BARTEC

PBS-310-E | PBS-310-E10

Installation Instructions

PBS-310-E | PBS-310-E10 Power entry kit
for up to 2 trace heaters
for use with BARTEC BPL trace heaters

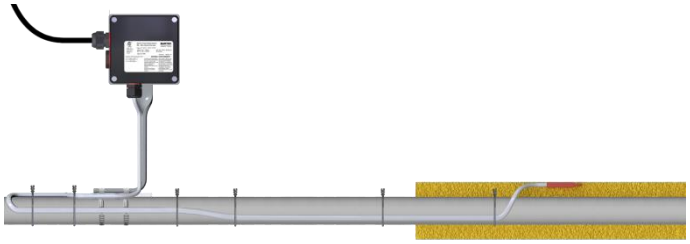
Consignes d’installation

Kit de connexion PBS-310-E | PBS-310-E10
pour jusqu’à 2 câbles chauffants
de type BARTEC BPL

Table of contents

Overview

This manual covers the installation and operation of the BARTEC PBS-310-E | PBS-310-E10 Power entry kit.



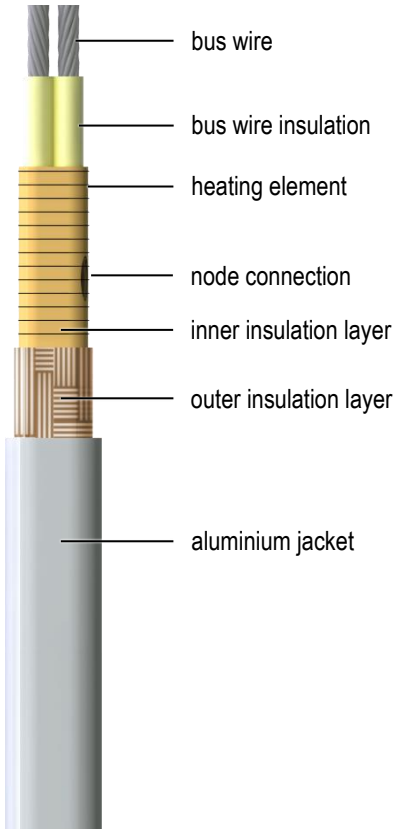
The trace heating system uses a power limiting trace heater. Its fixed specific resistance offers a constant power output irrespective of the ambient temperature. The aluminum outer jacket ensures maximum mechanical strength.

The trace heaters are fixed equipment heating systems for pipes in ordinary and hazardous areas. The trace heater can be cut and installed to any required length (up to the maximum heating circuit length as shown on page 8).

This manual applies for the following trace heaters:

- BARTEC BPL

The following terms describe the parts of the trace heater within these instructions:



Certifications / Approvals

PBS-310-E | PBS-310-E10 Power entry kit for BARTEC BPL power limiting trace heaters

Technical data

Maximum exposure temperature	***continuous***	-40 to 350 °C
	intermittent	-40 to 425 °C
Minimum operation temperature		-40 °C
Minimum installation temperature		-40 °C
Power supply		0 to 277 Vac
Trace heater output		15 to 70 W/m
Protection classification		Ⓔx II 2 G Ex e IIC T* Gb Ⓔx II 2 D Ex tb IIIC T# °C Db *(for T*and T# see table maximum pipe/work piece temperature below)*
Heater dimensions	***outer dimensions***	10.7 x 7.7 mm
	bus wires	3 mm²
Minimum bending radius		25 mm
Weight		16.5 kg / 100 m
Power cable entry	***PBS-310-E***	M25 cable gland
	PBS-310-E10	M32 cable gland
Max. power conductor size	***PBS-310-E***	6 mm²
	PBS-310-E10	10 mm²
Terminals		Spring clamp Ex e, 2x3 line, 1x3 PE

Maximum pipe / workpiece temperature[1]

	T5	*T4*	*T3*	*T2*	*T1*	*SAFE*[2]
5BPL-AL	36 °C	71 °C	160 °C	289 °C	350 °C	350 °C
10BPL-AL	11 °C	28 °C	100 °C	246 °C	323 °C	323 °C
15BPL-AL	-	-	39 °C	178 °C	276 °C	276 °C
20BPL-AL	-	-	-	80 °C	185 °C	185 °C

Safety

For safe installation of the PBS-310-E | PBS-310-E10 Power entry kit the technical requirements and instructions given in this manual must be followed.

⚠ WARNING

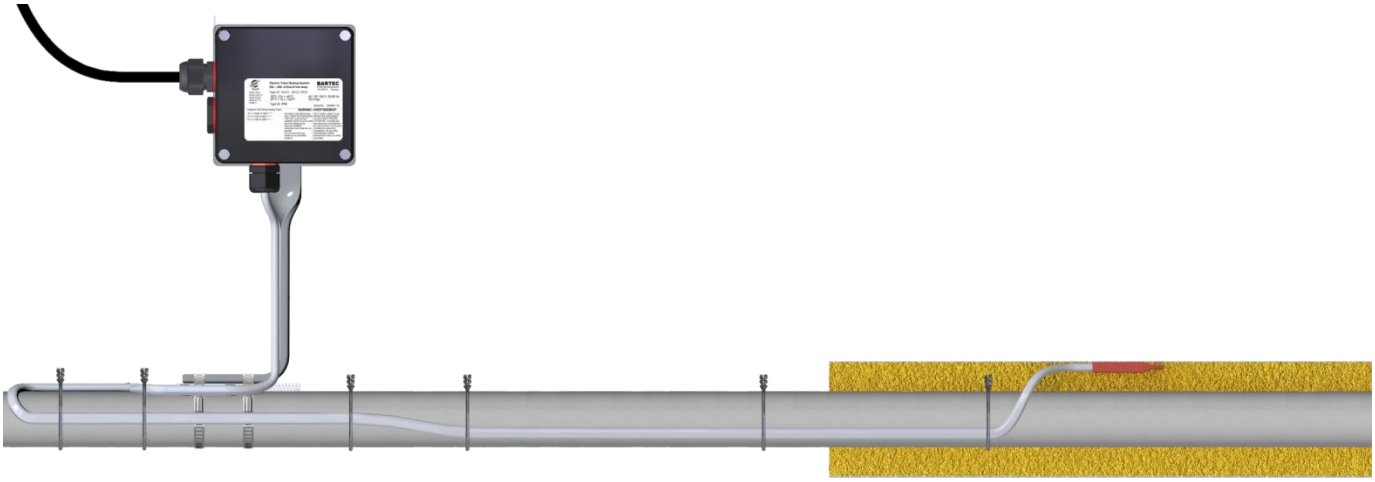
Risk of fire or electrical shock. Follow these guidelines to avoid personal injury or material damage.

- All electrical systems and installations must comply with BARTEC GmbH requirements and be installed in accordance with the relevant electrical codes and any other applicable national and local codes.
- BARTEC GmbH, the US and Canadian electrical codes require ground fault protection to be provided for all trace heating circuits.
- Install the connection kit, trace heaters and end seals carefully.
- Use the trace heater in accordance with the intended purpose and strictly comply with the operational data specified in section *Technical Data*.
- The bending radius of the trace heater must be at least 25 mm.
- Any defective component of the kit must be replaced before installation.
- To avoid short circuits, do not connect the trace heater bus wires together.
- Keep all components and the trace heaters dry before and during installation.
- This kit contains silicone adhesive. Keep out of reach of children. Store at below 25 °C. Follow the safety instructions given on the packaging.
- Keep these instructions for future reference. If applicable, leave them with the end user.
- De-energize before installation or servicing.
- Use only original BARTEC accessories.

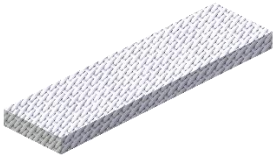
[1] Applies for 230 V, for 277 V applications contact your local BARTEC representative for assistance. Surface temperature limits in accordance with EN60079.
[2] Surface temperature limited by materials of construction (withstand temperature)

Kit contents

The following table lists the kit contents of the PBS-310-E | PBS-310-E10 Power entry kit[3]:



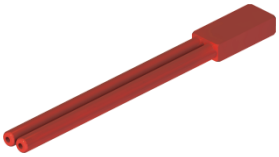
PBS-310-E | PBS-310-E10 Power entry kit



1 x
Thermal break pad

1 x
Cover for junction box
incl. 4 fixing screws

1 x
Junction box with connection terminals
“-E” junction boxes 122 x 120 mm
“-E10” junction boxes 160 x 160 mm



1 x
Silicone pants

1 x
End seal

1 x
Silicone adhesive

1 x
Plastic gland body

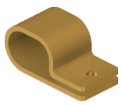
1 x
BPL-Grommet

1 x
Fixing nut

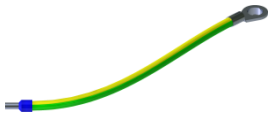
1 x
Seal ring for gland body

1 x
Lock nut for gland body

[3] Note that the illustrations might vary depending on whether you use the PBS-310-E or the PBS-310-E10 kit.



1 x
Bonding clip

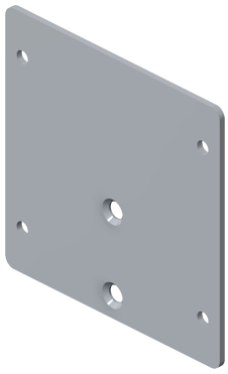


1 x
Bonding jumper for bonding clip

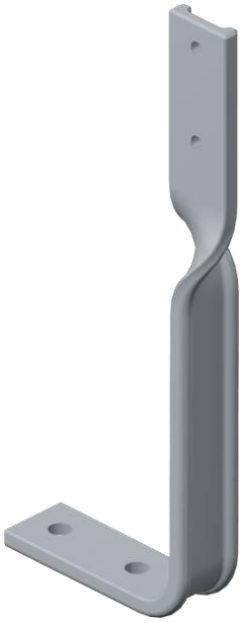
1 x
Fixing screw for bonding clip
ISO 1207, M4x10

1 x
Washer
ISO 7089, M4

1 x
Nut
ISO 4032, M4



1 x
Base plate for mounting stand (galvanized)



1 x
Mounting stand
L-shape, galvanized

2 x
Fixing screw for junction box ISO 1207, M6x35 (~1 1/3")

2 x
Fixing screw for base plate
ISO 2009, M5x20 (~ 3/4")

2 x
Washer
ISO 7092, M6

2 x
Washer
ISO 7089, Type B, M5

2 x
Split washer
DIN 127, Type B, M6

2 x
Split washer
DIN 127, Type B, M5

2 x
Nut
ISO 4032, M6

2 x
Nut
ISO 4032, M5

Accessories

The following accessories are available for the PBS-310-E | PBS-310-E10 Power entry kit.

BPL cable gland kit and end seal

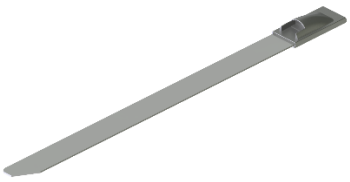
spare parts kit for replacement of damaged or lost parts

Catalog No.: CAK-PLG
Order No.: 432394
Part No.: 27-59CX-E101/0001

Stainless steel tie wire

for installation of power limiting trace heaters on pipes, etc.

Catalog No.: TW-05
Order No.: 710109
Part No.: *Contact your local BARTEC distributor.*



Stainless steel cable ties

for installation of power limiting trace heaters, mounting stands, etc.

SSC-03: pipe ø up to 3" / DN80
SSC-06: pipe ø up to 6" / DN150

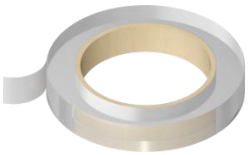
Pack of 100 pcs.

SSC-03:

Catalog No.: SSC-03
Order No.: 126227
Part No.: 03-6510-0208

SSC-06:

Catalog No.: SSC-06
Order No.: *126228*
Part No.: 03-6510-0209



Glass cloth tape

for attaching self-regulating trace heaters on all pipes including stainless steel / required during preparation of power limiting trace heaters

12 mm x 50 m per roll

Minimum installation temperature (dry surface): -10 °C
Maximum withstand temperature: 200 °C

Catalog No.: GT-164
Order No.: 392328
Part No.: 02-5500-0047

Tip: Refer to the following table to estimate the required number of tape rolls for your installation (for attaching trace heaters on pipes only)

Pipe diameter DN (inch)	DN8 (1/4")	DN15 (1/2")	DN20 (3/4")	DN25 (1")	DN32 (1 1/4")	DN40 (1 1/2")	DN50 (2")	DN65 (2 1/2")	DN80 (3")	DN100 (4")	DN150 (6")	DN200 (8")	DN250 (10")	DN300 (12")	DN350 (14")	DN400 (16")	DN450 (18")	DN500 (20")	DN600 (24")
Required no. of tape rolls per 30 m of piping	1	1	1	1	2	2	2	3	3	4	5	7	9	10	11	12	14	15	18

Stainless steel pipe straps

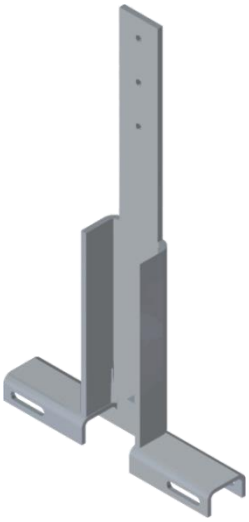
stainless steel, for attaching mounting stands on pipes etc. No special tooling required.

for pipe ø up to 3" / DN80:

Catalog No.: PC-1
Order No.: 435727

for pipe ø up to 10" / DN250:

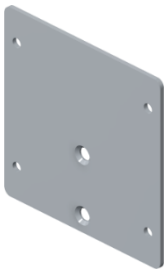
Catalog No.: PC-2
Order No.: 435729



Stainless steel mounting stand (optional)

T-shape, 160 x 287 mm

Catalog No.: MB-SS200
Order No.: 129911
Part No.: 05-0091-0051



Stainless steel base plate for mounting stands (optional)

for “E”-type junction boxes (122 x 120 mm)

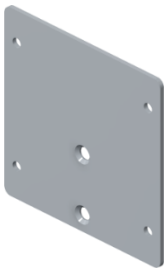
or “E10”-type junction boxes (160 x 160 mm)

"E"-Type:

Catalog No.: MP-SS122
Order No.: 123958
Part No.: 05-0091-0011

"E10"-Type:

Catalog No.: MP-SS160
Order No.: 123960
Part No.: 05-0091-0013



Galvanized base plate for mounting stands (optional)

for “E”-type junction boxes (122 x 120 mm)

or “E10”-type junction boxes (160 x 160 mm)

"E"-Type:

Catalog No.: MP-GL122
Order No.: 121684
Part No.: 05-0005-0015

"E10"-Type:

Catalog No.: MP-GL160
Order No.: 121686
Part No.: 05-0005-0017

Electrically traced warning label

Warning label for trace heater circuits

Recommended: electrical warning label every 3 m on the outside of the thermal cladding on a clearly visible place.

Packaged in rolls of 100 pcs.

German:

Catalog No.: HTWL-DE
Order No.: 113450
Part No.: 05-2144-0046

English:

Catalog No.: HTWL-EN
Order No.: 113550
Part No.: 05-2144-0047

French:

Catalog No.: HTWL-FR
Order No.: 120300
Part No.: 05-2144-0703

Russian:

Catalog No.: HTWL-RU
Order No.: 207439
Part No.: 05-2144-0860

Installation

Preparation

Before installing any electric trace heating, the person installing must check if the trace heating has been designed and planned correctly. It is particularly essential to verify the following points:

- complete project planning documentation, operating instructions and installation instructions.
- correct selection of the trace heater and accessories with respect to:
  - calculation of heat losses
  - max. permissible operating temperature
  - max. permissible ambient temperature
  - temperature class (for hazardous locations)
  - heating circuit length

Before installing, make sure that all piping and equipment is properly installed and pressure tested.

Maximum heating circuit length

The following table shows the maximum circuit lengths in meters for the different BPL trace heater types with standard circuit breaker amperages. Breaker sizing should be based on international electric codes or any other local or applicable code. The values apply for a volt drop variation of max. 10 %.

