No: ...> 22-29 mm

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS19ATEX1214U IP 65

End Cap EL-ECN-Ex

eltherm EL-ECN <Lot-No: ...> 30-36 mm

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS19ATEX1012U IP 65

End Cap EL-ECSH-Ex

eltherm EL-ECSH <Lot-No: ...> 26-34 mm

 II 2G Ex 60079-30-1 IIC Gb  II 2D Ex 60079-30-1 IIIC Db EPS17ATEX1146U IP 65

Plastic Gland 0X80100

eltherm GmbH Burbach M25 x 1,5

 II 2G Ex eb IIC Gb  II 2D Ex tb IIIC Db
IBExU07ATEX1022X IP 65 **CE** 0637

Plastic Gland EL-GSR

eltherm GmbH Burbach EL-GSR

 II 2G Ex eb IIC Gb  II 2D Ex tb IIIC Db
IBExU25ATEX1041X IP 65 **CE** 0637

Cable Joint Ex-Con SR 0X81125

eltherm GmbH Burbach Verbindungsmuffe 0X81125 550V / 145A

 II 2G Ex eb IIC T3...T6 Gb  II 2D Ex tb IIIC TX Db
IBExU07ATEX1080X IP 65 <Lot-No: ...> **CE** 0637

Warnung: Nicht unter Spannung öffnen!

Warning: Do not open while energized!

Temperature sensors ELTF-PTEEx

eltherm GmbH Burbach ELTF-PTEEx.<Nr.>

 II 2G Ex eb IIC T6...T2 Gb  II 2D Ex tb IIIC Tx Db
IBExU 04 ATEX 1004 X IP65 <Lot-No: ...> **CE** 0637

Junction Box ELAK-Ex-R

eltherm GmbH Burbach ELAK-Ex-R 550V / 28A

 II 2G Ex eb IIC T6 Gb  II 2D Ex tb IIIC T85°C Db
IBExU08ATEX 1113 X IP65 <Lot-No: ...> **CE** 0637

Warnung: Nicht unter Spannung öffnen!

Warning: Do not open while energized!

Mounting Post Ex-It

eltherm GmbH Burbach Ex-It

 II 2G Ex eb IIC Gb  II 2D Ex tb IIIC Db
IBExU09ATEX 1023U

Gland Peppers A8F

Peppers GU15 3BT UK

 II 2G Ex de IIC Gb  II 1D Ex ta IIIC Da
CML19ATEX1346X

4. Possible T-Classes

Trace Heater	Nominal Voltage (VAC)	T-Class / maximum surface temperature as per "product classification" IEC/IEEE 60079-30-1 ed. 1 and EN 60079-30-1:2017 clause 5.1.13.2 (innate)	T-Class / maximum surface temperature as per "systems approach" IEC/IEEE 60079-30-1 ed. 1 and EN 60079-30-1:2017 clause 5.1.13.3 (controlled or stabilized design of heating circuit required by eltherm or by tool eltherm designer V2.0x)
ELSR-LS-...-2-... (all types / power levels)	230	T6	n.a.
ELSR-N-...-2-... (all types / power levels)	230	T6	n.a.
ELSR-QH-...-2-BOT (all power levels)	230, 277	T3	T4, T5, T6
ELSR-H-...-2-BOT (all power levels)	230, 277	T3	T4, T5, T6
ELSR-H+-...-2-BOT (all power levels)	230	T3	T4, T5, T6
ELSR-SH-...-2-BOT (all power levels)	230	T3	T4, T5, T6
ELSR-SH-90-2-BOT	230	T2	T3, T4, T5, T6
ELSR-SHH-...-2-BOT (all power levels)	230	T3	T4, T5, T6
ELSR-SHH-...-2-BOT (all power levels)	277	T2	T3, T4, T5, T6
ELSR-SH+-15-1-BOT	120	T3 / T200°C	T4, T5, T6 / Tx with x < 200°C
ELSR-SH+-30-1-BOT	120	T2 / T230°C	T3, T4, T5, T6 / Tx with x < 230°C
ELSR-SH+-60-1-BOT	120	T2 / T260°C	T3, T4, T5, T6 / Tx with x < 260°C
ELSR-SH+-15-2-BOT	240	T3 / T200°C	T4, T5, T6 / Tx with x < 200°C
ELSR-SH+-15-2-BOT	277	T2 / T230°C	T3, T4, T5, T6 / Tx with x < 230°C
ELSR-SH+-30-2-BOT	240	T3 / T200°C	T4, T5, T6 / Tx with x < 200°C
ELSR-SH+-30-2-BOT	277	T2 / T230°C	T3, T4, T5, T6 / Tx with x < 230°C
ELSR-SH+-45-2-BOT	240	T3 / T200°C	T4, T5, T6 / Tx with x < 200°C
ELSR-SH+-45-2-BOT	277	T2 / T230°C	T3, T4, T5, T6 / Tx with x < 230°C
ELSR-SH+-60-2-BOT	240, 277	T2 / T230°C	T3, T4, T5, T6 / Tx with x < 230°C
ELSR-SH+-75-2-BOT	240, 277	T2 / T260°C	T3, T4, T5, T6 / Tx with x < 260°C
ELSR-SH+-90-2-BOT	240, 277	T2 / T260°C	T3, T4, T5, T6 / Tx with x < 260°C

Table 1: T-classes of the system ELSR...

