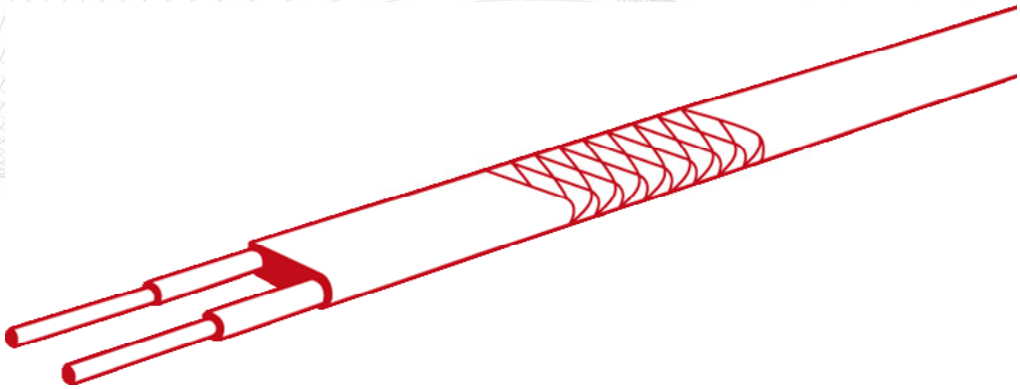
eltherm®
innovations in heat tracing



QAA 085

Instruction Manual

Installation and Operation of the
Heat Tracing System
ELSR-Ex in Hazardous Areas

Contents

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 for T-Class T6 (ELSR-N, -LS) and T3 (ELSR-H, ELSR-SH except -SH-90, ELSR-SHH except -SHH-75) and T2 (ELSR-SH-90, ELSR-SHH-75) according to EN 60079-0:2018, 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.

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:

Component
Trace heater ELSR-H, -LS, -N, -SH or –SHH…
End Cap EL-ECL, -ECN or ECSH (optional)
Plastic Gland M25 0X80100 (optional)
Cable gland Peppers A8F20R or A8 M25 (optional)
Cable Joint Ex-Con SR (0X81125, optional)
Temperature Sensor ELTF-PTEx (optional)
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

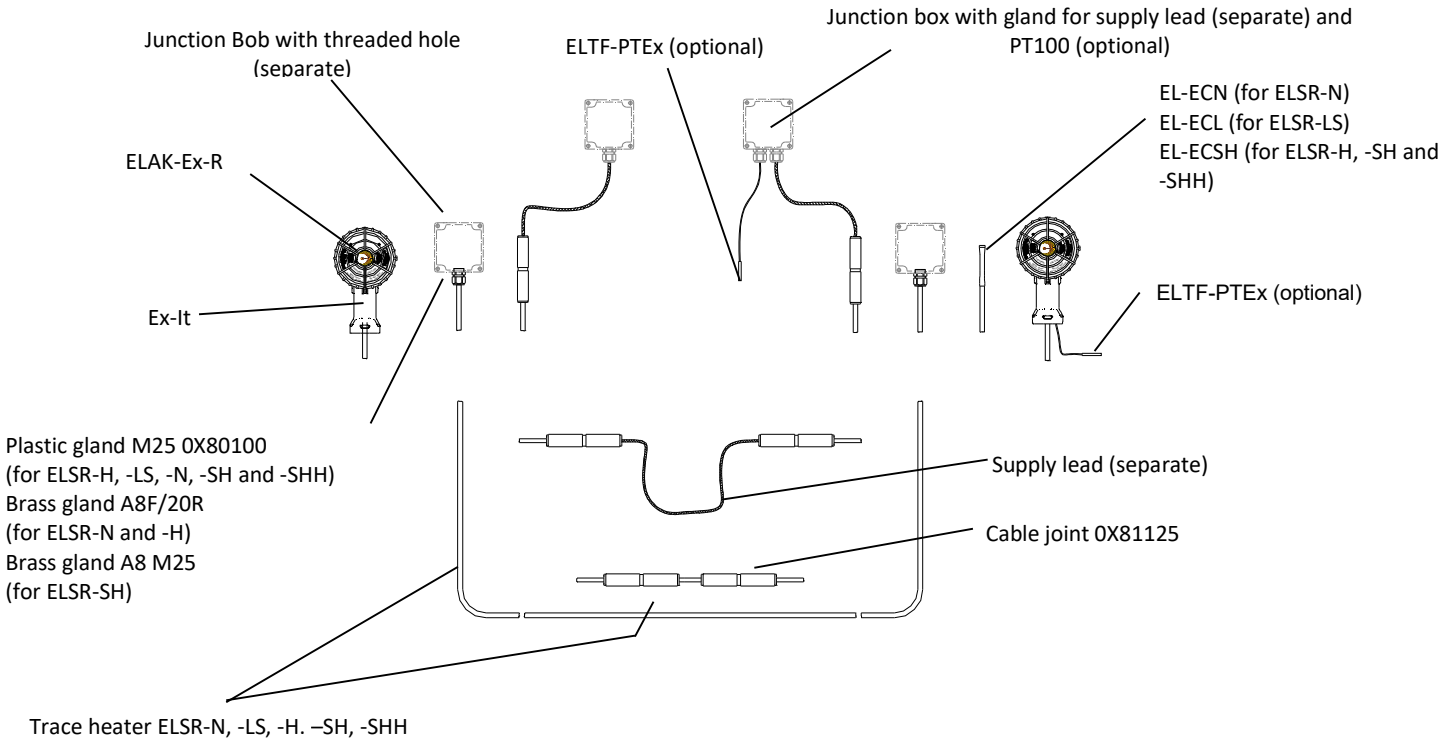
eltherm GmbH Burbach ELSR-Ex 230VAC
manufacturing date and specific output W/m at 10°C: see cable print

