

## **PBS-400-A/A10**

### **Installation Instructions**

PBS-400-A/A10 Single entry power junction box  
for on- and off-pipe installation  
for use with BARTEC supplied MI trace heaters

### **Consignes d'installation**

Boîte de jonction à une entrée PBS-400-A/A10  
à poser directement sur ou à distance de la tuyauterie  
à utiliser avec les câbles chauffants de type MI fournis par BARTEC



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**Safety**

For safe installation and operation of the PBS-400-A/A10 Single entry power junction box 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 requirements and be installed in accordance with the relevant electrical codes and any other applicable national and local codes.
- The US and Canadian electrical codes require ground fault protection to be provided for all trace heating circuits.
- Install the connection kit and MI trace heaters carefully.
- Use the trace heater in accordance with the intended purpose and strictly comply with the operational data specified in section *Technical Data*.
- Do not cross, overlap, or group the MI trace heaters.
- The bending radius of the MI trace heater must be at least 5 times its outer diameter.
- 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 MI trace heaters dry before and during installation.
- 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.

**NOTICE**

**The following instructions are provided in English only. Refer to [www.bartec.us](http://www.bartec.us) for the French version.**

**Sécurité**

Afin de garantir la sécurité lors de l'installation et de l'utilisation du Boîte de jonction à une entrée PBS-400-A/A10, il est impératif de respecter les exigences ainsi que les consignes techniques mentionnées dans le présent manuel.

**⚠ AVERTISSEMENT**

**Risque d'incendie ou d'électrocution. Suivez ces consignes pour éviter toute blessure ou dommage matériel.**

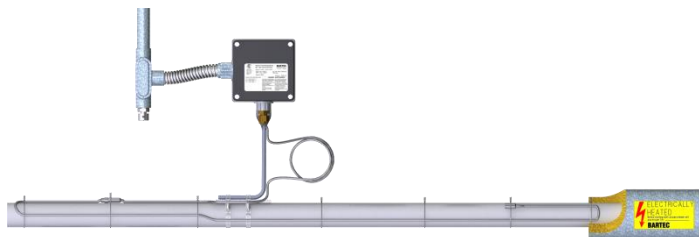
- Tous les systèmes et installations électriques doivent satisfaire aux exigences imposées par la société BARTEC GmbH et doivent être installés conformément aux normes électriques en vigueur ainsi qu'aux autres prescriptions nationales et locales applicables.
- La société BARTEC GmbH ainsi que les normes électriques américaines et canadiennes imposent une protection contre les défauts à la terre pour tous les circuits de traçage électrique.
- La pose du kit de raccordement, et des câbles chauffants de type MI doit être réalisée avec soin.
- Utilisez le câble chauffant conformément à l'usage prévu et en respectant les caractéristiques de fonctionnement spécifiées à la section *Caractéristiques techniques*.
- Ne croisez ni ne chevauchez ni ne groupez les câbles chauffants de type MI.
- Le rayon de courbure des câbles chauffants de type MI ne doit pas être inférieur à 5 fois leur diamètre extérieur.
- Tout élément défectueux dans le kit doit être remplacé avant l'installation.
- Conservez tous les éléments et les câbles chauffants de type MI au sec avant et pendant l'installation.
- Conservez ces instructions pour un usage ultérieur. Le cas échéant, remettez-les à l'utilisateur final.
- Mettre hors tension avant toute installation ou opération de maintenance.
- Utilisez exclusivement des pièces et accessoires d'origine BARTEC.

**AVIS**

**Les instructions qui suivent sont fournies en anglais uniquement. Veuillez vous référer au site [www.bartec.us](http://www.bartec.us) pour la version française.**

## Overview

This manual introduces the installation and operation of the BARTEC PBS-400-A/A10 Single entry power junction box.



The trace heating system uses a mineral insulated (MI) series resistance trace heater. Its fixed specific resistance offers a constant power output irrespective of the ambient temperature. The alloy 825 or stainless steel outer jacket ensures maximum mechanical strength.

The heating system is set up as a fixed equipment heating system for pipes in ordinary and hazardous areas.