5. Permissible Temperature Range

System component	Ambient temperature T _{amb} in °C	Max. Temperature in Switched on state in °C	Max. Temperature in Switched off state in °C
ELSR-LS-...AO, ...BO	-60 to 50	65	80
ELSR-N-...AO, ...BO, ...BOT	-60 to 50	65	80
ELSR-QH-...BOT	-60 to 50	120	135
ELSR-H-...BOT	-60 to 50	120	180
ELSR-H+...BOT	-60 to 50	165	210
ELSR-SH-...BOT	-60 to 50	165	250
ELSR-SHH-...BOT	-40 to 50	250	250
ELSR-SH+...BOT	-60 to 50	185	250
EL-EC SH-Ex	-60 to 250	250	250
EL-ECN-Ex	-60 to 135	135	135
EL-ECL-Ex	-60 to 135	135	135
Ex-Con SR	-32 to 200	200	200
ELVB-SREx-25	-25 to 70 (7Joule), -55 to 70 (4 Joule)	70	70
ELVB-SREx-SH+25	-60 to 130	130	130
ELVB-SRAH-Ex-20	-60 to 180	180	180
ELVB-SRAL-Ex-20	-60 to 180	180	180
ELVB-SREx-SH+20	-60 to 180	180	180
Mounting assembly Ex-It	-20 to 200	200	200

Table 2: Permissible temperature ranges of the system components

When the plastic gland 0X80100 is used, the maximum permitted ambient temperature is depending on the power output of the installed trace heater (see mounting instructions BU 080 for details).

6. Mechanical Properties

The cable joint 0X81125 is suitable for use with a low risk of mechanical damage (4J) and therefore needs to be installed in a protected way (e.g. underneath a thermal insulation). The end caps EL-EC... are suitable for use in areas with high risk of mechanical damage and exposure to light.

At ambient temperatures below -25°C, the plastic gland 0X80100 is to be installed in a way protected from mechanical stress > 4J.

7. Restrictions on permissible thickness and material of thermal insulation

Flexible (soft) materials:

no restrictions (needs to be compatible with heater temperature)

Rigid materials:

Provide a groove for the trace heater or select an inside diameter of the insulation with sufficient distance to the outside diameter of the pipe.

8. Heating Circuit Design

In case self regulating trace heaters ELSR-H, -H+, -QH, -SH, -SH+ or -SHH are intended for use in T-classes higher than the rating of the heater (e.g. ELSR-H in T4 instead of T3), the heating circuit design needs to be done by eltherm based on the complete set of application data provided by the user. Alternatively, if eltherm design software is used ("eltherm designer"), the design can be made by the user. In this case, design results need to be submitted to eltherm for verification and for issuance of heating circuit labels.

9. Location of temperature sensors

9.1 Temperature controllers

Temperature sensors may be used either as ambient sensing devices or attached directly to the equipment/device that is to be heated.

In case of ambient sensing, place the sensor in the coldest expected spot of the area where the heated equipment is located. This is typically a shaded place (e.g. on the northern side of buildings) on low ground. However, ambient sensing is recommended only for frost protection applications and when the permissible temperature band of the equipment to be heated and its contents is considerably wide (approx. 50K). Please consult the eltherm project department if further assistance is required.

In cases where sensors are directly attached to the heated equipment/device, two different applications need to be considered:

a) heated pipes

Place the sensor on the anticipated coldest section of the pipe (underneath the thermal insulation, direct contact to the heated surface). Avoid direct contact between sensor and trace heater. Branched piping systems may require more than one heating circuit (with a sensor each) or implementation of the "dead leg" technique depending on the flow pattern of the piping system. If help is required, please consult the eltherm project department for further assistance.

b) heated vessels

Place the heating on surfaces that always have contact to the contents of the vessel (typically the bottom of the vessel and/or lower section). Then place the temperature sensor in the heated area (underneath the thermal insulation, direct contact to the heated surface). Avoid direct contact between sensor and trace heater. Large vessels may require more than one heating circuit, especially when they need to be heated up to various fill levels. If help is required, please consult the eltherm project department for further assistance.

Be aware of the fact that temperature sensors mounted on the surface of the heated equipment never provide readings of the exact temperatures of the medium inside the device that is being heated. Therefore, temperature settings may need to be determined in an empirical way when exact temperatures are crucial for the process.

9.2 Temperature limiters

Heating circuits designed as per “controlled design” require the use of a temperature limiter when operated in explosive atmospheres Zone 1 or Zone 21 (example: operation of a T3 rated trace heater in T6, if no “stabilized design” has been made for this application).

Temperature limiter sensors are to be installed in the expected hottest area of the heated equipment. Avoid direct contact between sensor and trace heater. The chosen limiter set point must not lead to disconnecting the trace heater before the set point of the implemented temperature controller is reached. Additionally, the limiter set point must not be so high that the heater sheath temperature exceeds the temperature limit of the applicable T-Class (minus the associated safety margin, e.g. 5K in T3 => $200^{\circ}\text{C} - 5\text{K} = 195^{\circ}\text{C}$). The temperature offset between the heated equipment and the trace heater sheath needs to be considered accordingly.

Relevant information to this effect is provided in the heating circuit label, in the design software “eltherm designer” or by your eltherm contact person.

10. Specific Trace Heating Requirements as per EN 60079-30-1 7.4

- earth fault equipment protection is required for each circuit
- de-energise circuits before installation or servicing
- keep ends of trace heaters and kit components dry before and during installation
- the electrically conductive covering of this trace heater shall be connected to a suitable earthing terminal
- the presence of the trace heaters shall be made evident by the posting of caution signs or markings at appropriate locations and or at frequent intervals along the circuit
- retain the heat tracing documentation throughout the entire service life of the heated installation

11. Miscellaneous

Prior to work on pipes, vessels and associated equipment make sure it has sufficiently cooled down to avoid burns.