Ex II 2G Ex 60079-30-1 eb IIC Gb T< appropriate T-Class >
Ex II 2D Ex 60079-30-1 tb 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
IBExU09ATEX1047X for ELSR-LS
EPS19ATEX1014X for ELSR-N
EPS18ATEX1020X for ELSR-SH
EPS17ATEX1169X for ELSR-SHH

2. Possible Combinations



3. Marking of Components

The system components are marked in the following ways:

Trace Heater ELSR-LS

Ⓔx II 2G Ex 60079-30-1 IIC Gb Ⓔx II 2D Ex 60079-30-1 IIIC Db EPS19ATEX1215U 0637

Trace Heater ELSR-N

Ⓔx II 2G Ex 60079-30-1 IIC Gb Ⓔx II 2D Ex 60079-30-1 IIIC Db EPS18ATEX1133U 0637

Trace Heater ELSR-H

Ⓔx II 2G Ex 60079-30-1 IIC Gb Ⓔx II 2D Ex 60079-30-1 IIIC Db EPS12ATEX1429U 0637

Trace Heater ELSR-SH

Ⓔx II 2G Ex 60079-30-1 IIC Gb Ⓔx II 2D Ex 60079-30-1 IIIC Db EPS18ATEX1028U 0637

Trace Heater ELSR-SHH

Ⓔx II 2G Ex 60079-30-1 IIC Gb Ⓔx II 2D Ex 60079-30-1 IIIC Db CML20ATEX3171 0637

End Cap EL-ECL

eltherm EL-ECL <Los-Nr: ...> 22-29 mm

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

End Cap EL-ECN

eltherm EL-ECN <Los-Nr: ...> 30-36 mm

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

End Cap EL-ECSH

eltherm EL-ECSH <Los-Nr: ...> 26-34 mm

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

Plastic Gland 0X80100

eltherm GmbH Burbach M25 x 1,5

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

Cable Joint Ex-Con SR (0X81125)

eltherm GmbH Burbach cable joint 0X81125 550V / 145A

II 2G Ex eb IIC T3…T6 Gb II 2D Ex tb IIIC TX Db

IBExU07ATEX1080X IP 65 <Los-Nr: ...> CE 0637

Warning: Do not open while energized!

T

emperature Sensors ELTF-PTEx

eltherm GmbH Burbach ELTF-PTEx.<Nr.>

II 2G Ex eb IIC T6...T2 Gb

II 2D Ex tb IIIC Tx Db

IBExU 04 ATEX 1004 X IP65 <Los-Nr: ...> 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 <Los-Nr: ...> CE0637

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

SIRA011ATEX1270X

4. Applicable Temperature Range

The system is suitable for ambient temperatures from -60°C to +50°C with ELSR-H, -LS, N and -SH and from -40°C to +50°C with ELSR-SHH; from -32°C to +50°C in combination with cable joint Ex-Con SR and from -20°C to + 50°C in combination with mounting post Ex-It . At ambient temperatures below -25°C, the plastic gland 0X80100 is to be installed in a way protected from mechanical stress > 4J.