Trace heater type	*Start-up temperature in °C*	**Maximum heating circuit length in m** *(115 V power supply)*			**Maximum heating circuit length in m** *(230 V power supply)*			**Maximum heating circuit length in m** *(277 V power supply)*		
		16 A	*25 A*	*32 A*	*16 A*	*25 A*	*32 A*	*16 A*	*25 A*	*32 A*
5BPL2-AL	+10	90	90	90	175	175	175	195	195	195
	-25	85	85	85	170	170	170	190	190	190
	-40	80	80	80	160	160	160	185	185	185
10BPL2-AL	+10	55	65	65	105	125	125	100	135	135
	-25	50	60	60	100	120	120	98	130	130
	-40	45	55	55	95	115	115	96	125	125
15BPL2-AL	+10	37	50	50	75	105	105	62	98	105
	-25	35	47	47	70	100	100	59	94	100
	-40	33	45	45	65	95	95	58	92	95
20BPL2-AL	+10	26	40	40	52	85	85	45	70	92
	-25	24	38	38	50	80	80	39	68	88
	-40	22	36	36	48	78	78	48	66	86

Required tools / equipment

The following tools and equipment are required for installation of the PBS-310-E | PBS-310-E10 Power entry kit:

- Flat screwdriver
- Cross-head screwdriver
- Electricians screwdriver
- Wire cutters
- Utility knife
- Adjustable wrenches (2x)
- Multimeter
- Tape measure
- Needle nose pliers
- BARTEC Glass cloth tape (see section *Accessories* on page 5).




2 x





1

Cautions and warnings

⚠ WARNING

Risk of fire or electrical shock. De-energize all power circuits before installation or servicing. Always use ground fault equipment protection with the trace heating system.

- Double-check that all power circuits are de-energized before you begin your work.
- Make sure that you do not exceed the maximum heating circuit length for the trace heater type you use.

2

Nodes

BPL trace heaters use a heating element that is wound around the inner insulation. To ensure power supply, it alternately touches the bus wires at fixed intervals. These contact points are called nodes. They represent the limits of a heating zone.

The position of the nodes is marked by asterisks at the beginning of the product identification string: i.e. **** BARTEC ® 5BPL2-AL …

When the trace heater is cut within a heating zone, this zone will remain cold.

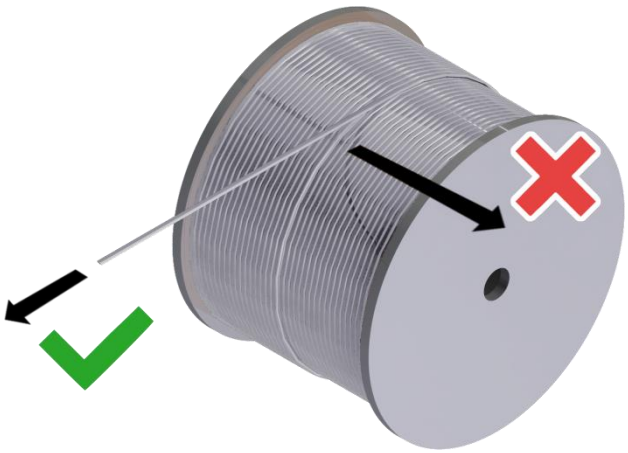
3

Trace heater preparation

⚠ WARNING

Risk of short circuit and/or material damage. Keep the trace heater ends dry before and during installation.

- Unroll the required trace heater in a straight line. Do not cut the trace heater yet.
- Do not bend or pinch the trace heater, or pull it over sharp edges.



4

- Before cutting the trace heater, measure the distance from the trace heater end to the first node marker.
- Note the measured distance.

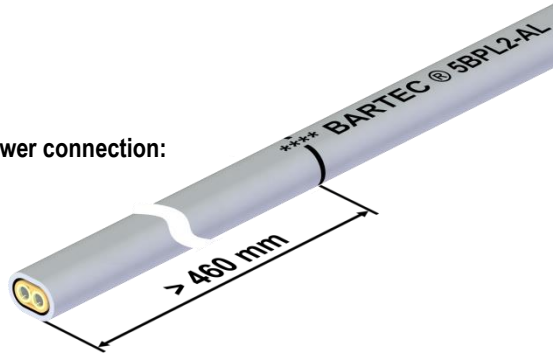
If you cannot find the node markers, refer to section Alternate method for node location on page 30.

5

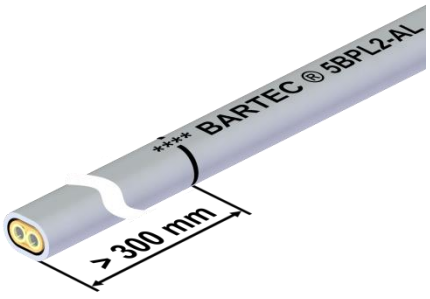
- Make sure that the distance to the first node is:
  - at least 460 mm for the trace heater end facing towards the power connection equipment
  - at least 300 mm for the trace heater end facing towards the end seal

  This ensures that the connection equipment will be protected from excessive heat.
- Cut off the trace heater ensuring a straight cut.

for power connection:



for end seal:



6

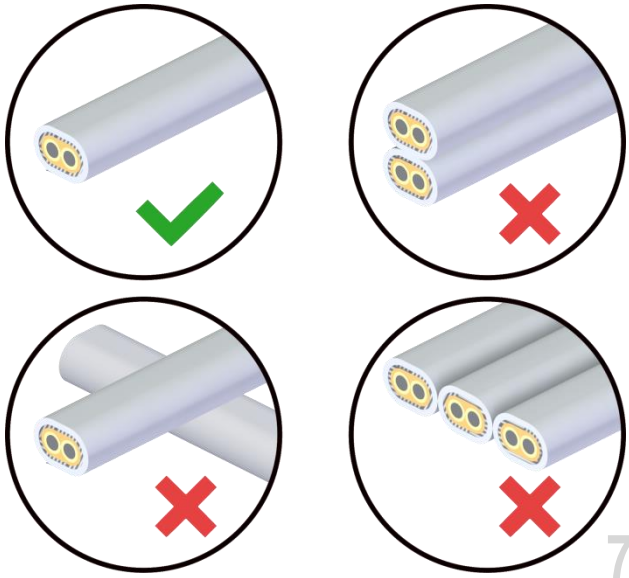
Trace heater routing

⚠ WARNING

Risk of fire, injury and/or property damage. Observe the following instructions when routing BPL trace heaters.

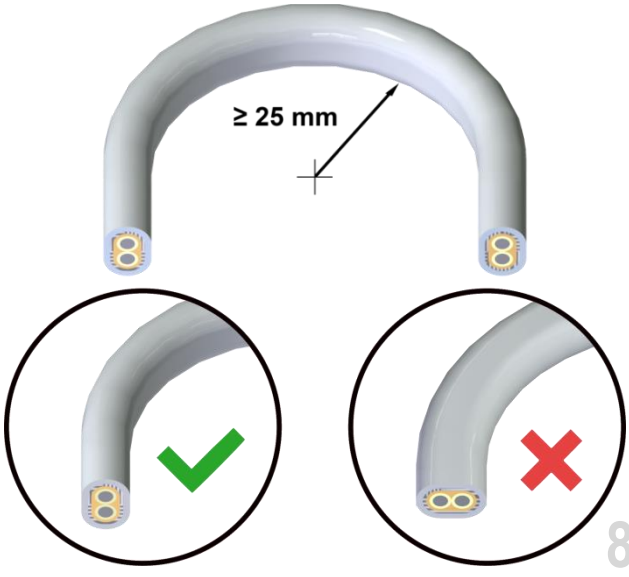
- Install the trace heater in a straight line along the pipe. This saves time, helps to avoid installation mistakes and prevents damage to the trace heater during the thermal insulation work.

- Never step on or drive over the trace heater. Do not use it as a loop for stepping on.
- When installing allow for an additional length of trace heater for assembling splice connections, tee branches, end seals etc. (approx. 0.5 m for each).
- Do not cross, overlap, or group the trace heaters.



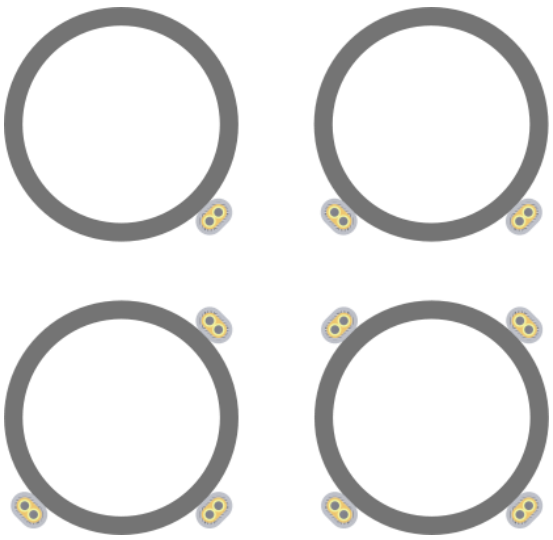
7

- When routing the trace heater, observe the minimum bending radius of 25 mm.
- Do not bend the trace heater on the narrow axis.



8

- Preferably install the trace heater in the lower half of the pipe, **but not on the lowest point**. This prevents mechanical damage and allows for better heat distribution.
- If you use multiple trace heaters, position them with an offset of 90°.



10

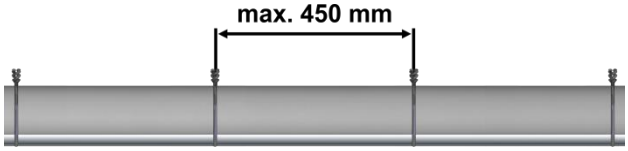
Fastening

Select the correct fastening material:

- Always use fastener that suits the expected temperatures.
- Preferably use soft stainless tie wire or stainless steel bands.

11

- Fasten the trace heater on the pipe at intervals of a maximum of 450 mm.



NOTICE

In order to ensure good heat transfer the trace heater should have a flat, flush fit over the whole length. If necessary, reduce the distances between the fixing points.

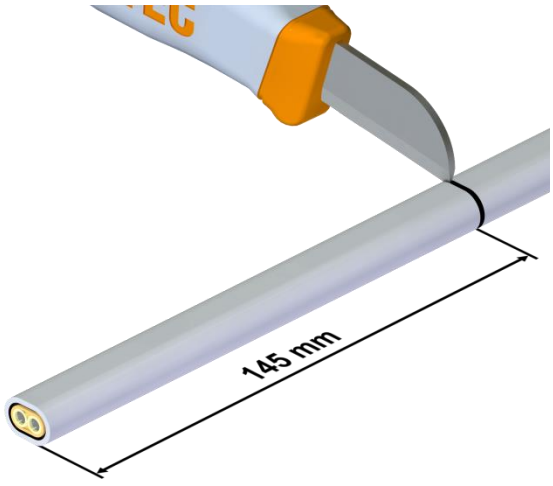
12

Preparation of the trace heater for connection

- Slide the fixing nut, the grommet, the gland body and the seal ring onto the trace heater.

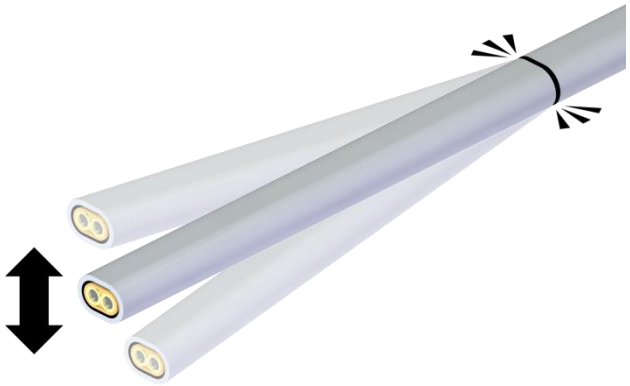
13

- Score around the aluminium jacket at 145 mm from the end of the trace heater.



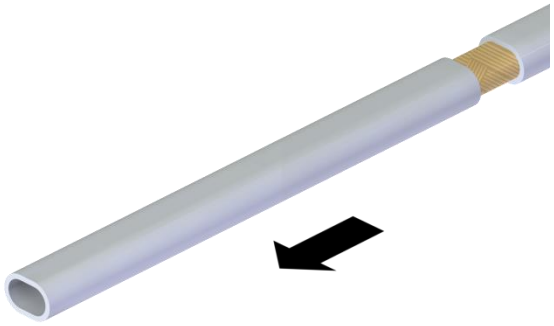
14

- Gently bend the aluminium jacket up and down at the scoring line until the aluminium jacket separates.



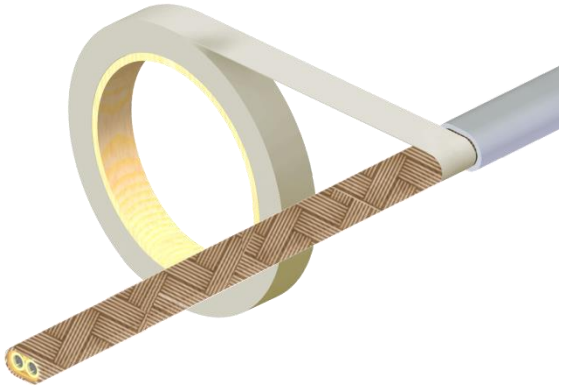
15

- Slide the aluminium jacket from the trace heater.



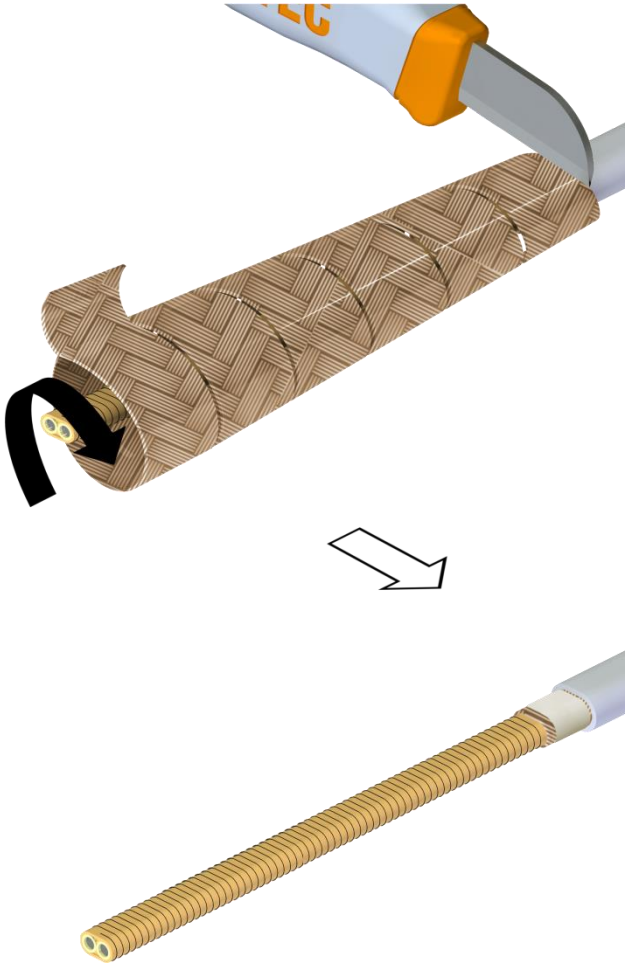
16

- Place 1 wrap of glass cloth tape over the insulation jacket next to the aluminium jacket.



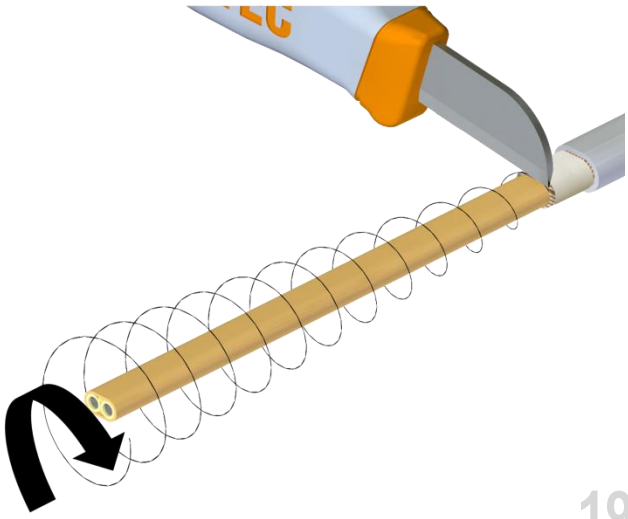
17

- Unwrap the outer insulation layer and cut it off.