When using power supply leads, make sure that

- the outer diameter is within a range of 7mm – 13,5 mm
- they are compliant with EN 60079-14:2014 Section 9.3.3
- the minimum ambient temperature rating is not above -32°C (or -20°C respectively)

12. Protective Measures

The minimum requirements for trace heating systems for use in explosive atmospheres are as follows:

- a) a means of isolating all line conductors from the supply;
- b) over-current protection provided for each branch circuit;
- c) a means of protecting against earth faults by disconnecting all line conductors.

1) For **TT** and **TN** systems, each trace heater or trace heater branch circuit, the electrical protection shall be capable of interrupting high impedance earth faults as well as short circuit faults. This shall be accomplished by an earth-fault protective device, or a controller with earth-fault interruption capability for use in conjunction with suitable circuit protection. The preferred trip level is nominal 30 mA or 30 mA above any inherent capacitive leakage characteristic of the heater as specified by the trace heater supplier.

2) For **IT** systems, an electrical insulation monitoring device shall be installed to disconnect the supply whenever the electrical resistance is not greater than 50 Ohms/V of rated voltage.

Exception: Where conditions of maintenance and supervision ensure that only qualified persons service the installed systems, and continued circuit operation is necessary for the safe operation of the equipment or processes, earth-fault detection without interruption is acceptable if alarmed in a manner to assure an acknowledged response.

The requirements of a), b), and c) may be performed by one device.

The design of electrical resistance trace heating systems shall be overseen by persons knowledgeable of trace heating following the design methodology for explosive atmospheres as specified by the manufacturer.

Persons involved in the installation and testing of electric trace heating systems shall be suitably trained in all special techniques required. Installation shall be carried out under the supervision of a qualified person.

The trace heating system documentation shall be retained for each trace heating circuit for as long as the system is in use

13. Further Documents

In addition to the specifications in these installation manual, the datasheets/assembly instructions for the system components used must be observed:

- | | |
|---|---|
| - Datasheet Trace heater ELSR-H, -H+, -QH, -LS, -N, -SH, -SH+, -SHH | - QAA 048 (End Cap EL-EC...) |
| - QAA 072 (Cable Joint Ex-Con SR) | - BU 139 (Mounting Post Ex-It) |
| - QAA 090 (Junction Box ELAK-Ex-R) | - QAA 097 / BU-143 / BU-147 (Power Termination) |
| - BU 065 (Temperature sensors ELTF-PTEx...) | - BU 080 (Plastic Gland) |

14. Installation

Installation and testing of electric trace heating systems shall be done by the manufacturer or by persons suitably trained in all special techniques required. Installation shall be carried out by skilled persons (as per definition in IEC 60050 IEV 195-4-1), compliant with the requirements of EN 60079-14 and under the supervision of a qualified person. Experience and education of this person regarding installations in hazardous areas is mandatory.

14.1 Receipt of Goods

After receipt of the goods check the heater and the accessories and compare with the data on the delivery note to ensure that the correct material was supplied. Ensure that only components listed in this manual are used. It is recommended that the insulation resistance is checked (see "14.5 Test and Commissioning").

14.2 Storage

The goods have to be stored in a dry place at an ambient temperature of $-20 \dots +60^{\circ}\text{C}$.

If a dry storage is not possible, the trace heater ends have to be sealed with an end termination set. This is also necessary if a heating circuit cannot be finished at the end of a shift.

14.3 Heating Circuit Length

The maximum heating circuit length is based on the information given in the data sheet of the delivered trace heater type. It depends on the chosen voltage drop (max. 10% recommended) and on the utilisation of the installed circuit breaker (type C „slow“, 80% utilisation recommended).

14.4 Installation Instructions

ATTENTION

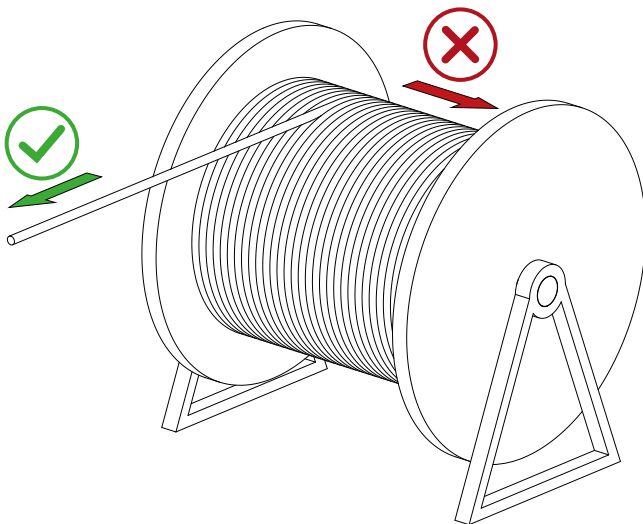
- Do not use adhesive tape with emollients (i.e. PVC)!
- Remove any sharp objects on the surface to be heated.
- Clean and degrease the surface.

ATTENTION

To avoid short circuit, do not connect the two bus wires of the trace heater to each other. Under all circumstances observe the termination and maintenance instructions for the connection and termination of the trace heaters

