QAA 087

OPERATING MANUAL

Of Ex Heat Tracing System ELK-AG-N 2.5 Ex

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Contents

1. Description and Technical Data

Application
The Ex Heat Tracing System ELK-AG-N 2.5 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 T6, T5, T4 and T3 according to EN 60079-0:2018, EN 60079-7:2015/A1:2018, EN 60079-30-1:2017 and EN 60079-31:2014). Operation in Zone 1 / Zone 21 needs to be done either in stabilized or in controlled design according to EN 60079-30-2.

System Components
The Ex Heat Tracing System ELKM-AG-N 2,5 Ex comprises the following components:

- Trace heater ELKM-AG-N
- Cable Joint Ex-Con 22/4 or 22/4Si or 25/7

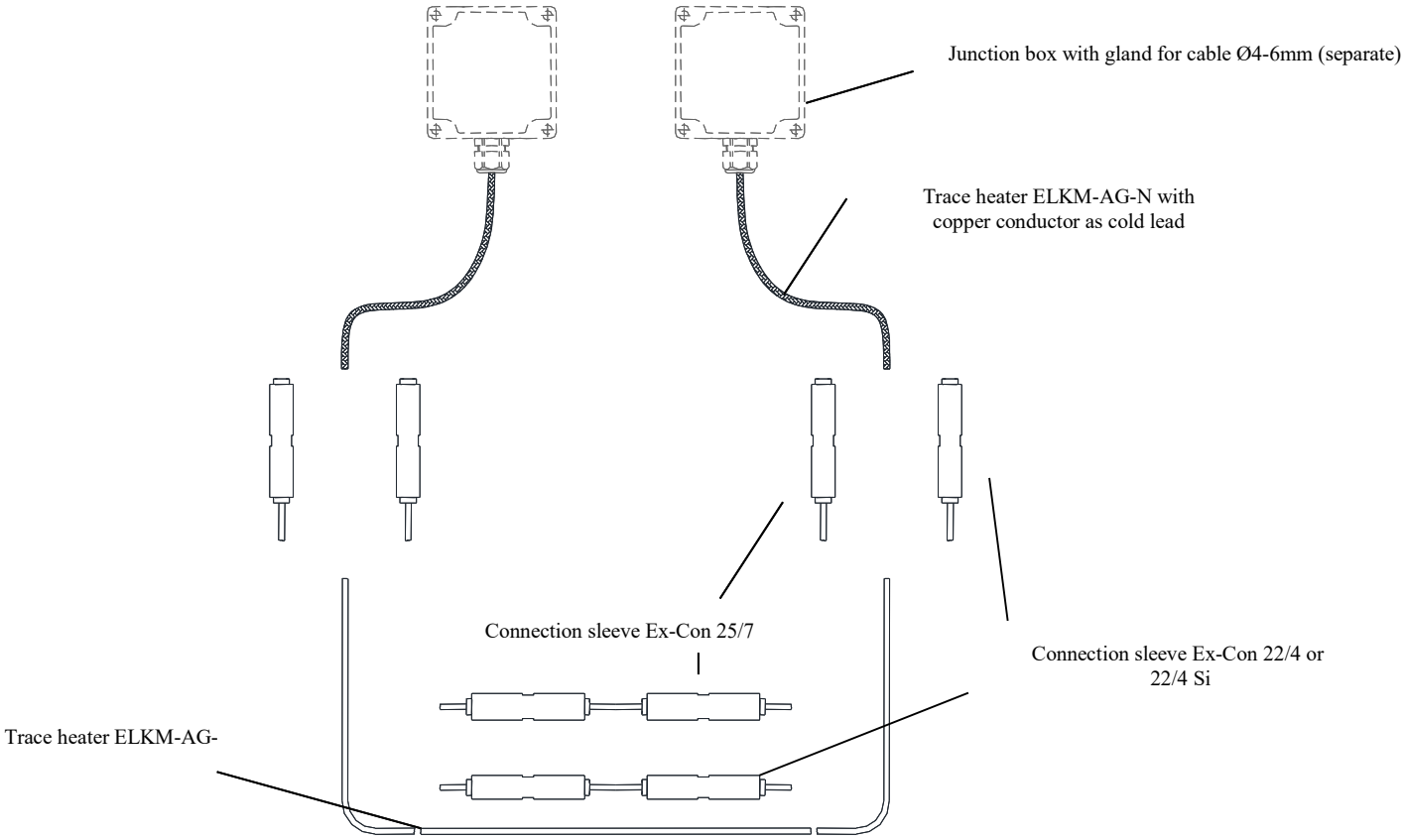
The electrical connection needs to be made to a suitable junction box approved for Hazardous Areas (including glands suitable for cable of 4-6 mm OD) or outside the Hazardous Area.