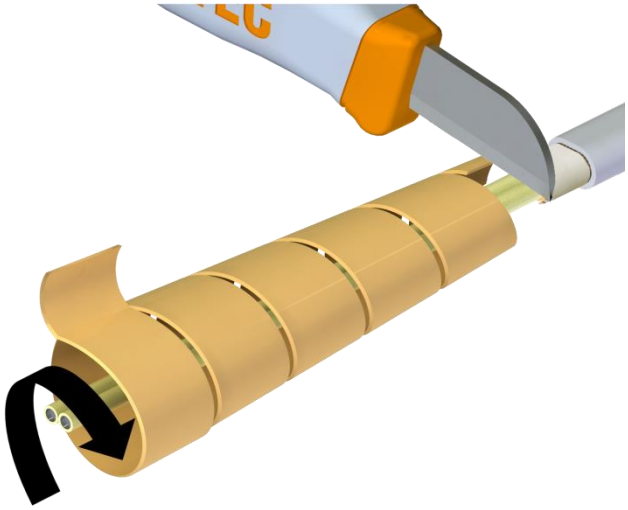
18

- Unwind the heating element and cut it off.



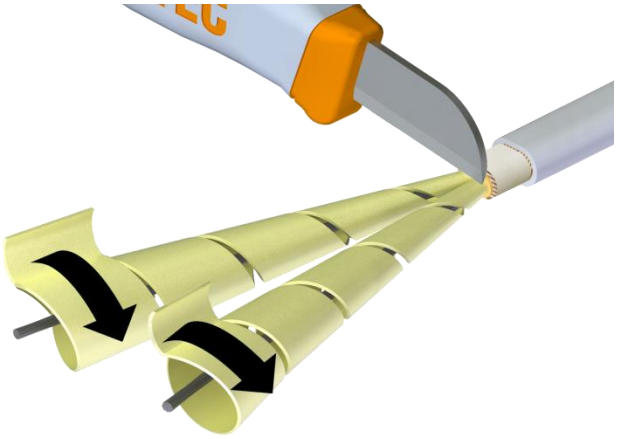
19

- Unwrap the inner insulation layer and cut it off.



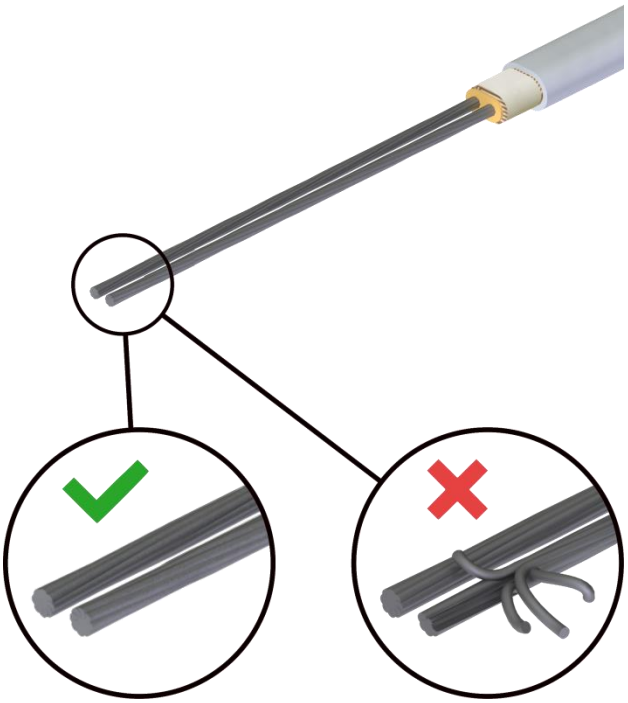
20

- Unwrap the exposed bus wire insulation and cut it off.



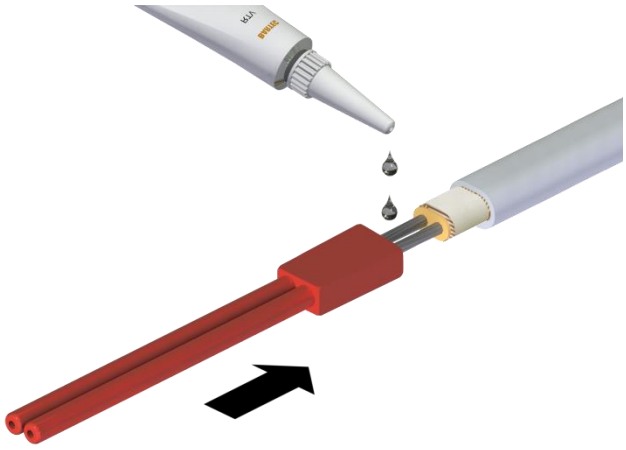
21

- Make sure that all bus wires are intact and not nicked or damaged.



22

- Thread the bus wires into the silicone pants.
- Add further silicone adhesive into the silicone pants to ensure optimal sealing.
- Slide the silicone pants all the way onto the aluminum jacket.

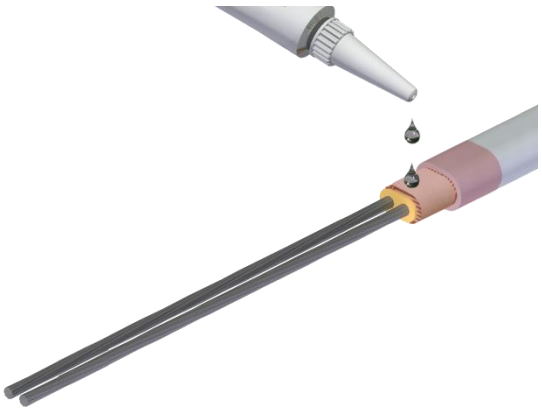


24

⚠ CAUTION

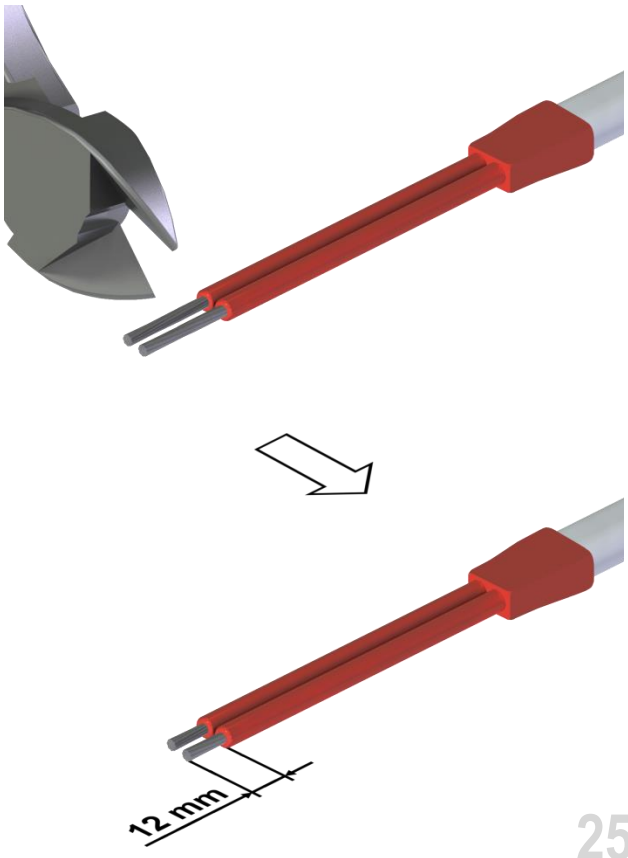
The silicone adhesive may cause irritation to skin and eyes. Avoid eye contact. Avoid repeated or prolonged skin contact. In case of contact with eyes, rinse with water and seek medical advice.

- Put a liberal amount of silicone adhesive all around the taped insulation layer and aluminium jacket.



23

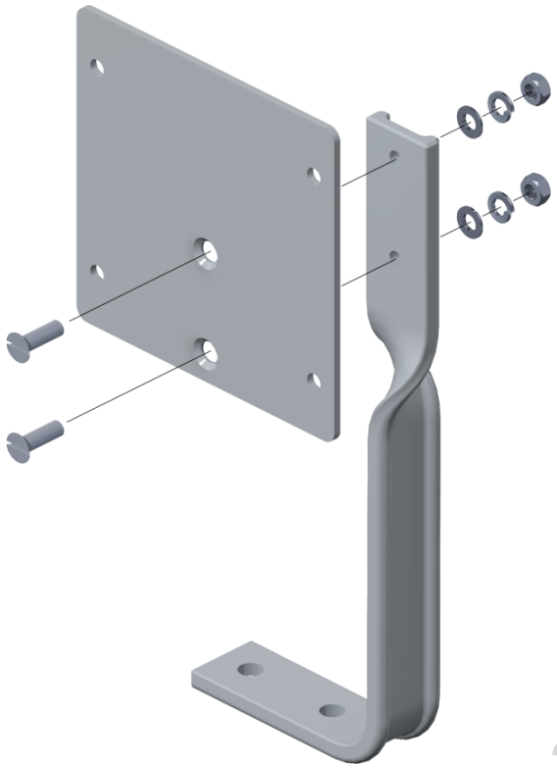
- If necessary, trim the exposed bus wire ends to 12 mm.



25

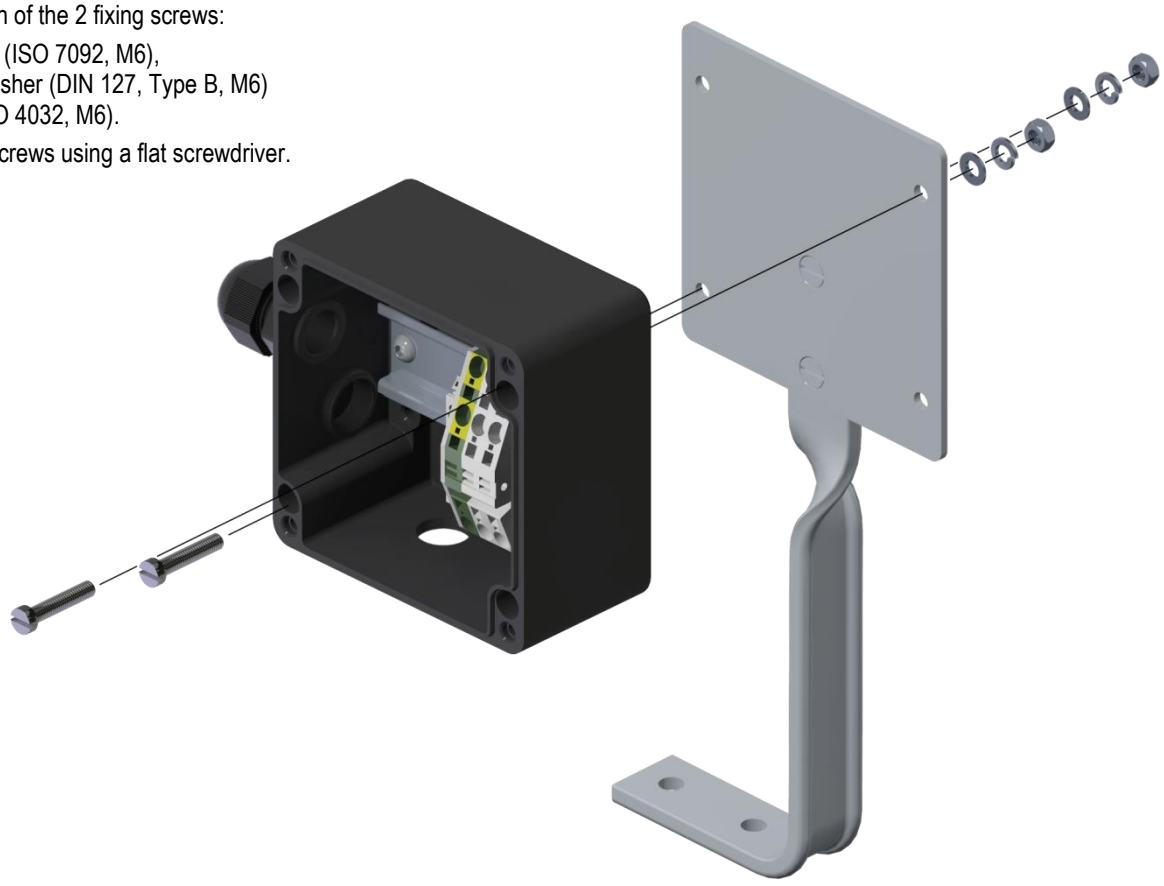
Installation of the mounting stand

- Insert the 2 fixing screws (ISO 2009, M5x20) into the base plate.
- Install the base plate on the mounting bracket.
- Install on each of the 2 fixing screws:
  - a washer (ISO 7089, Type B, M5),
  - a split washer (DIN 127, Type B, M5)
  - a nut (ISO 4032, M5).
- Tighten the screws using a flat screwdriver.



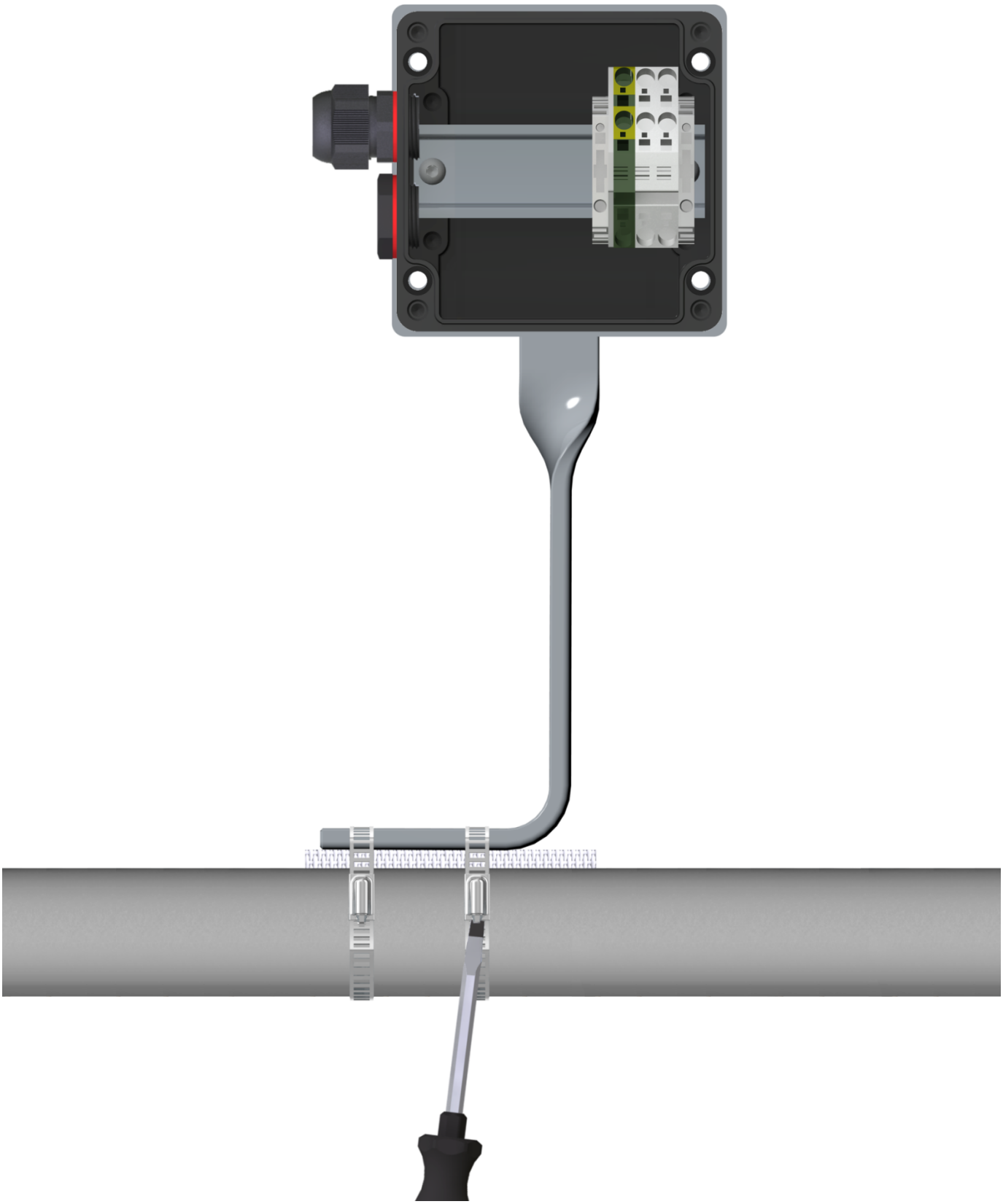
26

- Insert the 2 fixing screws (ISO 1207, M6x35) into the junction box.
- Install the junction box on the base plate.
- Install on each of the 2 fixing screws:
  - a washer (ISO 7092, M6),
  - a split washer (DIN 127, Type B, M6)
  - a nut (ISO 4032, M6).
- Tighten the screws using a flat screwdriver.