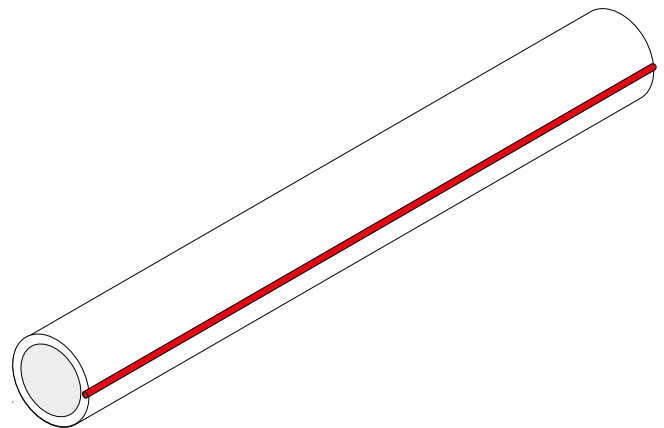
- The installation of a heating circuit has to be carried out using original eltherm accessories acc. to the eltherm installation instructions.
- A minimum bend radius of 25 mm must not be exceeded.
- An overlapping or contacting installation of the trace heater does not damage the heaters, due to the self-regulating characteristic. However, when used as per Table 1 column 4, overlapping or contacting between heater sections needs to be considered for sheath temperature determination.
- The trace heater is to be fully covered (the entire length) with (adhesive) aluminium foil in order to prevent insulation material slipping between the heater and surface to be heated. If the insulation is covered with a metal cladding, an insulation entry kit has to be used to avoid mechanical damage of the trace heater.
- The connection and end termination of the free trace heater ends has to be carried out using eltherm Ex power and end termination kits. Required air gaps and creeping distances need to be observed (see eltherm termination instructions).
- In case the junction box ELAK-Ex-R and the associated mounting post Ex-It or the cable joint Ex-Con SR are not used to establish the power connection, the free cable end is to be connected either outside the Hazardous Area or to a connection box which is approved according to a standardized type of protection.
- Make sure to attach the trace heater – especially the area next to the electrical connection – to its surroundings in a proper way to avoid pulling stress or torsion on the electrical connection.
- The cable joint Ex-Con SR needs to be installed in a way protected from mechanical stress > 4J and from UV radiation. In case ambient temperatures may drop below -25°C, the gland 0X80100 needs to be protected from mechanical stress > 4J, too.
- Upon completion of the installation, the heating circuit needs to be marked by fitting an appropriate label to the associated junction box or to the trace heater close to the junction box. The label shall be weatherproof and bear relevant information of the installed system including the Ex marking.

Unrolling the trace heater

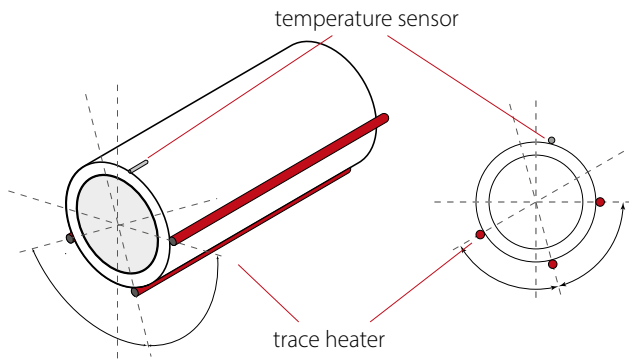


- Use a stable holder to unwind the trace heater.
- Ensure that the unwinding device runs smoothly to prevent damage to the trace heater due to excessive tensile force.
- Unroll the trace heater straight over the edge of the drum, not off to the side.

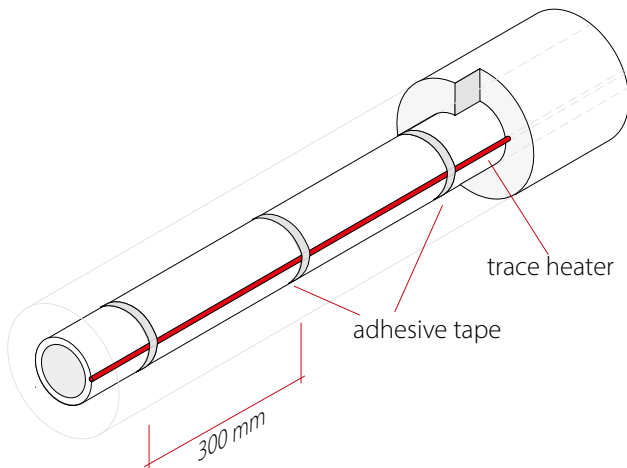
Fastening the trace heater to the pipe



- Normally the trace heater is laid stretched out along the pipe. Lay trace heaters in a spiral pattern only if the projects planning explicitly calls for it.



- Do not lay the trace heater on the lowest point of the horizontal pipeline.
- Laying the trace heater on the top half of a horizontal pipeline is unfavourable for reasons of heat distribution and should only be done if the project planning calls for it.

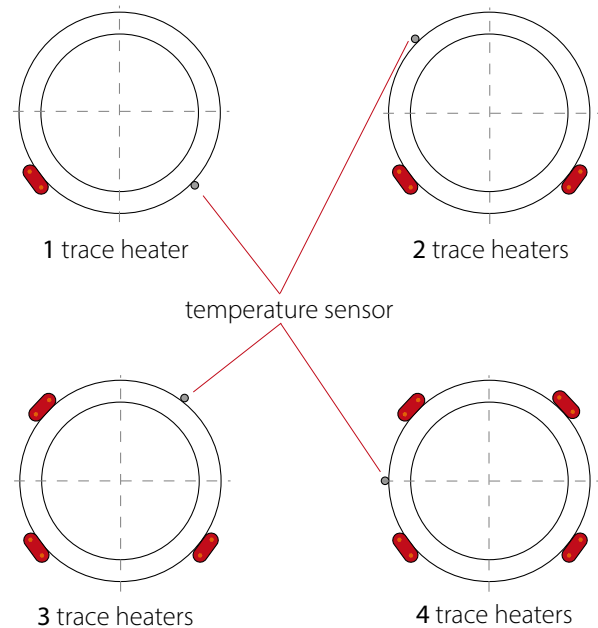


- Fasten the trace heater at intervals of 300 mm.
- Use only fastening materials that have been defined as suitable accessories by the manufacturer and that were selected in the design documents.
- Make certain that the selected materials meet the requirements (for temperature, mechanical and chemical resistance).
- Check whether the use of other elements (such as aluminium adhesive tape for better heat transfer) is required in the design documents.