The maximum maintenance temperature for the system using trace heaters ELSR-LS or -N is 65°C (energised). The maximum process temperature is 80°C (de-energised).

The maximum maintenance temperature for the system using trace heater ELSR-H is 120°C (energised). The maximum process temperature is 180°C (de-energised).

The maximum maintenance temperature for the system using trace heater ELSR-SH is 165°C (energised). The maximum process temperature is 250°C (de-energised), in combination with cable joint Ex-Con SR 200°C.

The maximum maintenance temperature (energised) and the maximum process temperature (de-energised) for the system using trace heaters ELSR-SHH is 250°C. If the components Ex-It or Ex-Con-SR are part of the system, it is 200°C.

When the plastic gland M25 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).

5. 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 exposed to light.

6. 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

7. Miscellaneous

Prior to work on pipes, vessels and assiciated 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)

8. 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 /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

9. Further Documents

In addition to this manual, the following documents are to be observed:
- Data sheet heater ELSR-H, -LS, -N
- QAA 048 (end cap EL-EC…)
- QAA 072 (cable joint Ex-Con SR)
- QAA 073 (mounting post Ex-It)
- QAA 090 (junction box ELAK-Ex-R)
- QAA 097 / QAA 101 (power termination)
- BU 065 (temperature sensors ELTF-PTEx...)
- BU 080 (plastic gland)

10. Installation of the Ex Heat Tracing System ELSR-…

10.1 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 be checked (see “10.5 Test and Commissioning”).

10.2 Storage

The goods have to be stored in a dry place at an ambient temperature of –20 … +60°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.

10.3 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).

10.4 Installation Instructions

- Remove any sharp objects on the surface to be heated.
- Clean and degrease the surface.
- 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.

Attention: Do not use adhesive tape with emollients (i.e. PVC)!

- An overlapping or contacting installation of the trace heater does not cause overheating due to the self-regulating characteristic.

- 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.

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.

- 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.

- 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).

10.5 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.

10.6 Operation and Maintenance:

- 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, exposure temp., operating temp., 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 or -SHH as well as ELSR-H 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 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.

- Read the heat tracing documentation prior to any maintenance or repair work

- The opening of controllers, junction boxes and terminations is permitted only when the heating system is not energised.

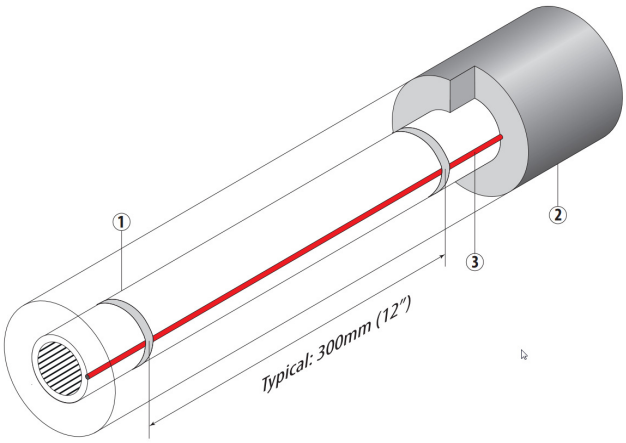
- Installed trace heater has to be protected against damages that may occur during repair work on heated components.

- After completion of the repair, the heating circuit will once again need to be tested as shown in paragraph 10.5 “Test and Commissioning”. Also, test the operation of the earth-fault device of each affected circuit.

- Damaged heating circuits shall not be operated. 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.