27

- Place the mounting stand on the pipe (or other support) where you want to install it.
- If the expected pipe temperature exceeds 150 °C, put the thermal break pad under the mounting stand.
- Install the pipe straps and tighten them firmly using a screwdriver.

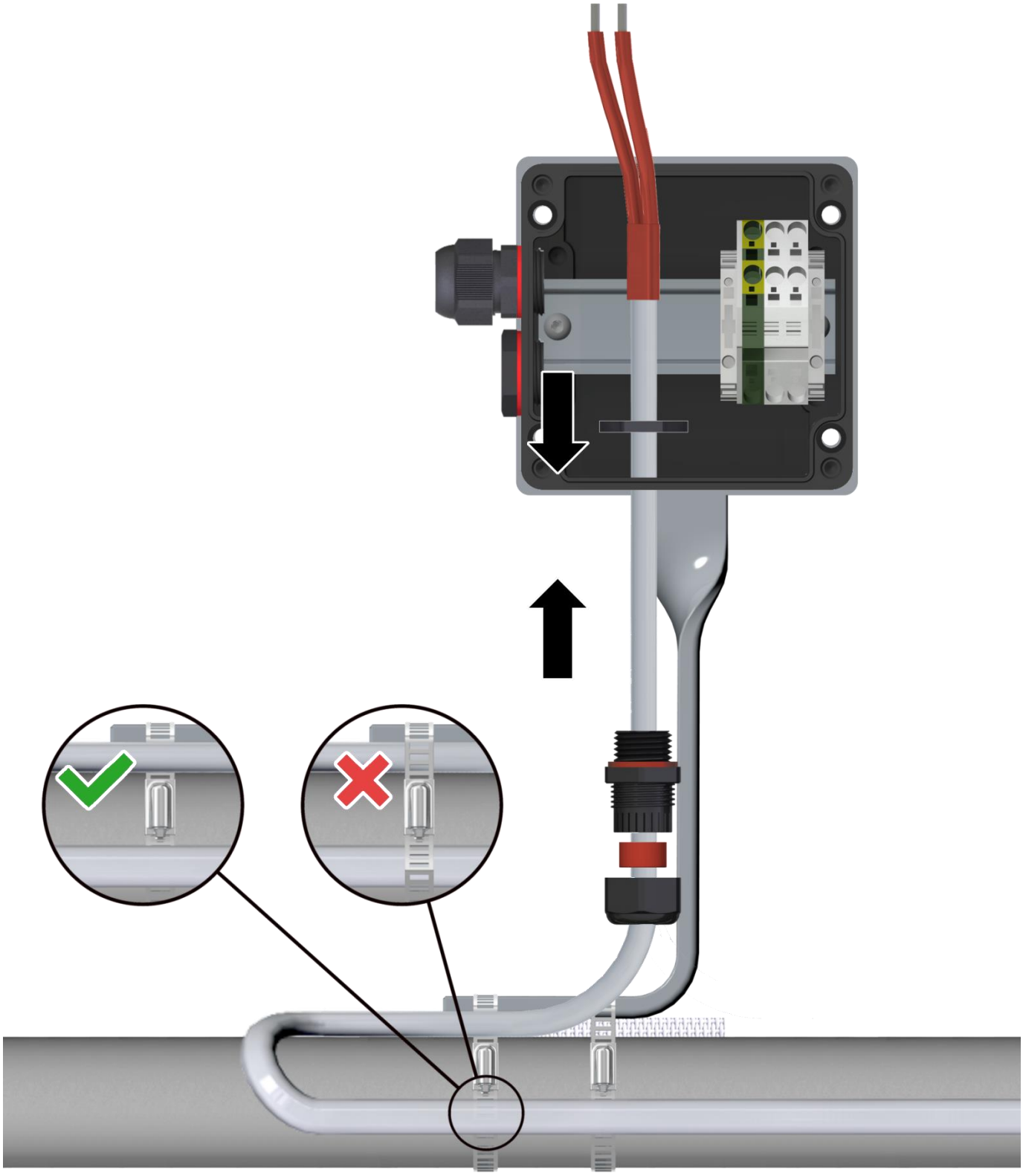


28

Installation of the trace heater and power cable

For PBS-310-E only. For PBS-310-E10 see step 29B on page 19.

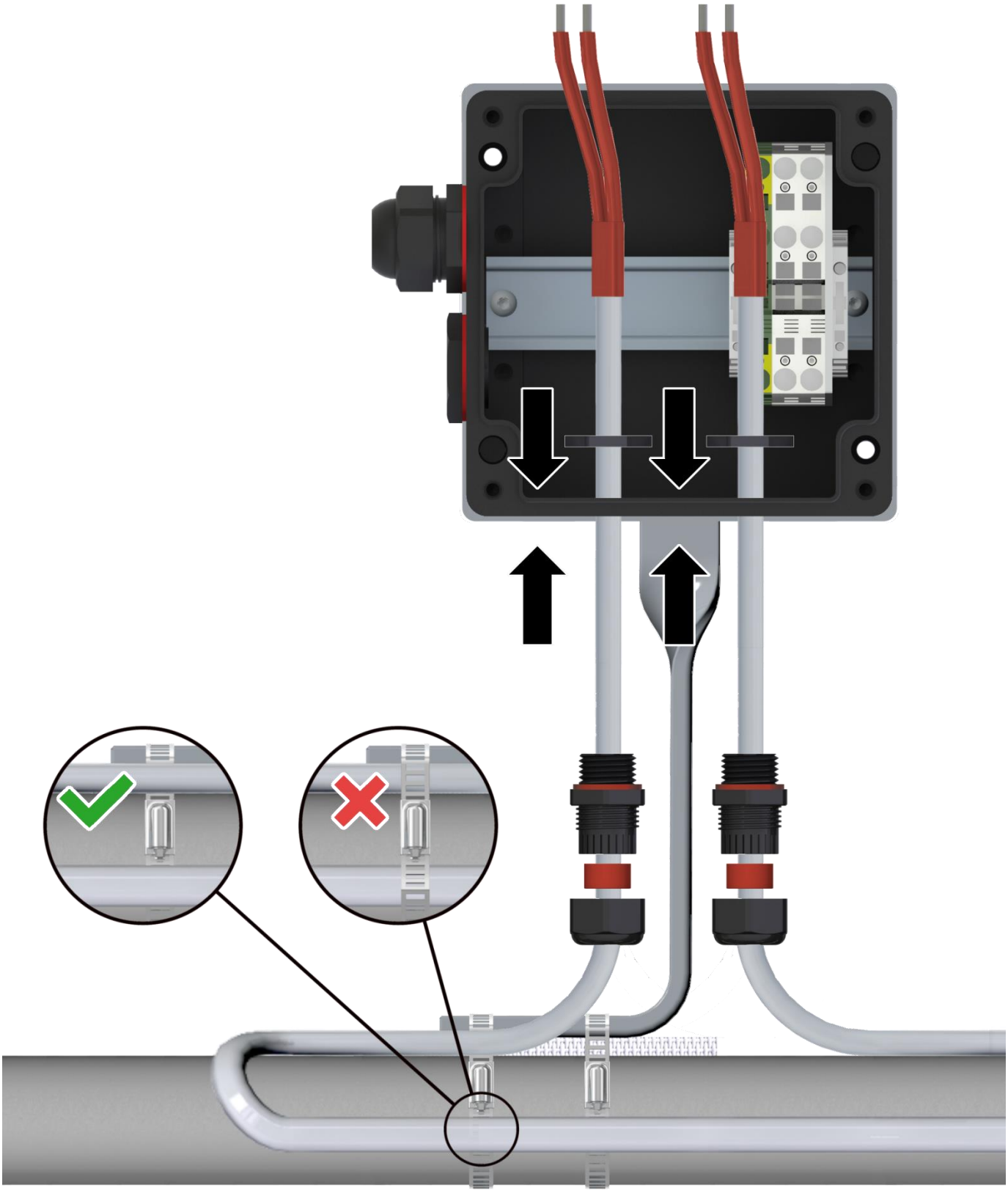
- Feed the prepared trace heater into the junction box.
- Slide the lock nut onto the trace heater.
- Always make sure that the trace heater runs over the pipe straps.



29A

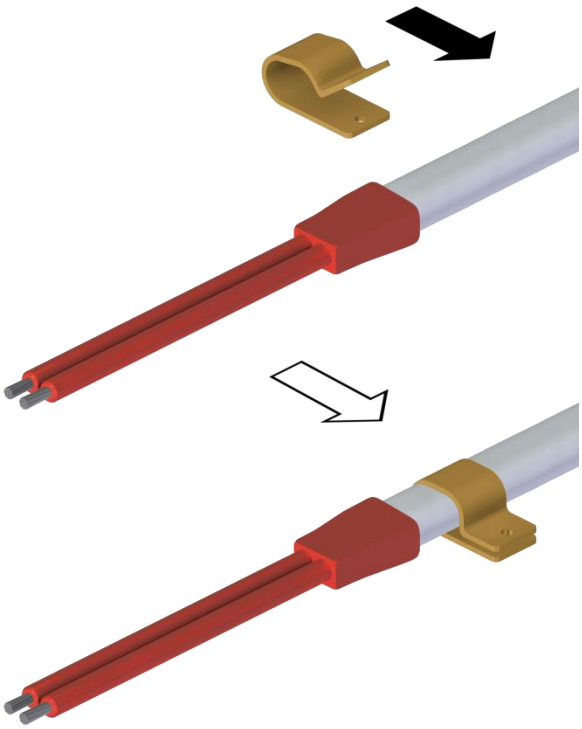
For PBS-310-E10 only. For PBS-310-E see step 29A on page 18.

- Feed the prepared trace heaters into the junction box.
- Slide the lock nut onto each trace heater.
- Always make sure that the trace heaters run over the pipe straps.



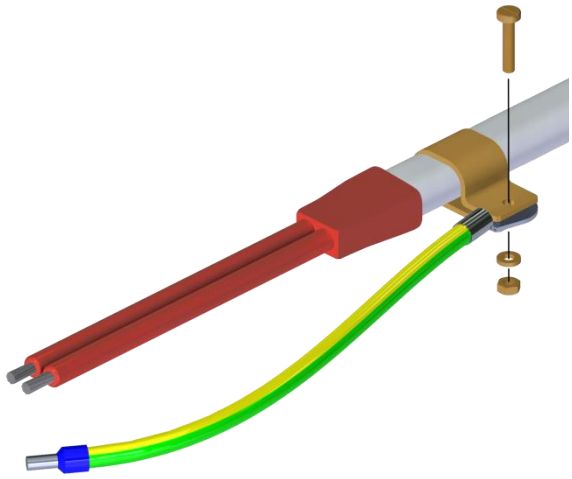
29B

- Slide the bonding clip onto the trace heater(s).



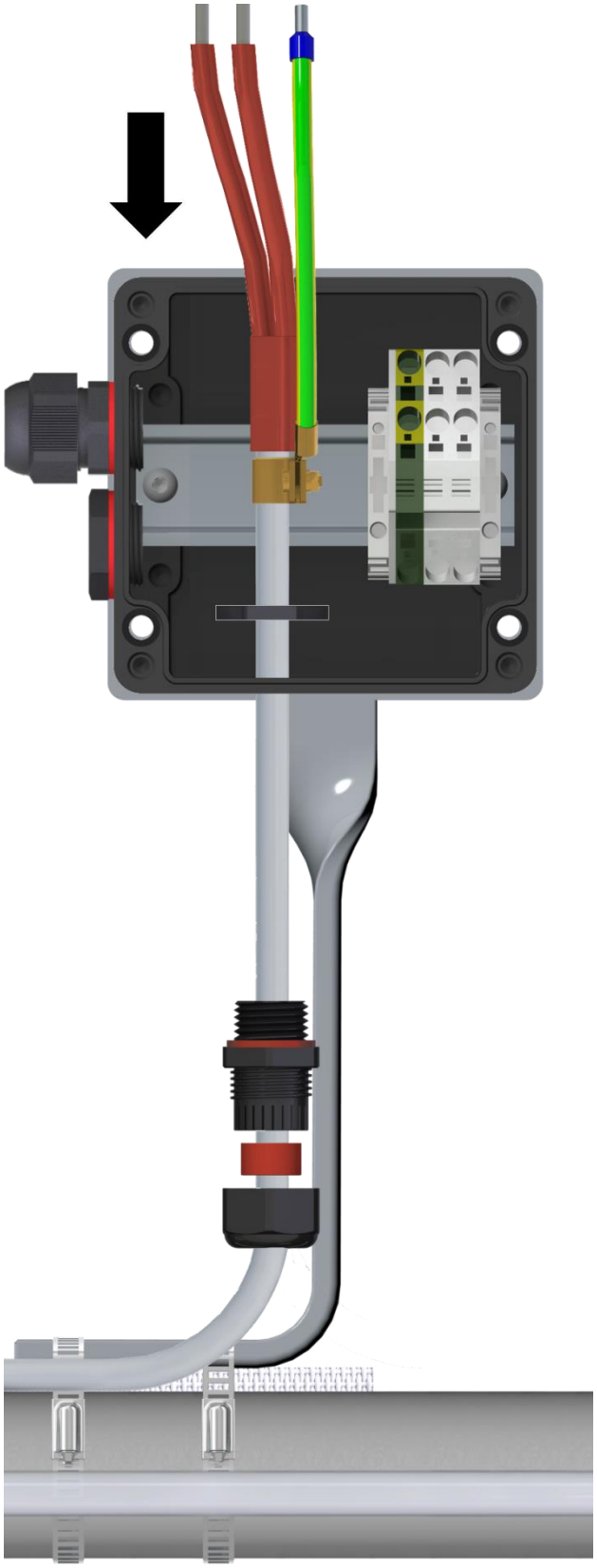
30

- Install the bonding jumper at the bonding clip.
- Install the fixing screw, the washer and the nut.
- Tighten the fixing screw using a flat screwdriver. Lock the counter nut using an adjustable wrench.



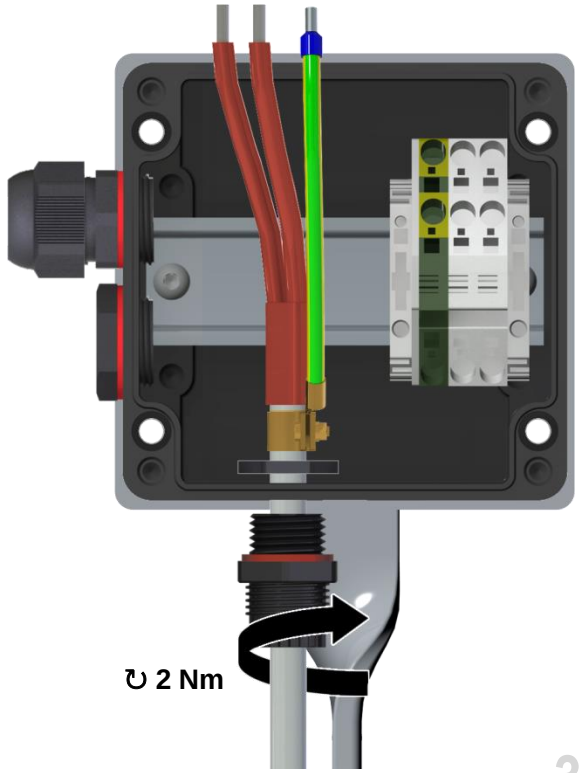
31

- Push back the trace heater until the bonding clip is positioned just over the bottom of the junction box.