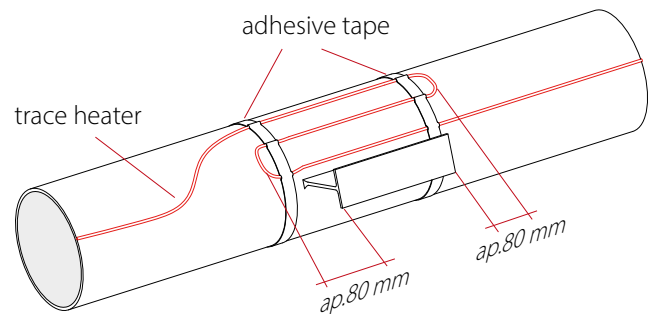
i NOTE

- We recommend covering the entire surface of the trace heater on plastic containers or pipes (PE/PP/PVC/GRP/GRP or similar) with aluminium foil.
- To save energy and to keep process temperatures constant, the application of superior control units are recommended. Please ask our project engineers when in doubt.

- When installing several trace heaters on one pipe please refer to the following sketch.



Fastening the trace heater on pipe supports



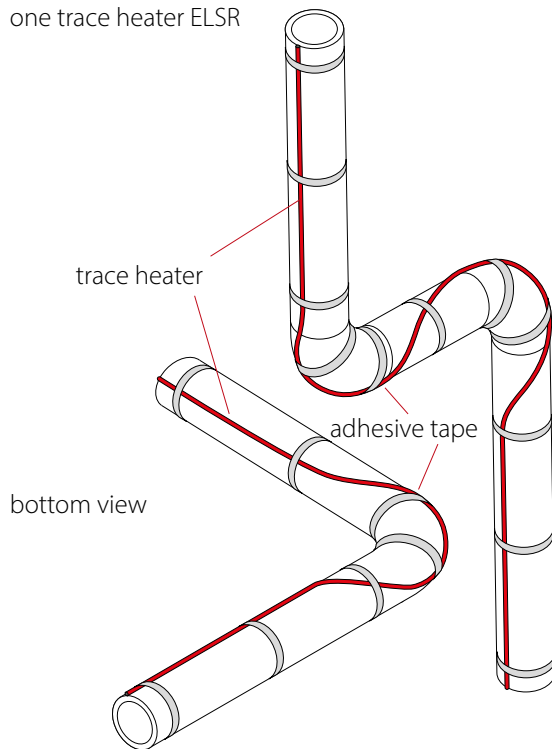
- In areas of pipe supports, trace heaters must be laid in a looped manner in order to be able to provide sufficient power at this point.

! ATTENTION

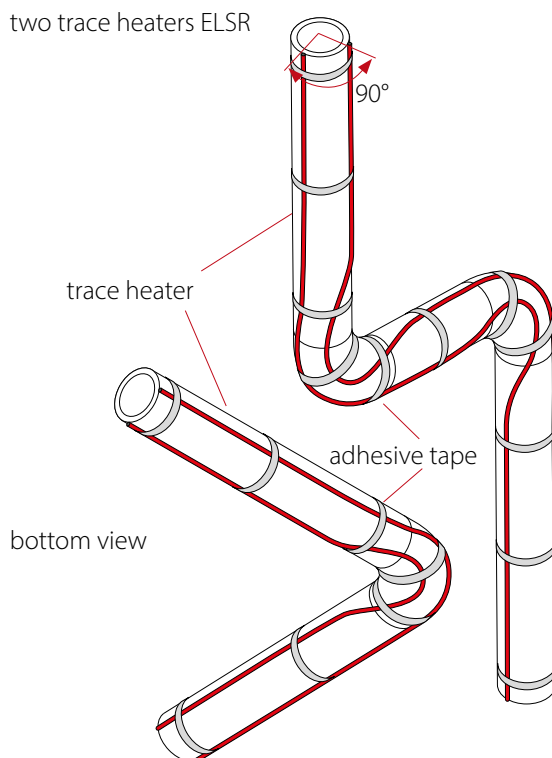
- Observe the specified length allowances in project planning or design (for example in eltherm Designer).

Fastening the trace heater on elbows

one trace heater ELSR

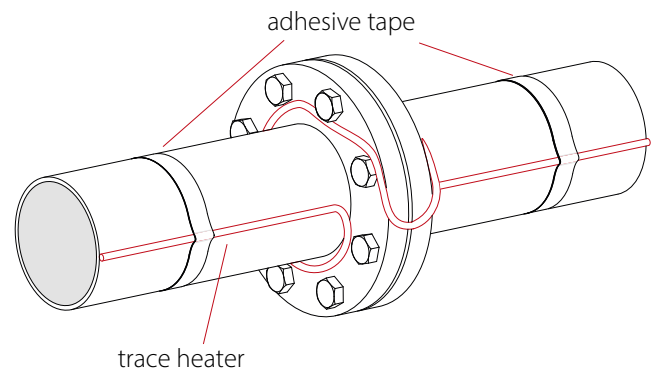


two trace heaters ELSR



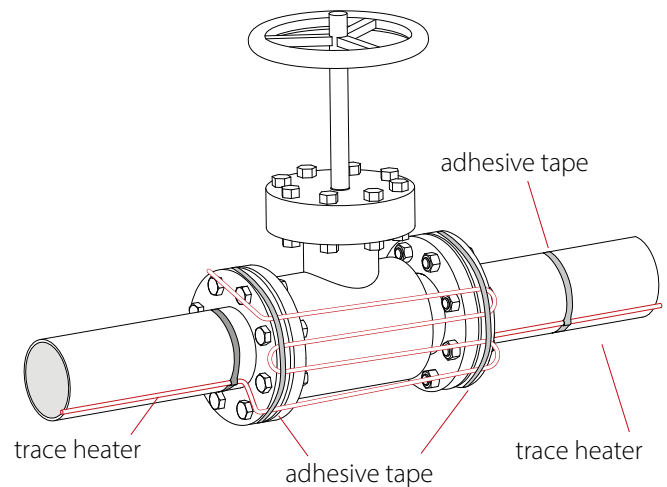
- When laying a trace heater around a pipe bend, the trace heater must be laid on the outside of the pipe bend. If it is laid on the inside, the flow medium may be deposited in the pipe due to the lower heat input to the pipe.