- Temperature control units and control devices are to be checked at least annually by trained workers or authorized persons

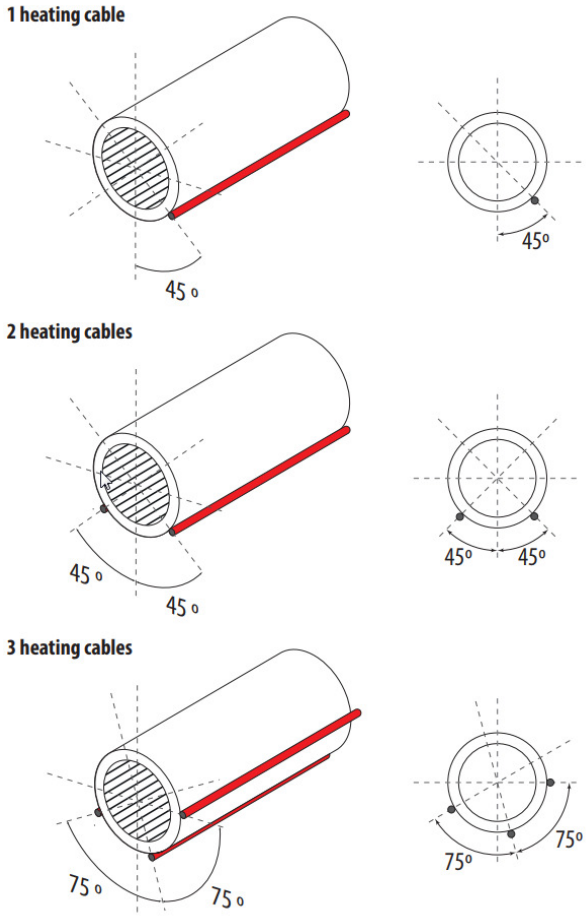
11.Installation of trace heaters on pipes



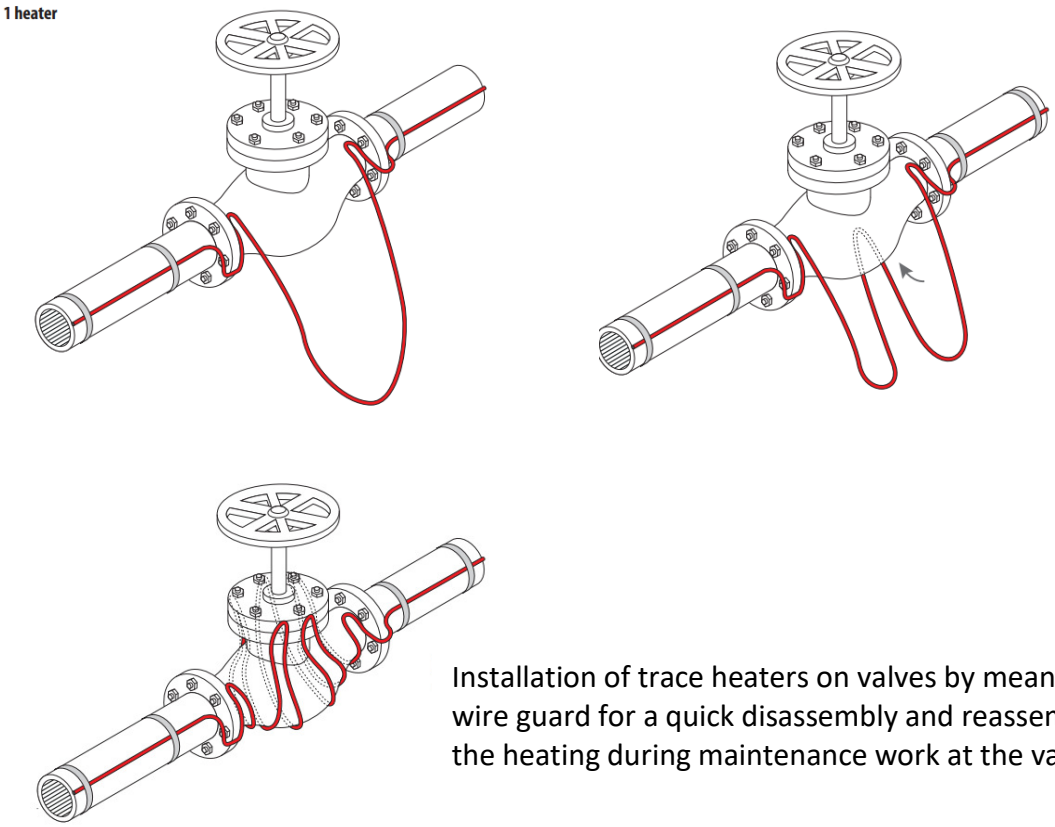
The heater is traced and fixed parallel to the pipe axis. Hazardous area: a max. 300 mm