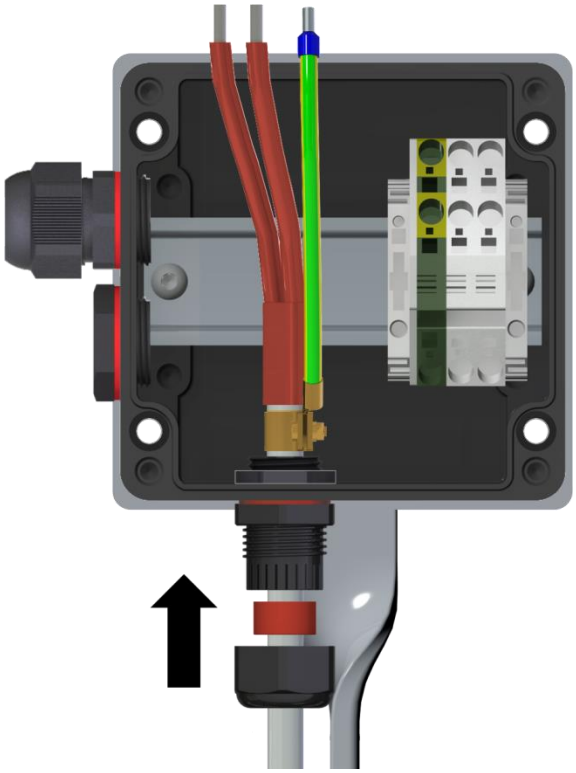
32

- Screw the gland body into the junction box. Make sure that the final tightening torque is 2 Nm.
- Slide the lock nut onto the gland body



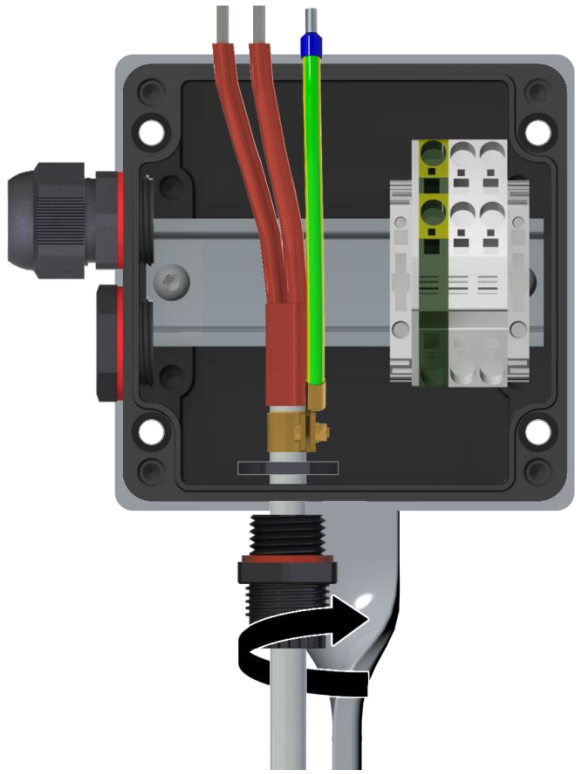
33

- Slide the grommet into the gland body and screw the fixing nut onto the gland body.



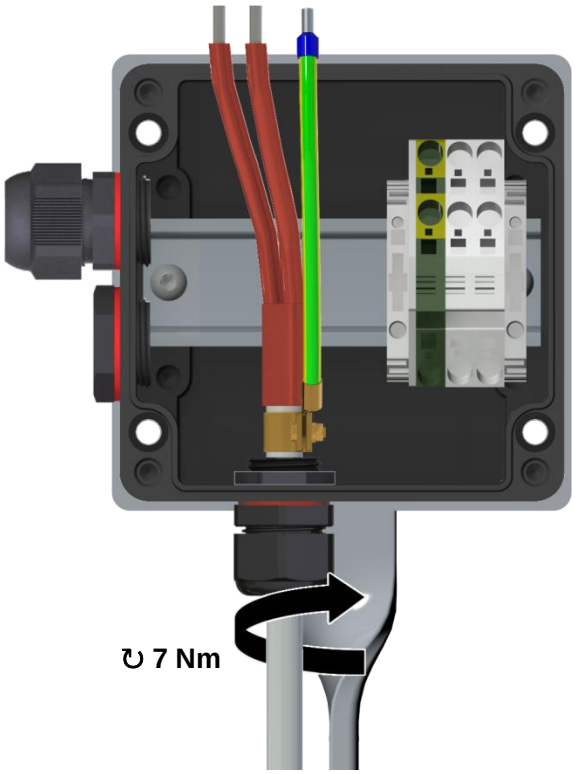
35

- Tighten the lock nut while locking the gland body using 2 adjustable wrenches.



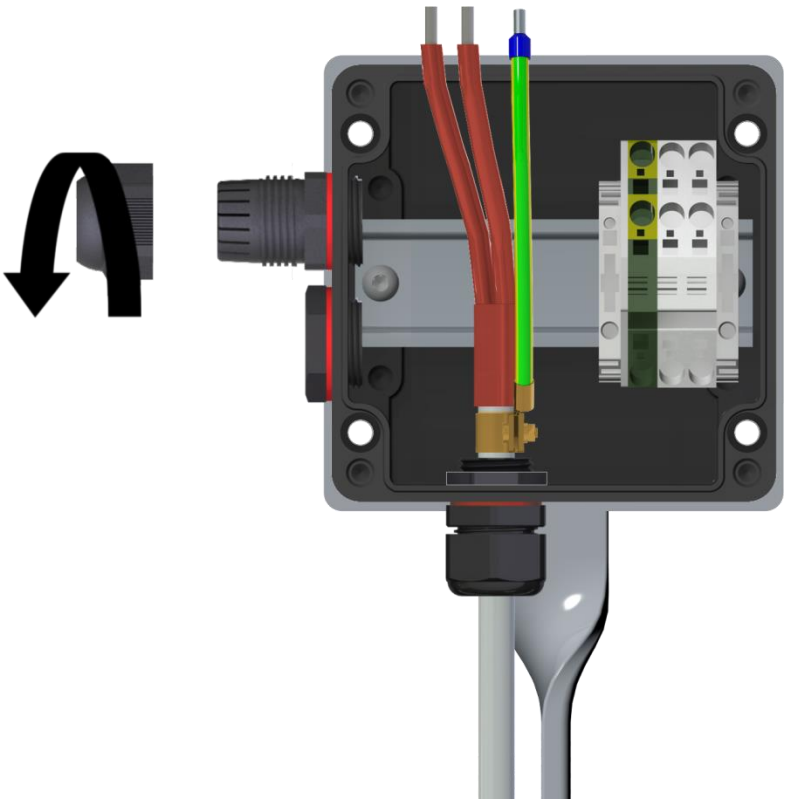
34

- Tighten the fixing nut. Make sure that the final tightening torque is 7 Nm.



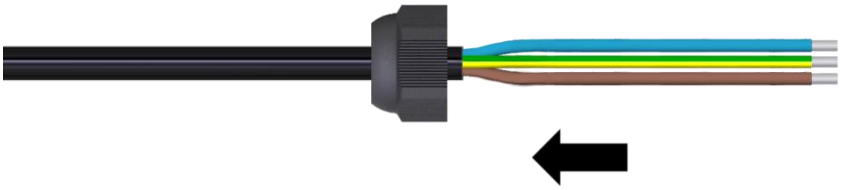
36

- Unscrew the fixing nut from the gland body using an adjustable wrench.



37

- Slide the fixing nut onto the power cable.



NOTICE

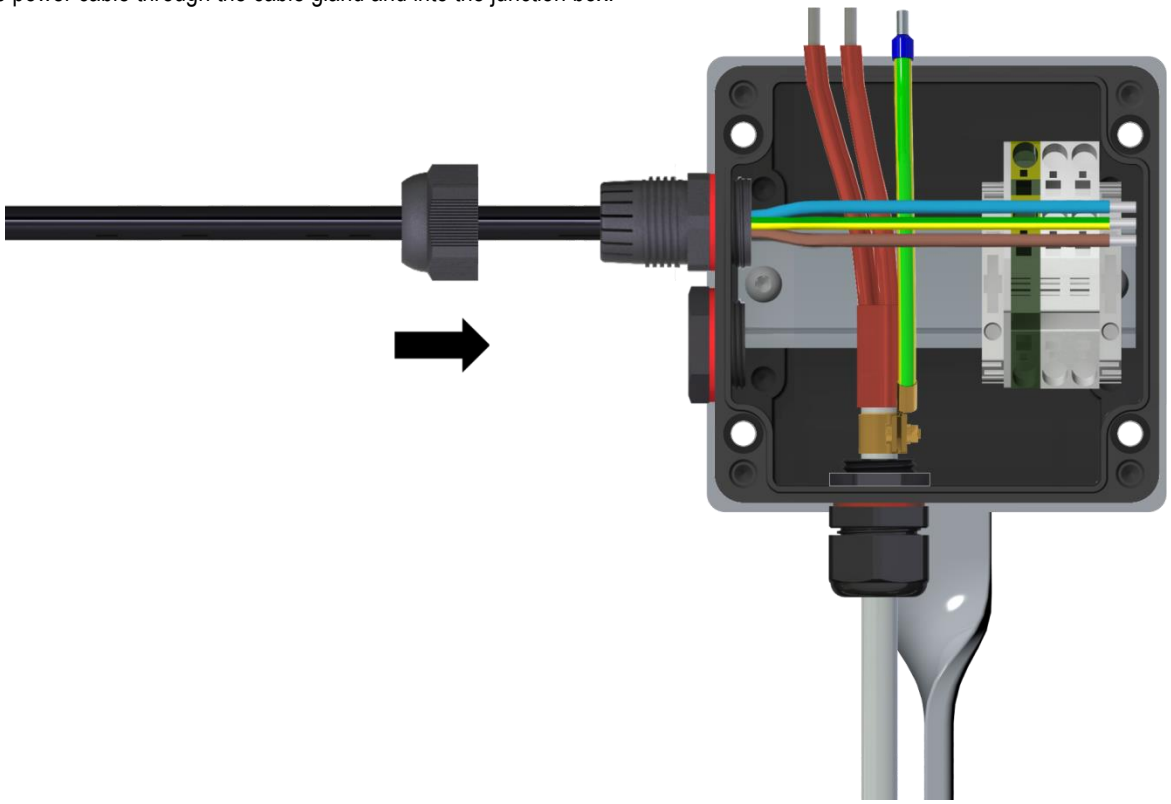
The supplied cable gland is suitable for the following cable diameters (outer jacket):

- **12-17 mm (PBS-310-E)**
- **16-21 mm (PSB-310-E10)**

For larger cable diameters contact your local BARTEC representative.

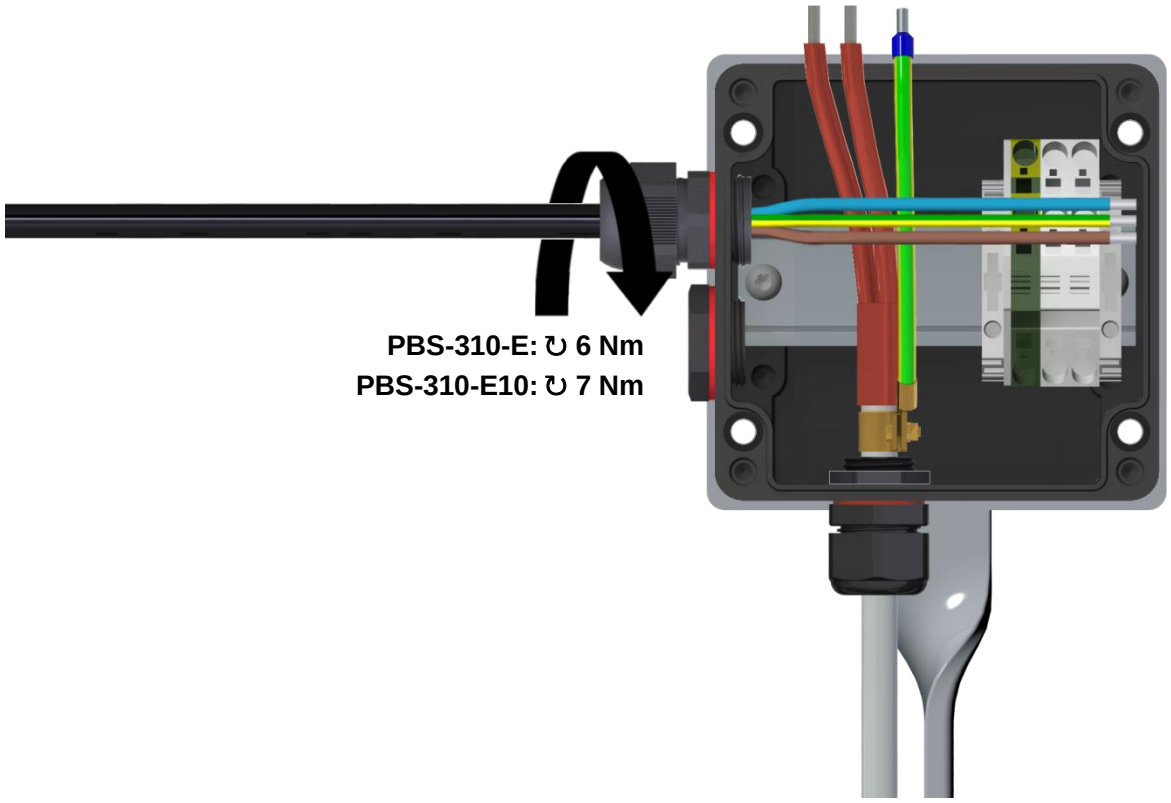
38

- Feed the power cable through the cable gland and into the junction box.



39

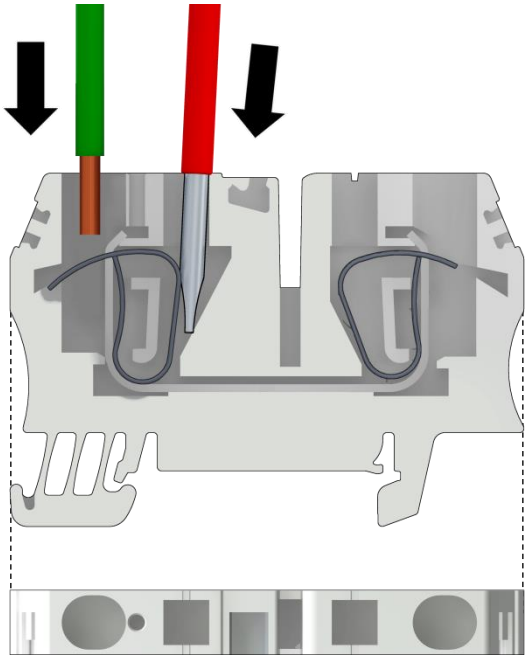
- Tighten the fixing nut. Make sure that the final tightening torque is 6 Nm for “E”-type junction boxes and 7 Nm for “E10”-type junction boxes.



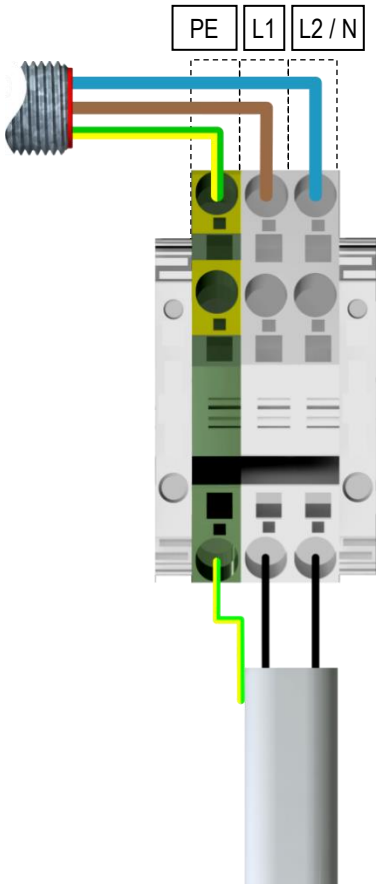
40

Wiring

- For wire connection at the terminals, insert a small screwdriver into the screwdriver slot, then insert the wire.
- Connect all wires as shown on the right.