Fastening the trace heater on flanges



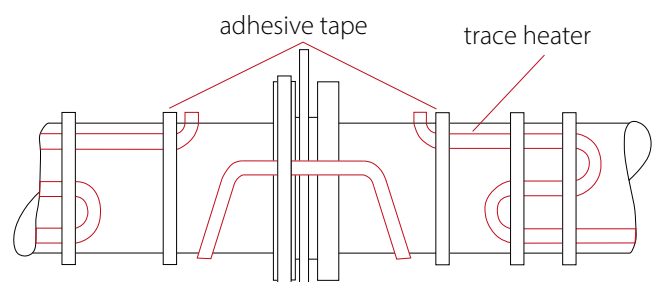
- When laying a trace heater around a flange connection, it must be ensured that the trace heater is laid once around the pipe directly in front of the flange connection. More power must be applied to the pipe at this point due to higher thermal expansion.

Fastening the trace heater on valves

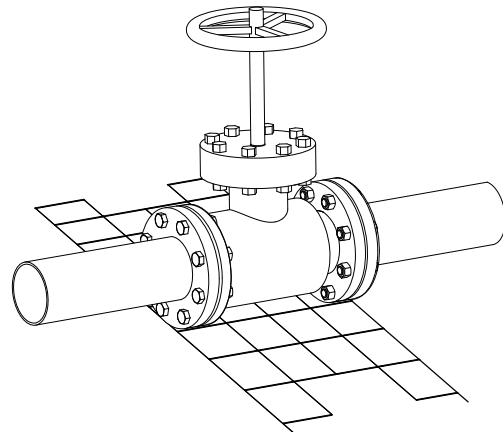
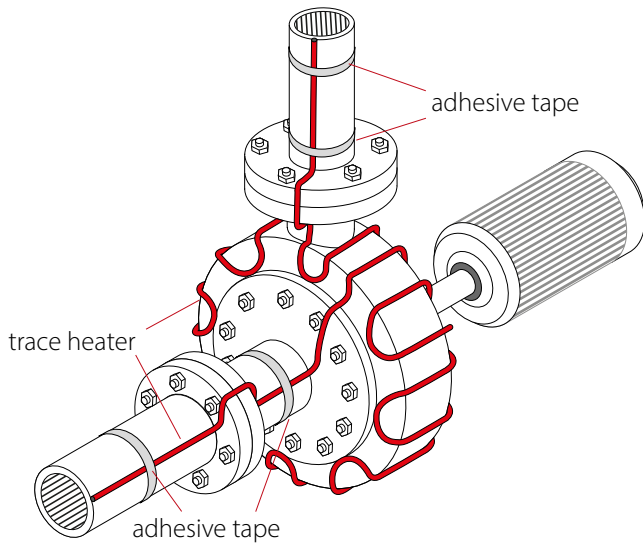


- In areas with large pipe diameters, trace heaters must be laid in a loop.

Fastening the trace heater on Plug-in disc



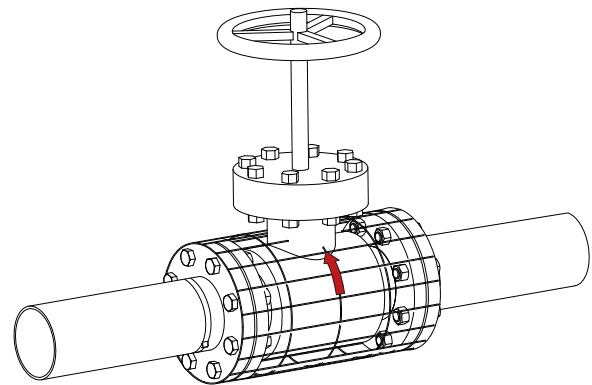
Fastening the trace heater on pumps



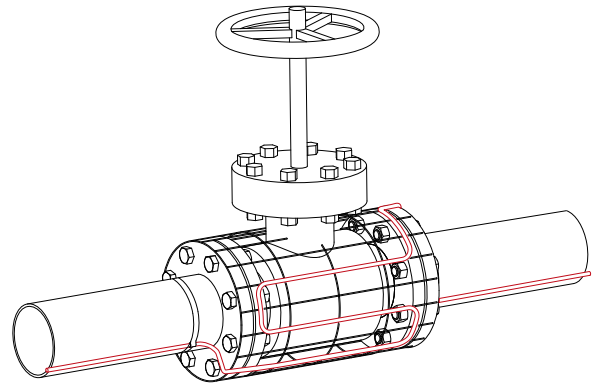
- Cut the wire guard to size so that it fits exactly

Fastening the trace heater onto wire guard

- A special mounting variant consists of fastening the trace heater onto wire guards. This variant is used mainly for heating geometrically complex shapes. This variant is also used if fittings (such as valves and pumps) have to be heated and easy access to the fittings is especially important (for maintenance purpose, etc.) This ensures that the wire guard will be easy to open and close again without having to remove the trace heater first.