Marking of Ex Heat Tracing System ELK-AG-N 2.5 Ex

eltherm GmbH 57299 Burbach ELK-AG-N 2.5 Ex
<nominal voltage>VAC <nominal current>A <Length>m
(manufacturing date see cable print)

Ⓔx II 2G Ex 60079-30-1 eb IIC T< relevant T-Class > Gb
Ⓔx II 2D Ex 60079-30-1 tb IIIC IP65 T< relevant max. surface temperature>°C Db
IBExU13ATEX1124X CE 0637
-60°C/-32°C <= Tp <= < max. maintenance temperature >

Possible Combinations:



Marking of Components
Components of the system are marked in the following way:

Trace heater ELKM-AG

eltherm ELKM-AG-N < specific resistance > Ohm/m 550 V
Ex II 2G Ex 60079-30-1 IIC Gb Ex II 2D Ex 60079-30-1 IIIC Db EPS12ATEX1466U 4J -60°C <= Ta <= 260°C

Connection sleeves Ex-Con 22/4, 22/4 Si and 25/7

eltherm GmbH 57299 Burbach Ex-Con <22/4, 22/4 Si or 25/7> 550V / 20A
Ex II 2G Ex eb IIC T6...T3 Gb Ex II 2D Ex tb IIIC TX Db
IBExU04ATEX1005X <Lot-No: ...> CE 0637
IECEx IBE 13.0012 X
Warnung: Nicht unter Spannung öffnen!
Warning: Do not open while energized

Applicable temperature range:
The system is suitable for ambient temperatures of –32°C to +50°C. for connection sleeves Ex-Con 22/4 and 25/7 and -60°C to +50°C for connection sleeve 22/4 Si. The maximum maintenance temperature is 170°C (energised) and 200°C (deenergised). The cable joint is to be mounted directly on the heated surface and will hence be the hottest part of the system. Maximum permissible currents for this setup are given in the table below:

T-Class	Max. maintenance temperature at currents of		
	10A	15 A	20A
T6	60°C	45°C	25°C
T5	75°C	60°C	40°C
T4	110°C	95°C	75°C
T3	170°C	155°C	135°C
Dust	TX-10K	TX-15K	TX-20K

TX: Maximal permissible surface temperature for dust explosible areas

Mechanical properties
All system components are suitable for use with a low risk of mechanical damage (4J) and therefore need to be installed in a protected way (i.e. underneath a thermal insulation). This also provides the required protection from light. IP rating of the system is IP65.

Heating circuit design
The following conditions are to be considered for electrical design of heating circuits:
- max. voltage 550V
- operating current depending on maintenance temperature and T-Class (see section “Applicable temperature range”
- max. current 20A
- max. specific current 30A/mm² (heater cross section)
- max. specific heater output 25W/m

For thermal design of the heating circuit the requirements of EN 60079-30-2 are to be observed.
Determination of T-Class for every single heating circuit to be performed by eltherm (this includes the confirmation of T-Classes that have been determined by third parties).
Limiting temperatures of all system-relevant components to be considered.

With the set of conditions given above, the cable joint can be considered the hottest point of the system when installed directly on the heated surface

Operation in Zone 1 or Zone 21 requires controlled design (with temperature controllers and limiters) or stabilized design as per EN 60079-30-2.

Specific information for trace heating installations according to EN 60079-30-1 Section 6.3:

- each heating circuit to be equipped with a RCD
- each heating circuit to be separated from power supply prior to installation or maintenance work
- keep trace heater ends and termination kits dry from receipt until completion of installation
- connect the protective braid or screen of the trace heater to ground
- make the presence of trace heaters visible by placement of recognizable signs in suitable intervals
- retain the heat tracing documentation throughout the entire service life of the heated installation

Further documents
In addition to this manual, the following documents are to be observed:

- Data sheet heating cable ELKM-AG-N
- QAA 059 (cable joint Ex-Con 22/4, 22/4 Si and 25/7)

2. Installation of the Ex Heat Tracing System ELKM-AG-N 2,5 Ex

2.1 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 to check the insulation resistance (see “6. Test and Commissioning”).