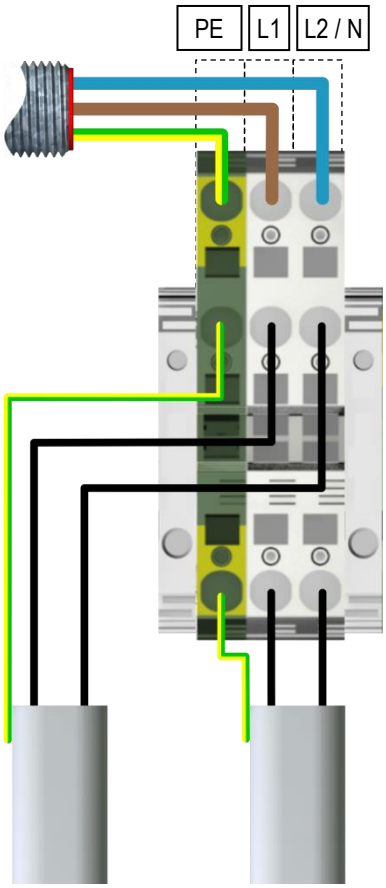


Power connection wiring



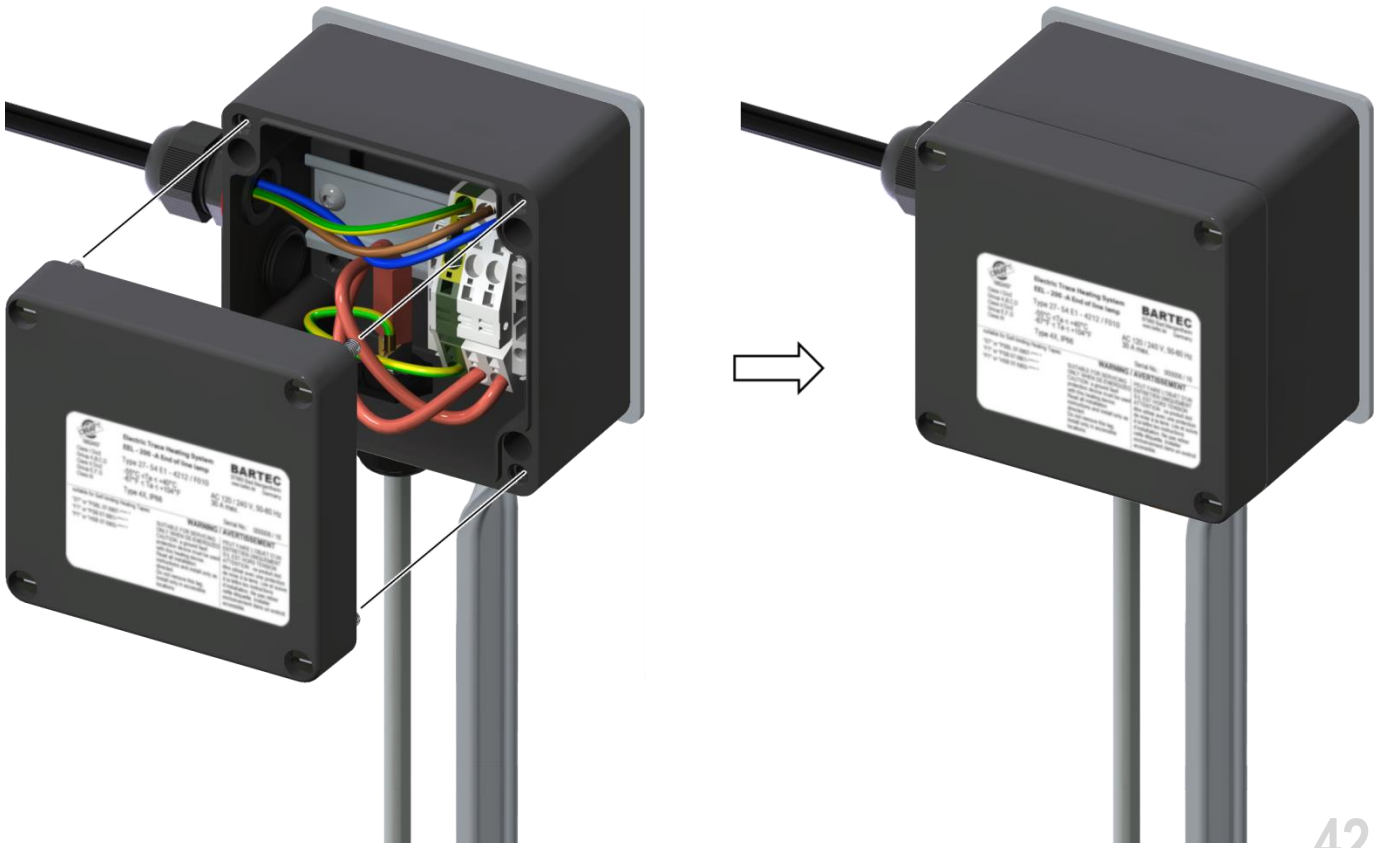
41A

Powered splice connection wiring (-E10 version only)



41B

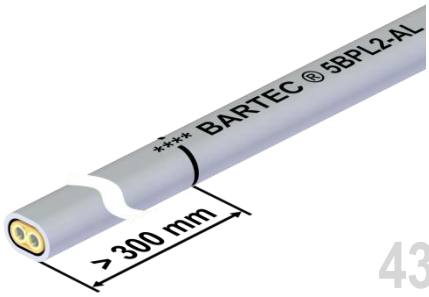
- Mount the cover of the junction box and tighten the 4 fixing screws using a screwdriver.



42

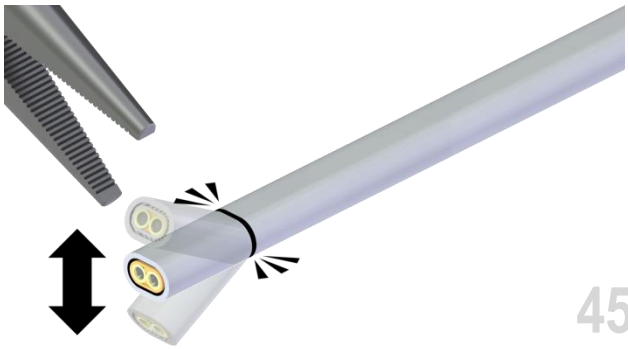
Installation of the end seal

- Remember to make sure that the distance from the end of the trace heater to the first node is at least 300 mm.



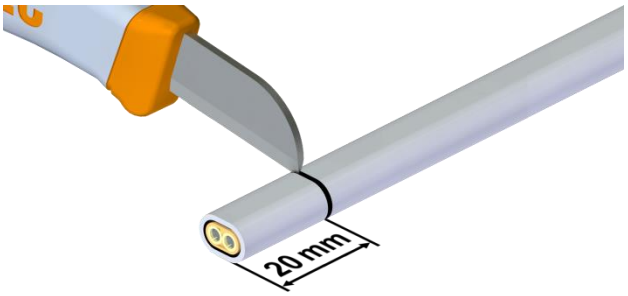
43

- Gently bend the aluminium jacket up and down at the scoring line using needle nose pliers until the aluminium jacket separates.



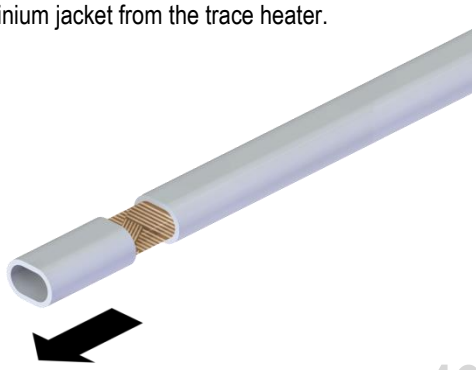
45

- Score around the aluminium jacket at 20 mm from the end of the trace heater.



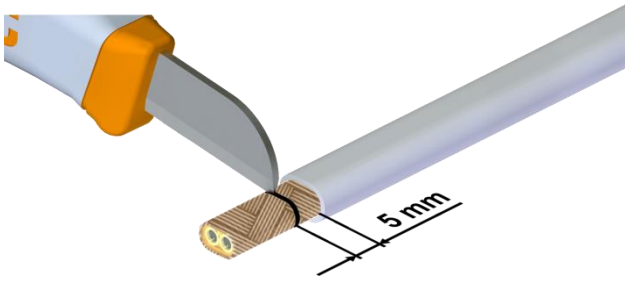
44

- Slide the aluminium jacket from the trace heater.



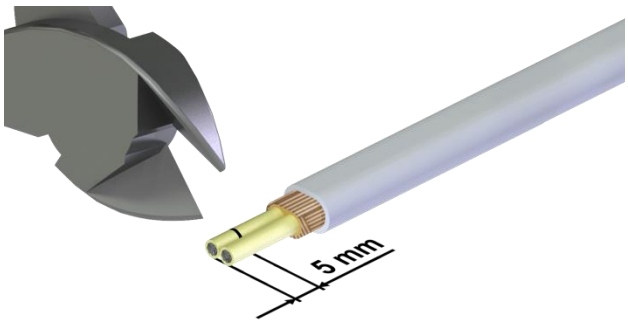
46

- Score around the outer insulation at 5 mm from the edge of the aluminium jacket.



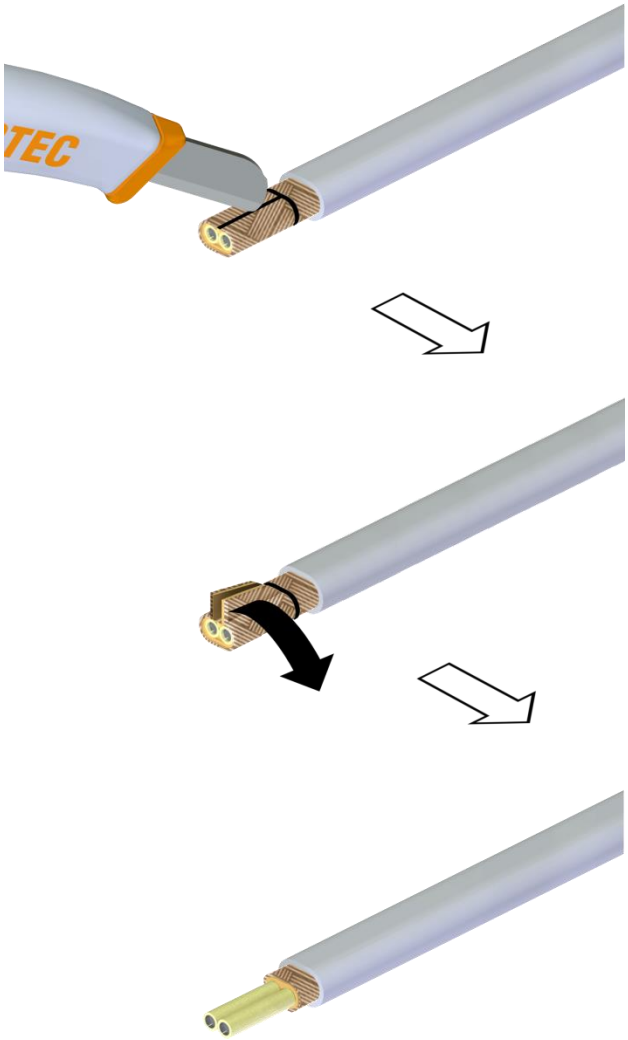
47

- Remove 5 mm of one of the bus wires.



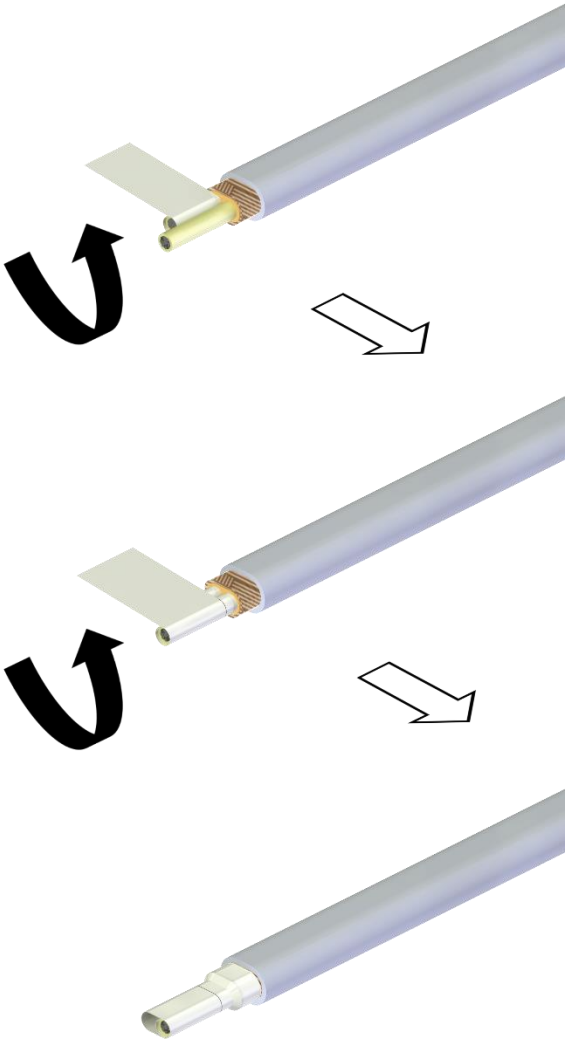
49

- Score along the middle of the exposed outer insulation.
- Unwrap the outer insulation layer.



48

- Wrap glass cloth tape separately around each of the bus wires.
- Then, wrap glass cloth tape around the both bus wires and around the outer insulation layer.

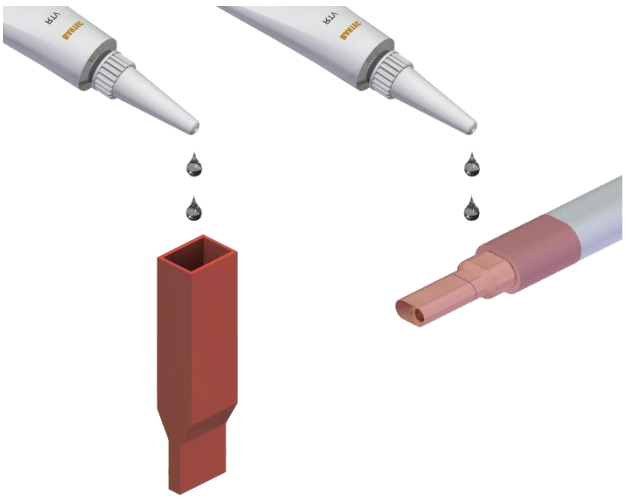


50

⚠ CAUTION

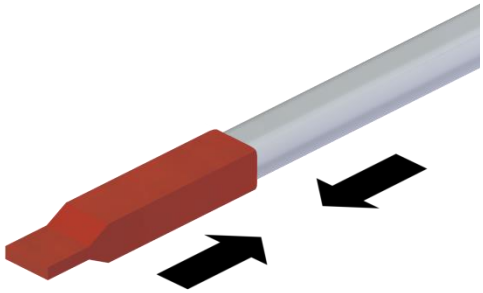
The silicone adhesive may cause irritation to skin and eyes. Avoid eye contact. Avoid repeated or prolonged skin contact. In case of contact with eyes, rinse with water and seek medical advice.

- Put a liberal amount of silicone adhesive all around the trace heater end as well as into the end seal.



51

- Push the end seal onto the trace heater.



NOTICE

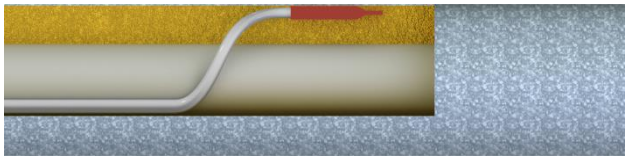
Allow the adhesive to cure for 20 minutes, then visually inspect. Full strength is reached after 24 hours.

52

Application of the pipe insulation

- Apply the pipe insulation according to the manufacturer's installation instructions.
- Apply an electrical warning label every 3 m on a clearly visible place.

If the pipe temperature exceeds 190 °C, install the end seal above the insulation but below the outer cladding. This way, the end seal will be protected from excessive heat and mechanical damage.