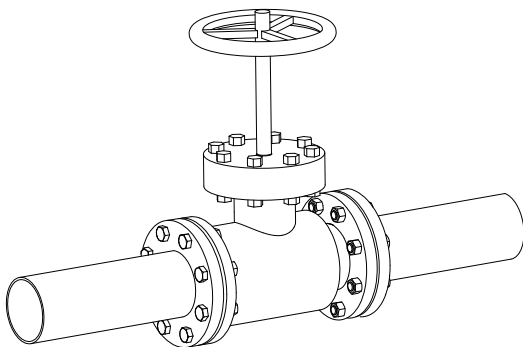
- Fasten the wire guard onto the fitting



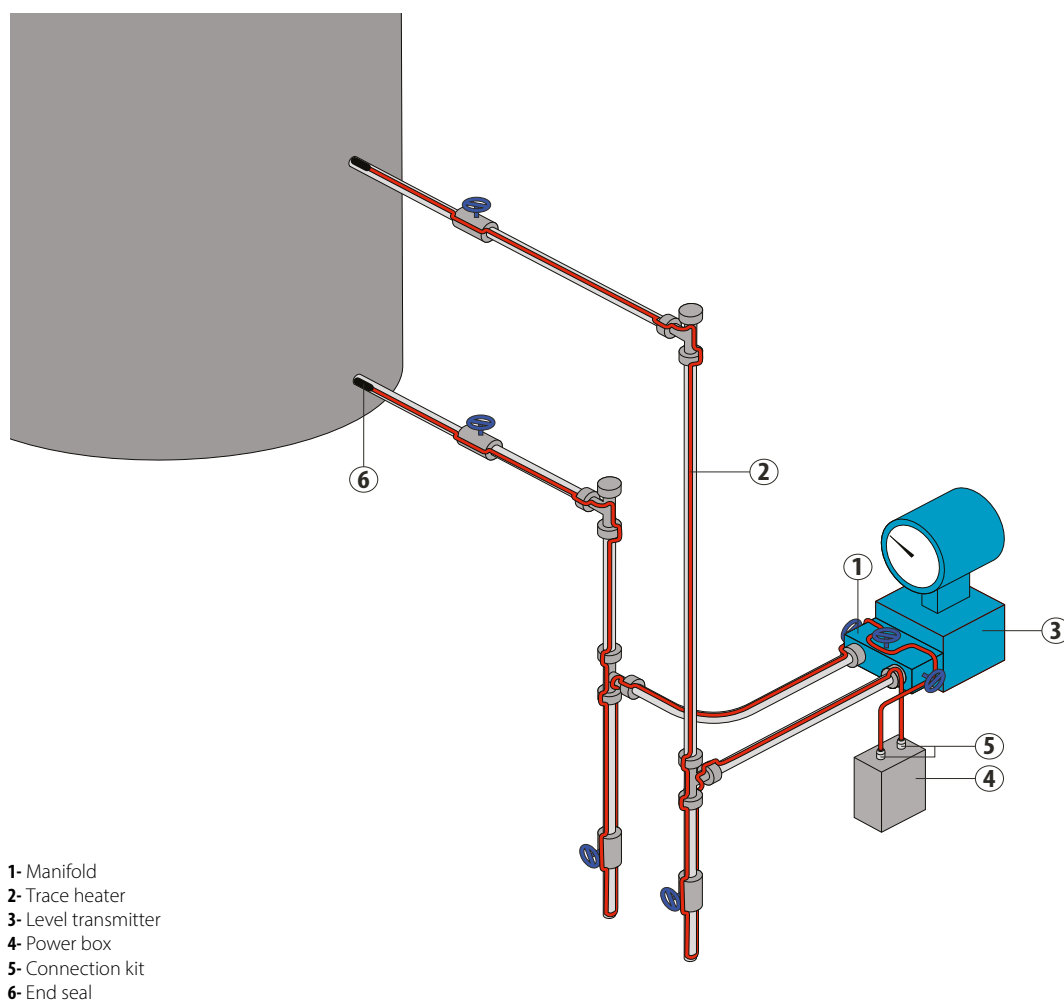
- Fasten the trace heaters onto the wire guard

ATTENTION

- Make certain the wire guard has the best possible contact with the surface of the fitting.
- Only fasten the trace heater with the fastening material provided by the manufacturer and follow the recommendations for fastenings.



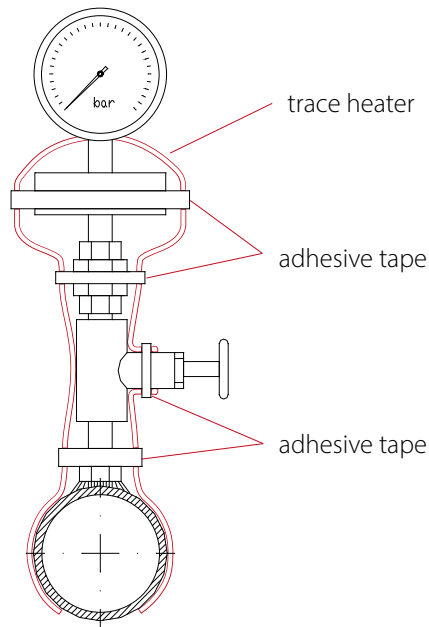
Fastening the trace heater on level indicators



ATTENTION

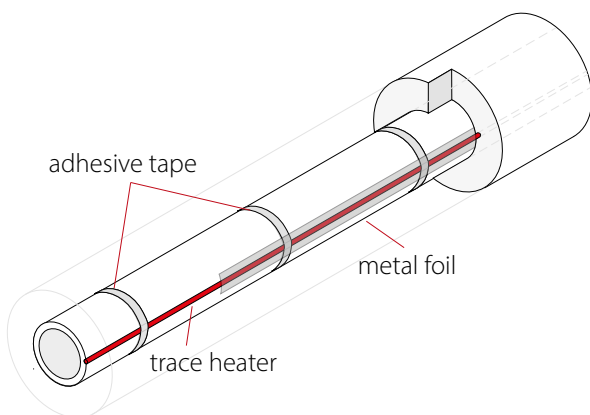
Fittings and level indicators must be installed all round to ensure uniform thermal expansion.