2.2 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 installation cannot be finished at the end of a shift.

2.3 Length of Heating Circuit

The length of factory terminated heaters has been determined by eltherm. It may only be changed when approved by the eltherm project department.

The design of “off the reel” heater is to be done based on the relevant datasheet. The given maximum voltages, operating temperatures and specific heater outputs (in W/m) must not be exceeded (see chapter “Description and Technical Data” section “Heating circuit design”).

3. Protective Measures

- always install trace heaters ELKM-AG-N in a way protected from mechanical stress (4J).
- in addition to the requirements of EN 60079-30-2, all applicable local codes and regulations are to be observed during design and installation.
- in Zone 1 and Zone 21 the heating may only be operated in controlled or stabilized design as per EN 60079-30-2.
- temperature sensors are to be placed in a way suitable for the prevention of overheating of workpiece and trace heater.
- the use of a ground fault protection device 30mA (or 30mA above leakage current of heating element) for each heating circuit is mandatory.
- when using the trace heaters on metal surfaces, they also have to be protected against indirect contact acc. to DIN VDE 100, part 410 (or equivalent standards) before operation of the system.
- the metallic braid or screen of the trace heater has to be connected to the potential earth.
- de-energise all circuits prior to installation or maintenance of heating components.

4. Installation Instructions

- work is only to be done by the manufacturer of the system or personnel that has been trained for installation of trace heaters in hazardous areas.
- installation requires an electrically skilled person (according IEC 60050 IEV 195-4-1) and must be supervised by a person who is well trained regarding requirements of EN 60079-14 for trace heating systems. Experience and education of this person regarding installations in hazardous areas is mandatory.
- remove any sharp objects from the surface to be heated.
- clean and degrease the surface.
- mark laying distance on surface.
- for single conductor trace heaters that are fed from both ends: Arrange cable entry and exit next to each other for the ease of power supply.
- the installation of a heating circuit has to be carried out using original eltherm accessories acc. to the eltherm installation instructions. Fix trace heaters to the surface with self adhesive aluminium tape (approx. one patch every 300 mm).

Caution: Take care that the trace heaters are not twisted and that the installed sections do not touch nor cross, as it might otherwise lead to local overheating and destruction of the trace heaters. Furthermore, this will void the Ex approval. The minimum bending radius is 10 mm for trace heaters with a maximum OD of 5 mm and 15 mm for all others.

- The trace heater and its supply lead is to be secured to the heated surface directly before and after the connection sleeve (e.g. by adhesive tape or temperature resistant wire straps) to avoid pulling stress or torsion on the electrical connection.

- the length of trace heater that is the active (heating) part needs to be terminated with cold leads for power connection. This termination is to be done by use of approved eltherm accessories only. The required creeping distances and clearances need to be observed (see related termination instructions). The free ends of the cold leads are to be connected either outside the Hazardous Area or to a connection box which is approved according to a standardized type of protection.

- the maximum temperatures of the system must not exceed the temperature limits established by the plant owner (T6 – T1 or maximum surface temperature for dust). This can be achieved (regarding EN 60079-30-2) by utilisation of temperature controllers and limiters or by stabilized design.

- 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.

- 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).

5. Testing and Commissioning

After completion of a heating circuit and prior to the installation of the thermal insulation, the following steps have to be taken:

- a visual check of the trace heater regarding possible mechanical damages and/or incorrect 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 recorded.
- 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 conjunction with the required temperature controller and/or limiter to avoid overheating).
- eventual 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

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 data sheets (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.
- the system ELK-AG-N 2.5 Ex generally operates maintenance free. However, it is recommended to check the system 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 any repair, the heating circuit will once again need to be tested as shown in paragraph 6 “Testing and Commissioning”.
- damaged heating circuits shall not be operated.
- temperature control units and control devices are to be checked at least annually by electrically skilled persons.