- 1: Adhesive Tape
- 2: Insulation
- 3: Trace Heater

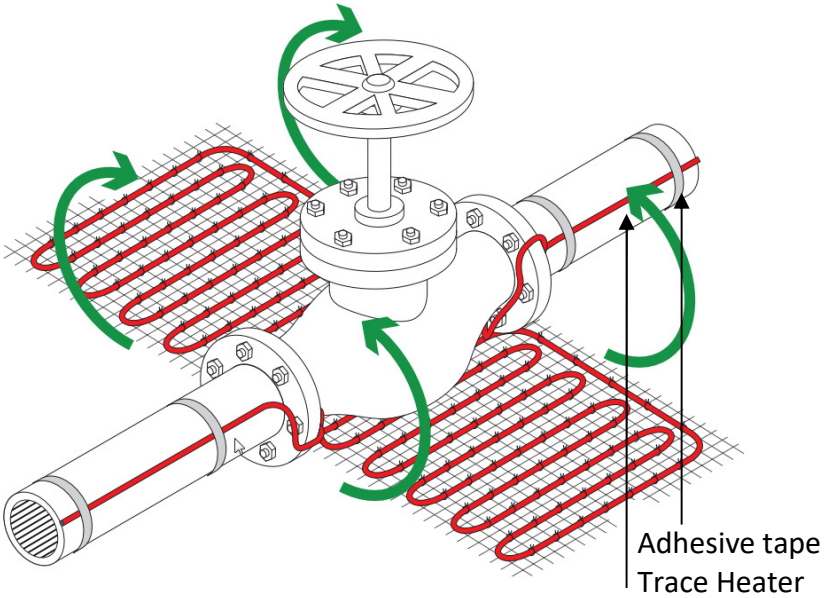
For multiple tracing please follow the drawing



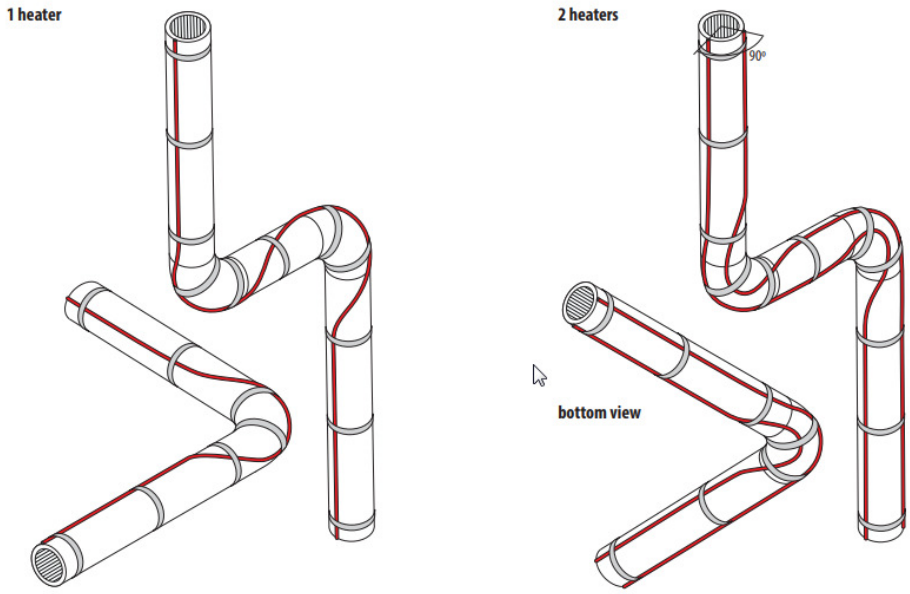
12. Installation of trace heaters on valves