Fastening the trace heater on fittings



Cover the trace heater with metal foil

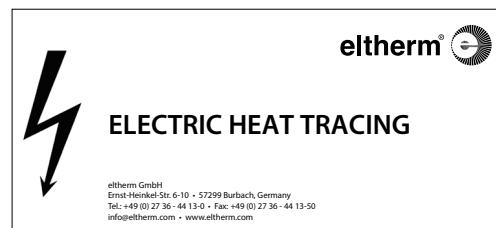
- To prevent the penetration of thermal insulation material between the trace heater and the surface to be heated and to keep the surface temperature of the trace heater as low as possible, the trace heater must be covered over its entire length with self-adhesive metal foil.
- If thermal insulation with a sheet metal jacket is used, an insulation bushing must be used to protect the trace heater from mechanical damage when it is led out of the panning.



Warning signs

DANGER

- Electrically heated parts have to be identified in reasonable distances with warning labels „Electrical heating“ on the thermal insulation.
- Approx. 5 m distance between each label on pipelines or at least 1 warning label per pipe-branch respectively.



ACHTUNG

Please observe the thermal insulation specifications given in the project planning or in the design (e.g. eltherm Designer)

14.5 Test and Commissioning

After completion of a heating circuit but prior to the associated wiring and the installation of the thermal insulation the following steps shall be taken:

- **A verification of the following heating circuit design parameters:**
 - a) temperature to be maintained or the maximum process / exposure temperature
 - b) maximum ambient temperature
 - c) trace heater type
 - d) operating voltage
 - e) trace ratio
 - f) length and resistance of trace heater
 - g) temperature class or maximum sheath temperature
- in case of **controlled design** also:
 - h) location of the sensor of the temperature controller on the heated workpiece
 - i) sensor mounting details
 - j) temperature set points
 - k) monitoring and failure annunciation methods
- in case of **stabilized design** also
 - h) workpiece dimensions
 - i) thermal insulation specification
 - j) cladding specification
 - k) maximum workpiece temperature
- Perform **visual inspection** of the trace heater for possible mechanical damage or improper installation.
- **Insulation resistance test:**
 - the insulation resistance of each heating circuit is to be measured between each single bus wire and the protective braid or screen. The measured values are to be noted.
 - test voltage: min 500 VDC, preferably 2500 VDC
 - independent of the heating circuit length, the insulation resistance must not be lower than 20 MOhm. In case of a lower insulation resistance, the source of defect has to be determined and eliminated.
- Check of the **function of the heating circuit** (only in connection with the required temperature controller and/or limiter).
- **Damages** must be repaired/replaced immediately. With short heating circuits, the trace heater may be replaced completely. With longer heating circuits, the defect is to be eliminated by cutting out the damaged part and replacing it by a new piece of trace heater according to the termination instructions.
- **Repeat the tests after the thermal insulation has been applied.**

14.6 Operation and Maintenance



ATTENTION

- consult the trace heating system documentation prior to maintenance/repair
- Installed trace heater has to be protected against damages that may occur during repair work on heated components.
- After completion of the repair, the heating circuit will once again need to be tested as shown in paragraph 14.5 "Test and Commissioning". Also, test the operation of the earth-fault device of each affected circuit.
- Measurements of the resistance and insulation resistance of the installed trace heaters may only be carried out when they are cold.
- Temperature control units and control devices are to be checked at least annually by trained workers or authorized persons



DANGER

- Damaged heating circuits shall not be operated. This is the case when:
 - heater or attached leads show damage or deformation
 - the circuit is electrically defective (open circuit, high leakage current).
 - after thermal or mechanical overstress
 - after failure of temperature controls
 - after damage to the workpiece to which the heater is installed

- During operation of the system, local laws and regulations for the use of electrical trace heaters in hazardous areas as well as all other applicable standards and safety regulations are to be followed.
- The permissible operating conditions as stated on the type plate, print or in the datasheets (i.e. voltage, amperage, IP protection classification) are to be followed accordingly.
- The permissible temperatures given in section "Applicable temperature range" must not be exceeded.
- In order to preserve energy, to obtain accurate temperatures or to protect the heaters use of temperature controllers can be appropriate. If in doubt, please contact the eltherm project department.
- If trace heaters ELSR-SH-90 or -SHH-75 are used in temperature class T3, T4, T5, T6 or if all other ELSR-SH, -SH+ (see separate Table 1) or -SHH as well as ELSR-H, -H+ or -QH are used in temperature class T4, T5 or T6, their surface temperature needs to be limited by controlled or stabilized design in accordance with EN 60079-30-2. The related designs are to be made by eltherm (this includes confirmation of designs made by third parties).
- The opening of controllers, junction boxes and terminations is permitted only when the heating system is not energised.
- Covers and cable entries of connected controllers, junction boxes and connection joints must be closed or tightened in accordance with the manufacturer's instructions.
- In the event of an earth fault or over current interruption, the device shall not be reset until the cause of the trip has been investigated by qualified personnel.



NOTE

The system ELSR-Ex generally operates maintenance free. However, it is recommended that the system be checked by qualified personnel in regular intervals for visual damages and insulation resistance.



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Visit our download area.