53

Tests and commissioning

Measurement of the insulation resistance

The measurement of the insulation resistance is used to determine damage to the trace heater and possible installation faults. It must be carried out at the following times:

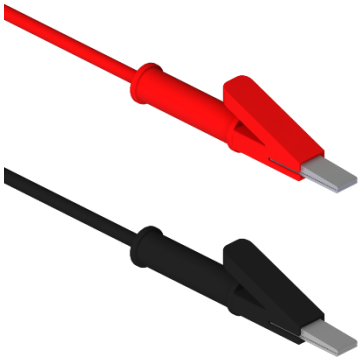
- Preliminary test (on the reel, before installation of the trace heater on the construction site)
- Acceptance test (after installation of the heating circuit and before installation of the thermal insulation)
- Final inspection (immediately after completion of work on the thermal insulation)
- Upon commissioning
- Before switching on the installation

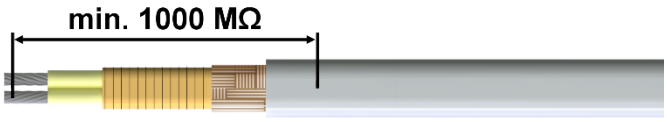
Preparation of the measurement:

- De-energize the heating circuit.
- Disconnect the thermostat or controller, if installed.
- Disconnect the bus wires and PE wires from the terminal block, if installed.
- For the measurement you will need a megohmmeter with, at least, a minimum testing voltage of 500 Vdc and a maximum testing voltage of 1000 Vdc.

Measurement:

- Set the test voltage to 0 Vdc.
- Connect the negative (-) lead to the aluminum jacket of the trace heater.
- Connect the positive (+) lead to both trace heater bus wires simultaneously.
- Turn on the megohmmeter and set the voltage to 500 Vdc.
- Apply the voltage for 1 minute. The meter reading should stabilize. Rapid changes in the reading indicate a breakdown of the insulation.
- Record the insulation resistance value in the Inspection Record.
- Repeat the measurement at 1000 Vdc.





Results:

- Properly installed dry and clean trace heater sets should measure thousands of megohms, regardless of the trace heater length or measuring voltage (0-1000 Vdc). Even if optimum conditions may not apply, all insulation resistance values should be greater than the IEC/IEEE 60079-30-1:2015 minimum recommendation of 20 megohms. However, BARTEC strongly recommends a minimum reading of 1000 megohms. If the reading is lower or fluctuating, refer to section *Troubleshooting* on page 29.
- Insulation resistance values for any particular circuit, should not vary more than 25 percent as a function of measuring voltage. Greater variances may indicate a problem with your trace heating system. Confirm proper installation and/or contact your local BARTEC representative for assistance.

⚠ WARNING

Risk of fire or electrical shock. If the insulation resistance is insufficient you must fix the heating circuit before putting it into operation.

After the measurement:

If trace heater meets all resistance criteria:

- Reconnect the bus wires.
- Reconnect any thermostat or controller.
- Reenergize the circuit.

Troubleshooting

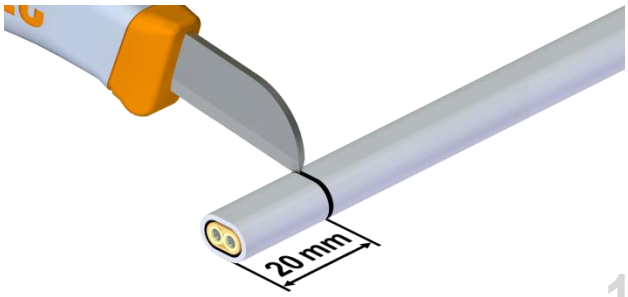
Problem	Possible cause	Remedy
Trace heater remains cold	No power supply	Check the power wiring for continuity to circuit breaker.
	Trace heater bus wires or power wiring not properly connected	Connect the trace heater and power wiring according to the installation instructions.
	Control unit adjusted incorrectly	Adjust the control unit according to the installation instructions.
Automatic circuit breaker tripped	Automatic circuit breaker defective	Replace the automatic circuit breaker.
	Automatic circuit breaker has wrong tripping characteristics, e. g. “B” instead of “C”	Install an automatic circuit breaker with Type-C tripping characteristics or contact the factory for Type-B tripping characteristics.
	Nominal circuit breaker size is insufficient	Install an automatic circuit breaker with higher capacity. Observe the maximum amperage of all components of the trace heating circuit!
	Maximum heating circuit length has been exceeded	Split the heating circuit into separate circuits.
	End seal has not been installed	Install the end seal according to the installation instructions.
	Short circuit	Identify the cause and remedy the fault (e. g. ensure that trace heater bus wires are not twisted together).
	Humidity inside the connection system or end seal	Dry the components. For junction boxes, be sure that the cable gland is correctly installed and sealing properly.
Ground fault protection is disengaged	Trace heater damaged	Replace the trace heater at the point where it is damaged.
	Moisture in the components	Dry the components. For junction boxes, be sure that the cable gland is correctly installed and sealing properly.
	Ground fault protection defective	Replace the ground fault protection device(s).
Low or inconsistent insulation resistance	Trace heater damaged	Replace the trace heater at the point where it is damaged.
	Moisture in the components	Dry the components. For junction boxes, be sure that the cable gland is correctly installed and sealing properly.
	Arcing due to damaged trace heater insulation	Replace the trace heater at the point where it is damaged.
	Arcing due to inadequate stripping distance between heating element and grounding braid	Check the stripping distance between bus wires/heating element and grounding braid at all power, splice and end seal connections to ensure adequate separation.
	Short-circuit between the grounding braid and the heating element or the grounding braid and the pipe	Check for cut or damaged cable or inadequate stripping length.
	Test leads touching the junction box	Relocate test leads and retest.

Note: High pipe temperature may lower the insulation resistance reading relative to earlier readings on a cold pipe.

Alternate method for node location

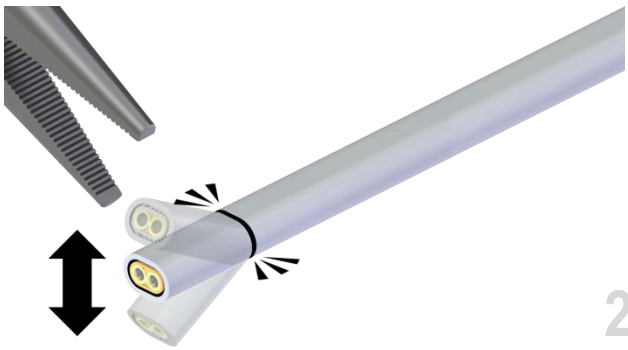
Alternate method for node location – only required if you cannot identify the node marker asterisks (****) on the trace heater

- Score around the aluminium jacket at 20 mm from the end of the trace heater.



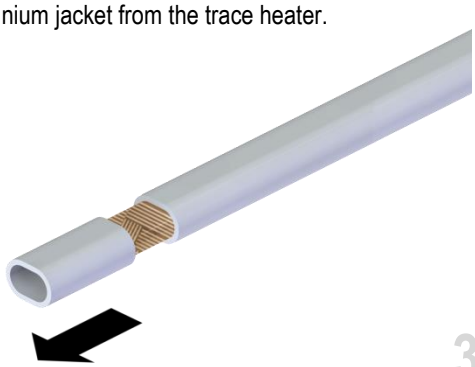
1

- Gently bend the aluminium jacket up and down at the scoring line using needle nose pliers until the aluminium jacket separates.



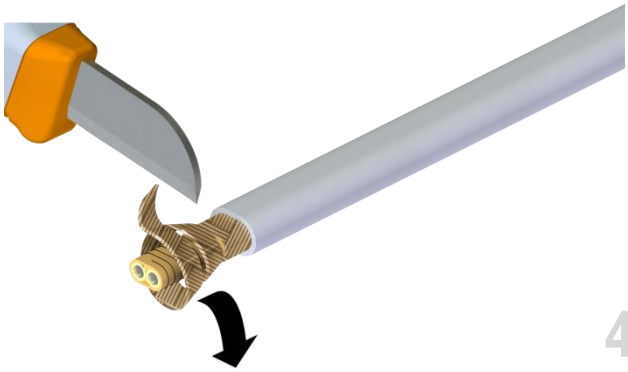
2

- Slide the aluminium jacket from the trace heater.



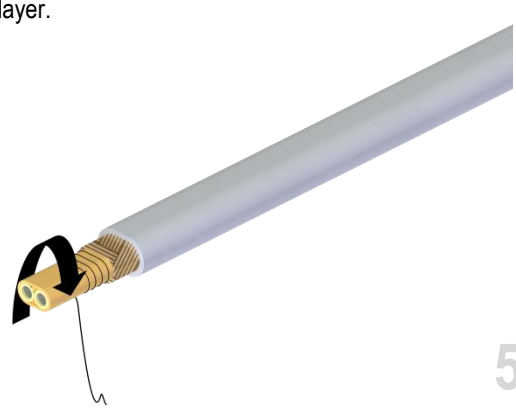
3

- Unwrap and cut off the outer insulation layer to expose the heating element.



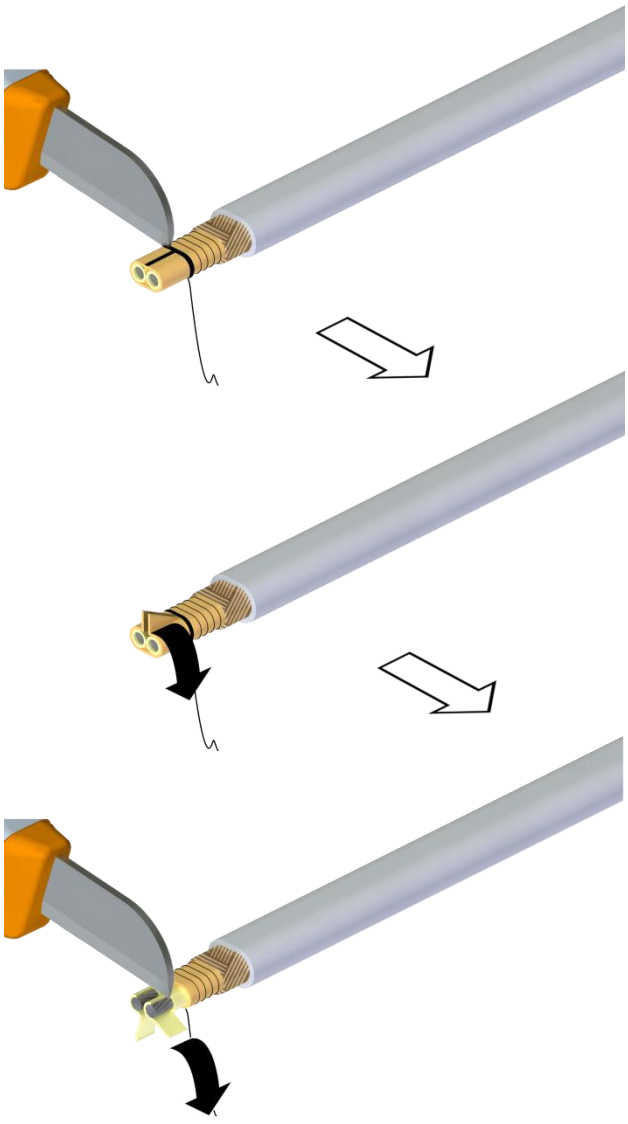
4

- Unravel 4-5 spirals of the heating element from around the inner insulation layer.



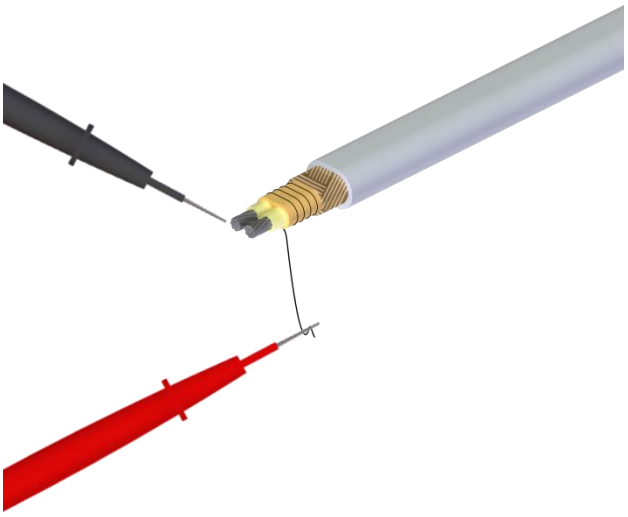
5

- Score around and along the middle of the bared inner insulation layer.
- Unwrap the inner insulation layer and bus wire insulation and cut it off to expose both bus wires.



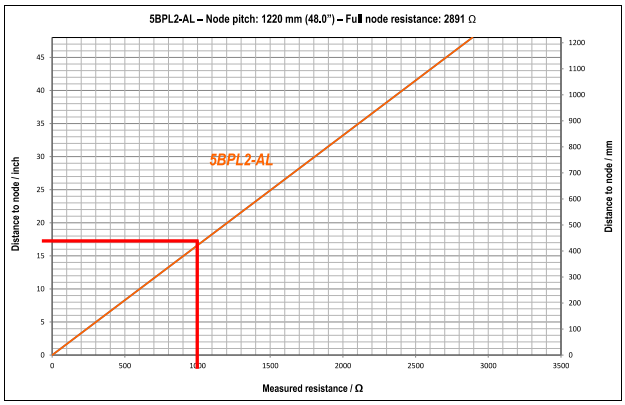
6

- Using a standard multimeter, subsequently measure the resistance of each of the bus wires against the heating element.
- One of the 2 bus wires will display a much lower resistance.
- Note this lower reading.



7

- You can now determine the distance between the trace heater end and the next node by referring to the respective product chart.
- For the product charts see section *Product charts for node location* beginning on page 32.



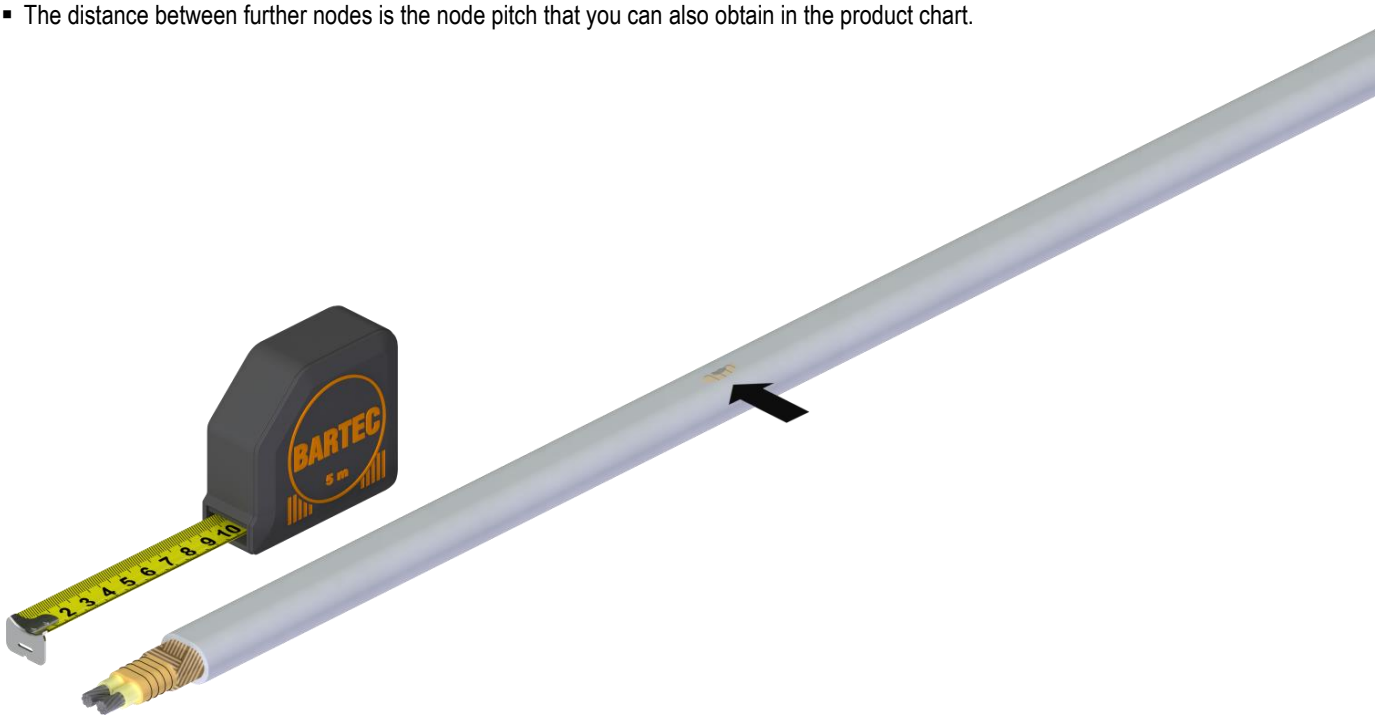
→ ***Example***

- Measured resistance: **1000 Ω**
- Trace heater type: **5BPL2-AL**
- Full node resistance: **2891 Ω**
- Node pitch: **1220 mm**

Distance to the next node: **1000 Ω / 2891 Ω x 1220 mm = 420 mm**

8

- Using a tape measure, you can now locate the next node from the end of the trace heater.
- The distance between further nodes is the node pitch that you can also obtain in the product chart.