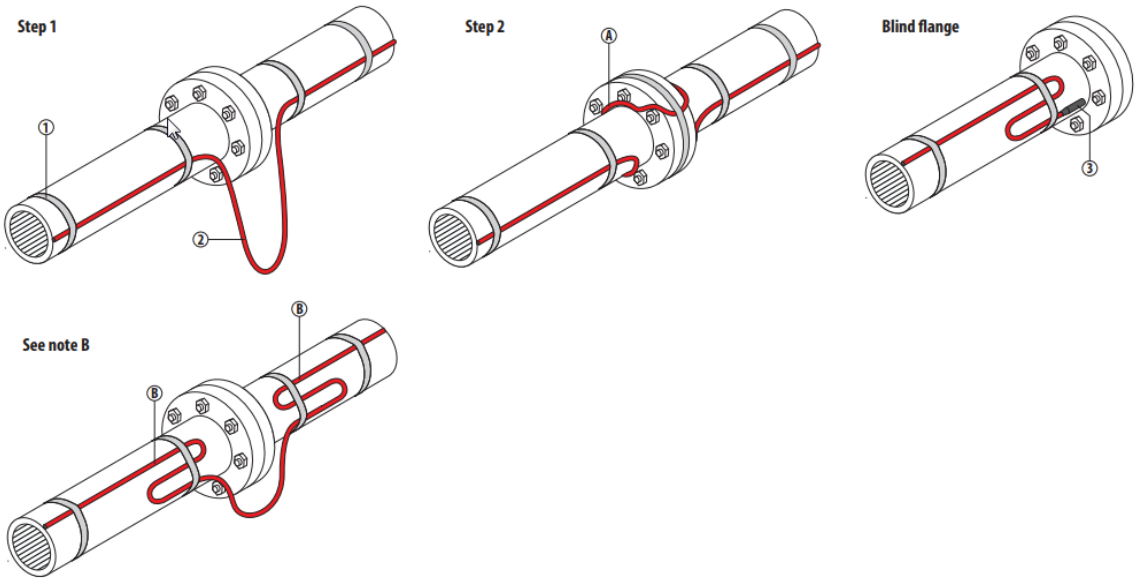
Installation of trace heaters on valves by means of a wire guard for a quick disassembly and reassembly of the heating during maintenance work at the valve.



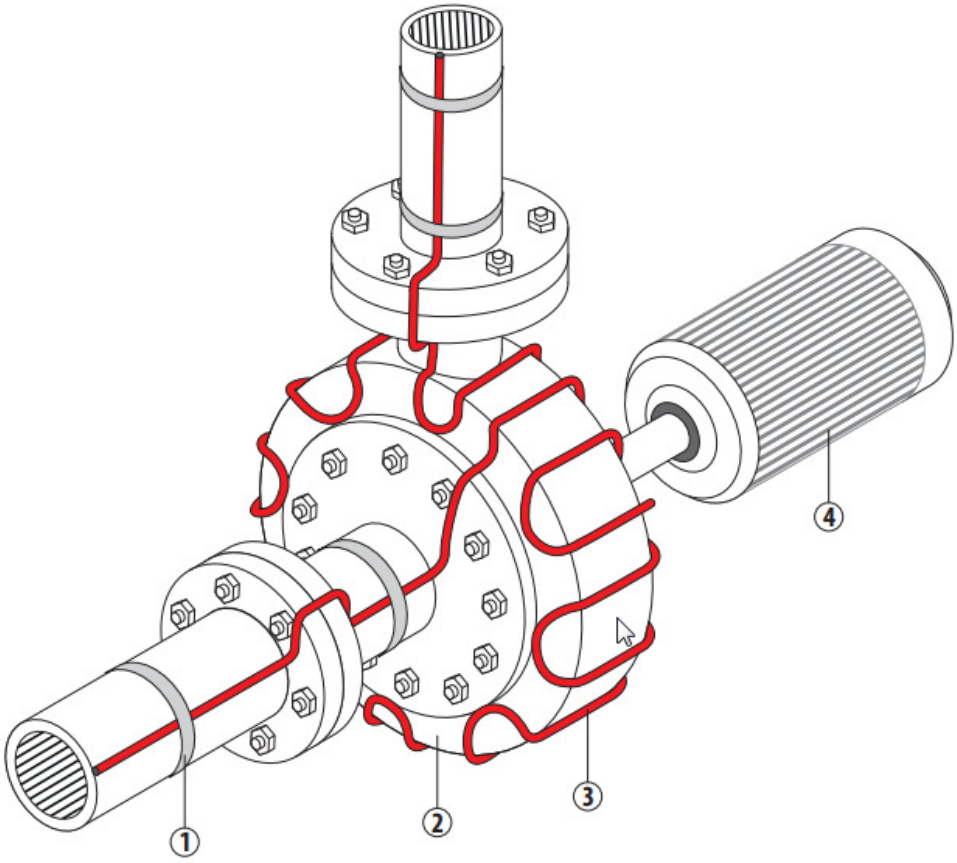
13.Installation of trace heaters on elbows



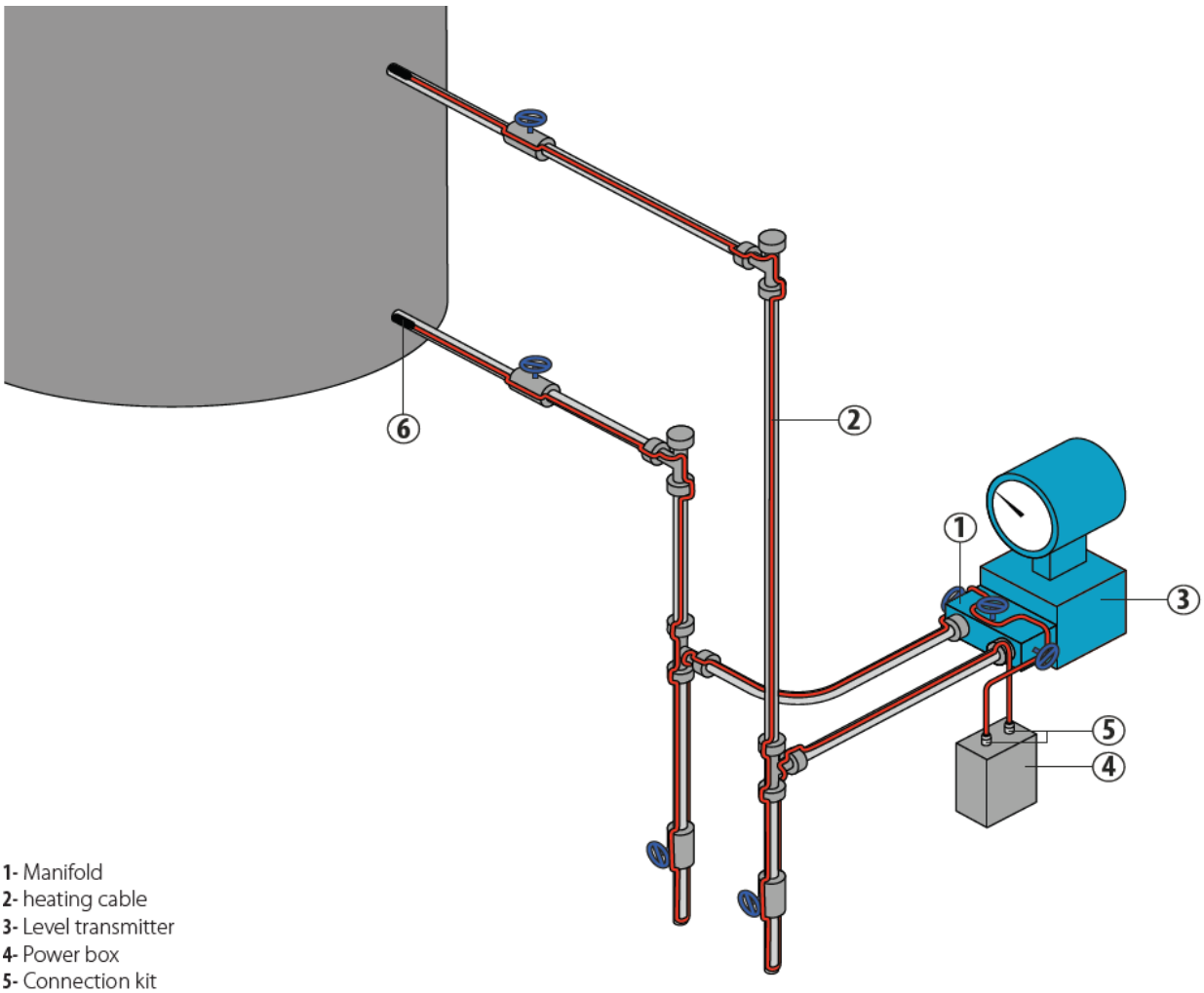
14.Installation on flanges



15.Installation of trace heaters on pumps



16. Installation of trace heaters on level indicators



1- Manifold
2- heating cable
3- Level transmitter
4- Power box
5- Connection kit
6- End seal

Note: Trace Heater Fixation:

- Fibre glass or aluminium tape for plastic sheath trace heaters (self-regulating and constant wattage)
- Stainless steel band for metal sheath trace heaters (mineral insulated)