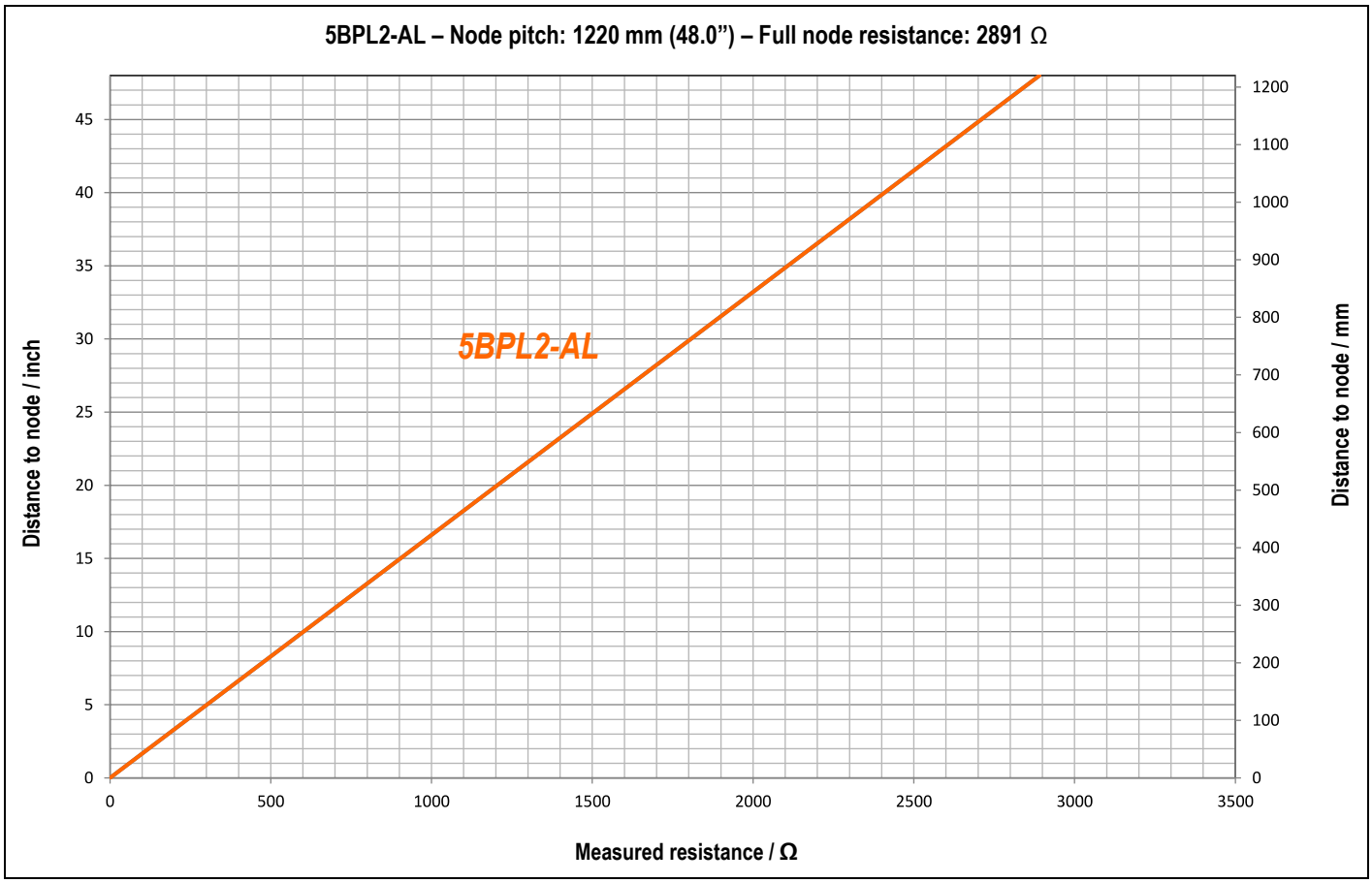


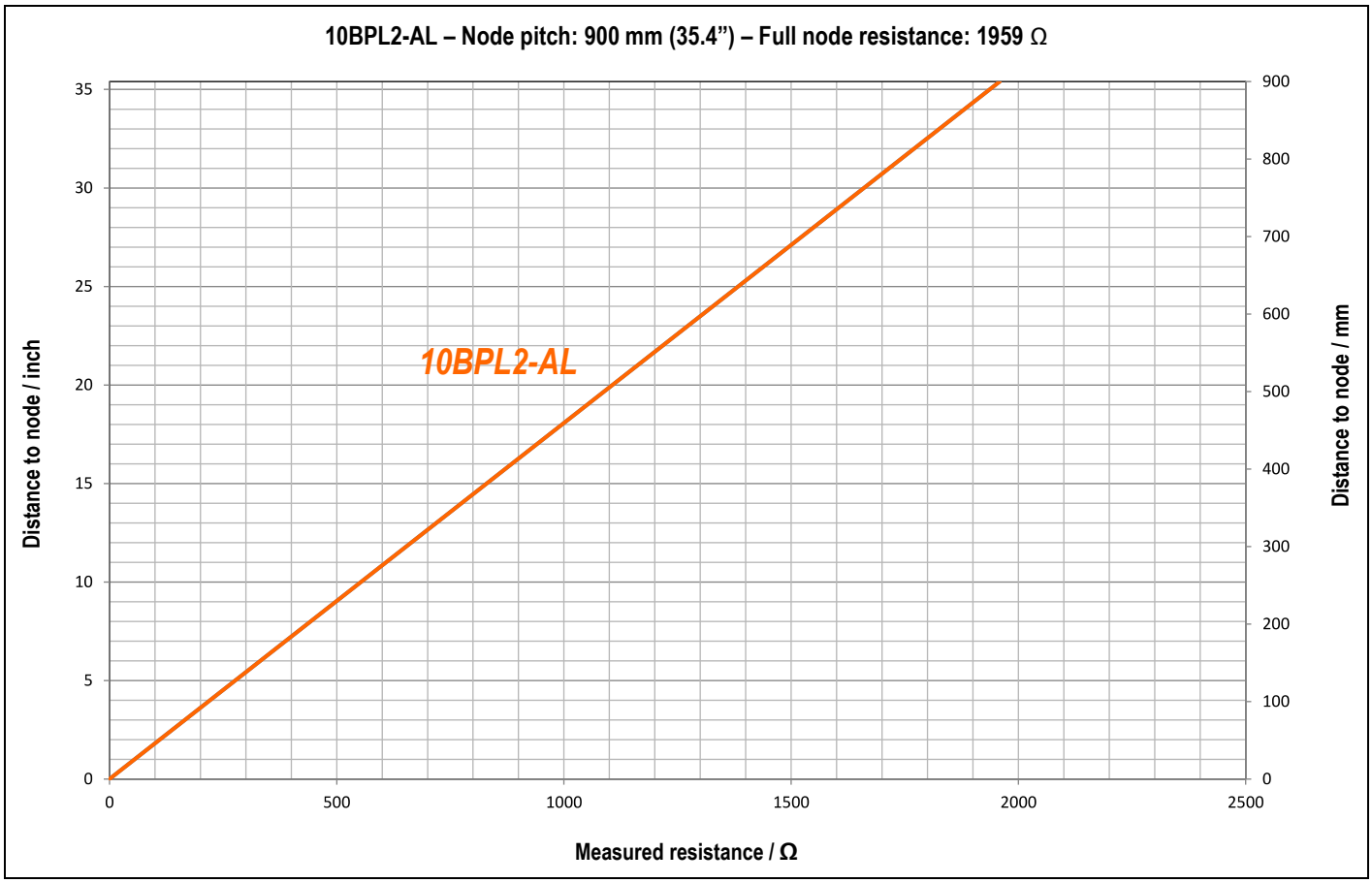
Once you have located the node position, you can refer to step 6 on page 11.

9

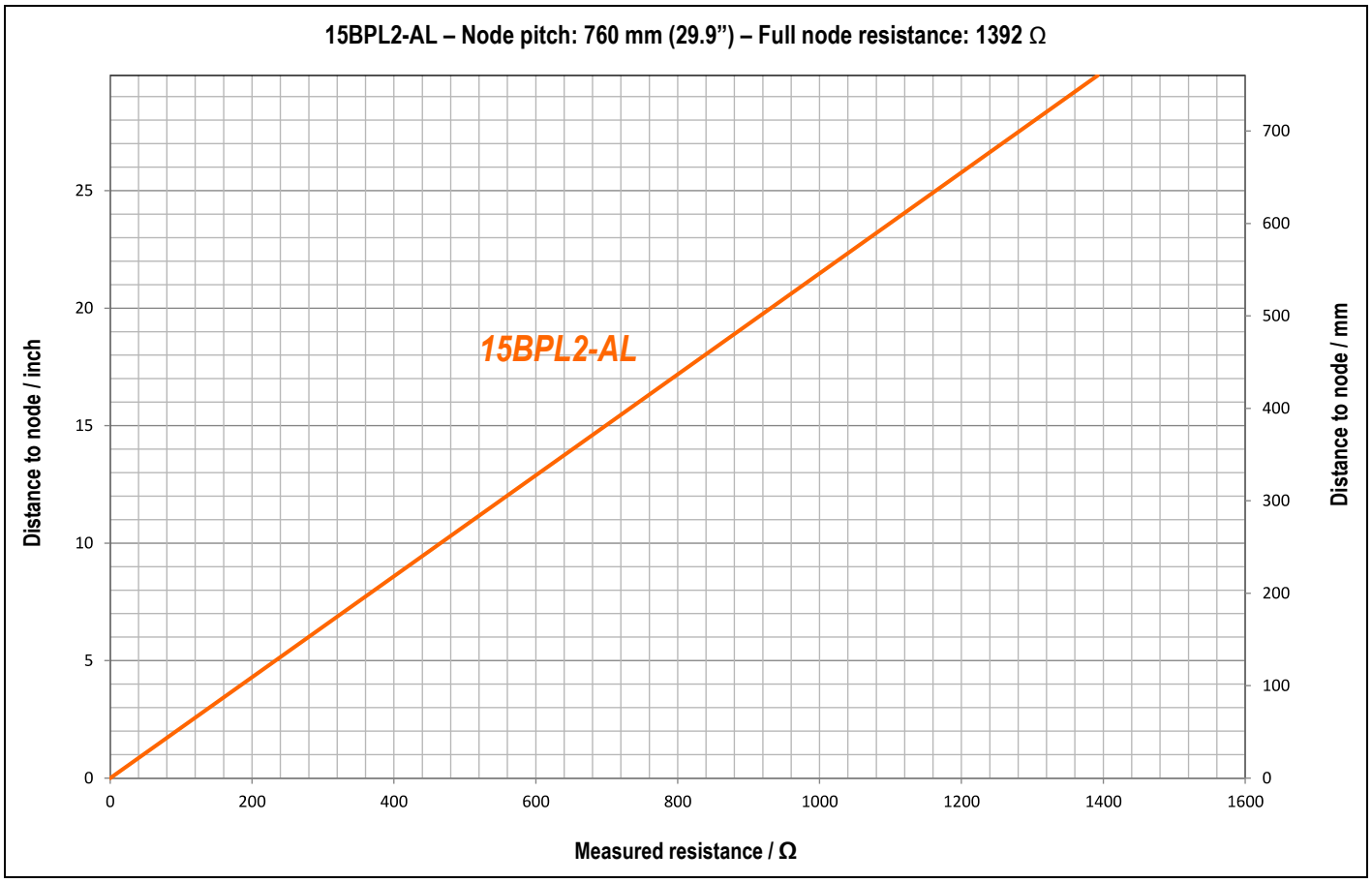
Alternate method for node location – only required if you cannot identify the node marker asterisks (****) on the trace heater

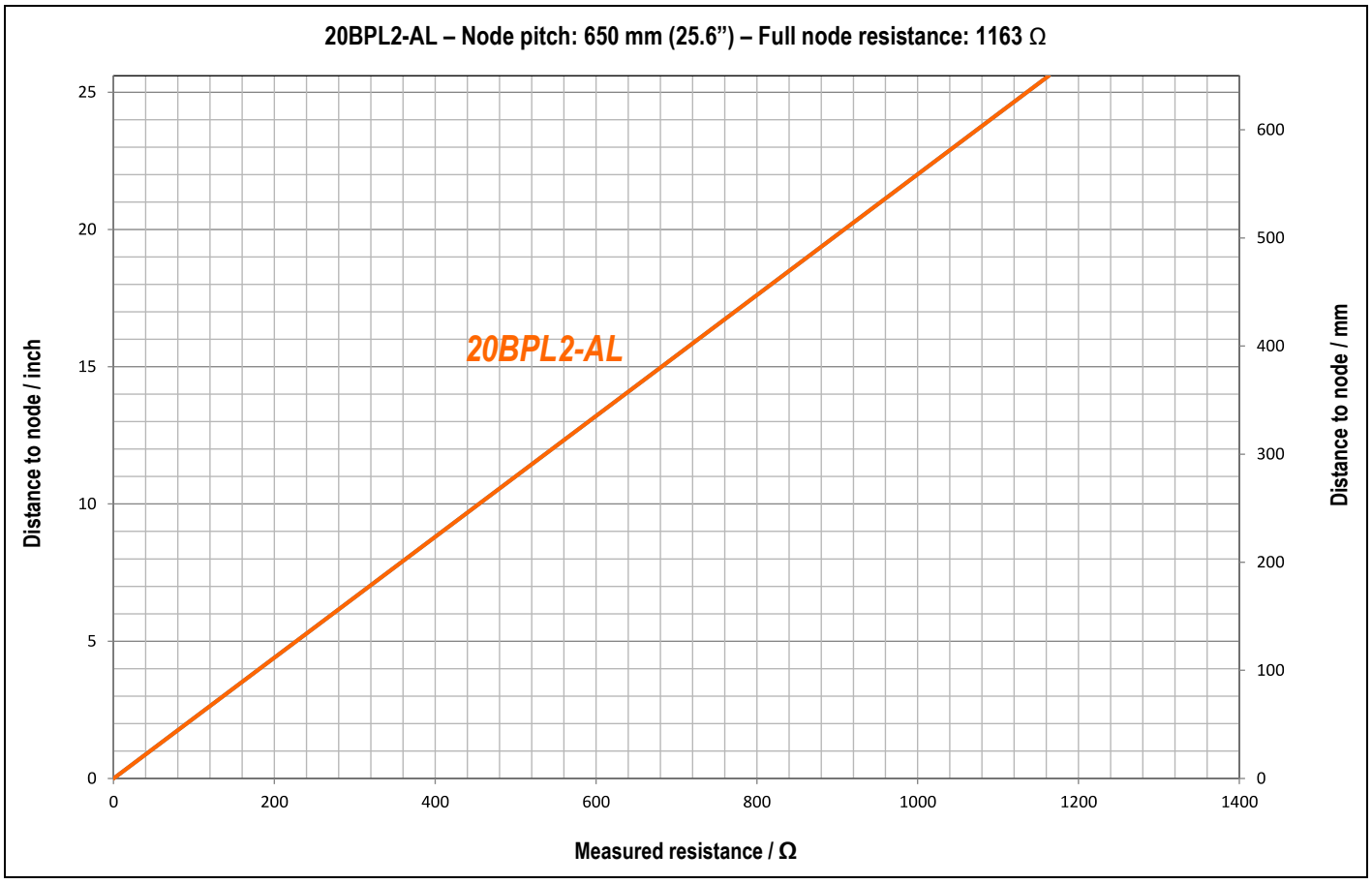
Product charts for node location





Product charts for node location





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