## Certifications / Approvals

PBS-400-A/A10 Single entry power junction box for BARTEC supplied MI trace heaters



## Technical data

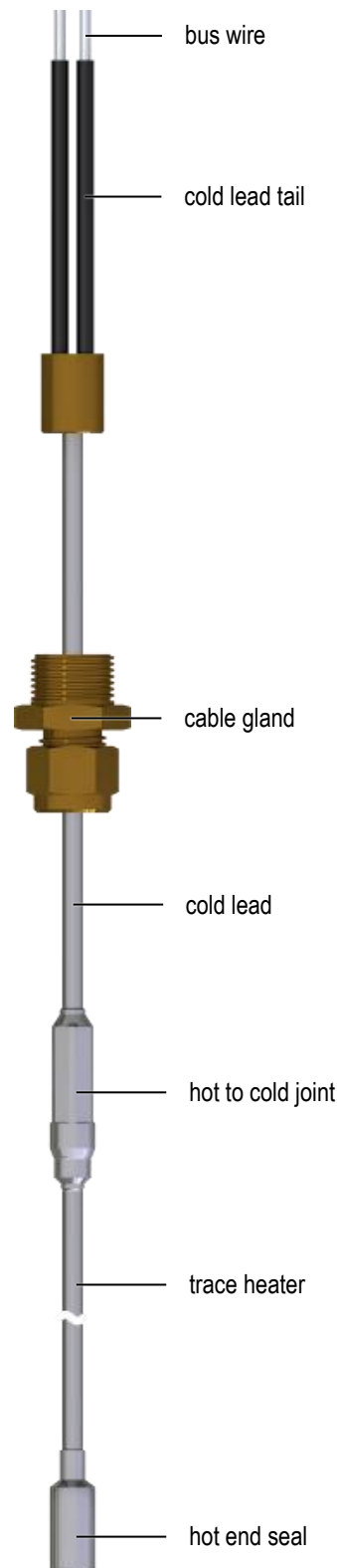
<b>Ambient temperature range</b>	<i>trace heater</i>	-23 to 1112 °F (-31 to 600 °C)
	<i>junction box</i>	-67 to 130 °F (-55°C to 55 °C)
<b>Minimum operation temperature</b>		-67 °F (-55 °C)
<b>Minimum installation temperature</b>		-20 °C (-4 °F)
<b>Power supply</b>		0 to 600 V <sub>AC</sub>
<b>Heat output</b>		max. 30 W/ft (100 W/m)
<b>Protection classification</b>		Class I, Div 2 Group A, B, C, D Class II, Div 2 Group E, F, G Class III, Div. 2
<b>Heater dimensions</b>		∅ 3.3 mm to 8.7 mm (depending on the trace heater type)
<b>Minimum bending radius</b>		5x outer diameter
<b>Conduit entry size</b>	<i>PBS-400-A</i>	3/4"
	<i>PBS-400-A10</i>	1"
<b>Maximum power conductor size</b>	<i>PBS-400-A</i>	10 AWG (6 mm <sup>2</sup> )
	<i>PBS-400-A10</i>	6 AWG (10 mm <sup>2</sup> )
<b>Terminals</b>		Spring clamp EX e 2x3 line, 1x3 PE

## Compatibility

The manual applies for the following trace heaters:

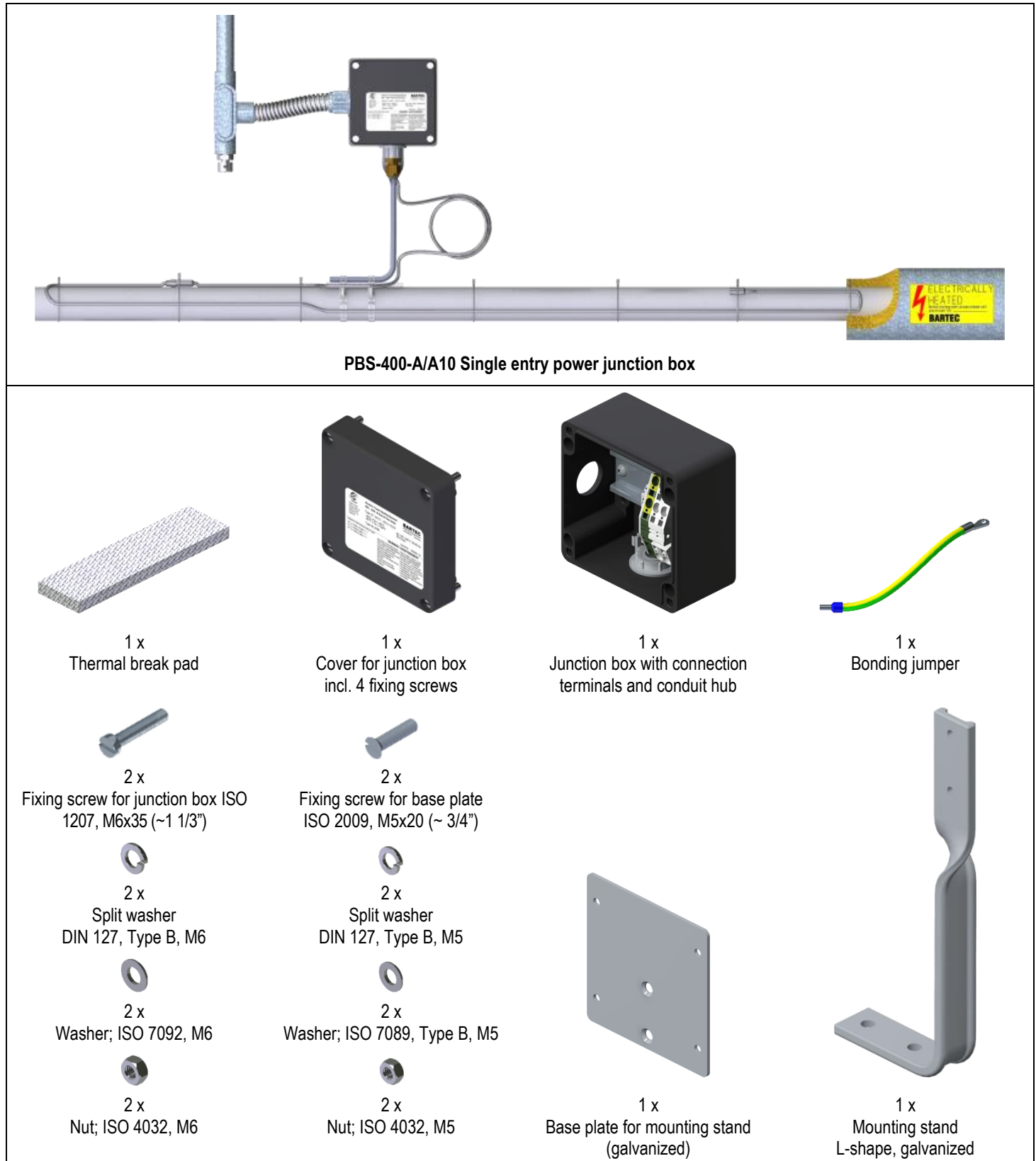
- BARTEC supplied MI trace heaters with 1/2" NPT connection

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



**Kit contents**

The following table lists the kit contents of the PBS-400-A/A10 Single entry power junction box<sup>1</sup>:



<sup>1</sup> Note that the illustrations might vary depending on whether you use the PBS-400-A or the PBS-400-A10 kit.

## Accessories

The following accessories are available for the PBS-400-A/A10 Single entry power junction box.



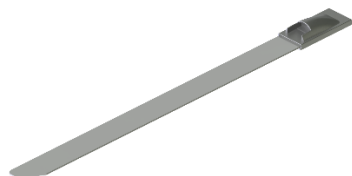
### Stainless steel tie wire

For MI trace heater installation on pipes, etc.

Catalog No.: TW-05

Order No.: 710109

*Supplied upon request, contact your local BARTEC distributor*



### Stainless steel cable ties

For MI trace heater installation on pipes, etc.

Catalog No.: SSC-03  
*(100 pcs., for pipe diameters up to 3" / DN80)*

Part No.: 03-6510-0208  
*(100 pcs., for pipe diameters up to 3" / DN80)*

Catalog No.: SCC-06  
*(100 pcs., for pipe diameters up to 6" / DN150)*

Part No.: 03-6510-0209  
*(100 pcs., for pipe diameters up to 6" / DN150)*



### Pipe straps

Stainless steel, for fixation of mounting stands on pipes etc.

*Supplied upon request, contact your local BARTEC distributor*



### Electrical warning label

Warning label for trace heater circuits

Catalog No.: HTWL-DE (German)  
HTWL-US (English)  
HTWL-FR (French)  
HTWL-RU (Russian)

Order No.: 113450 (German)  
113550 (English)  
120300 (French)  
207439 (Russian)

Part No.: 05-2144-0046 (German)  
05-2144-0047 (English)  
05-2144-0703 (French)  
05-2144-0860 (Russian)

**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
  - heating circuit length

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

**Trace heater identification**

Check the trace heater type and make sure that it has no damages:

- Identify the trace heater to ensure the proper type and quantity have been received. Factory-fabricated series circuits will have an imprinted I.D. tag with pertinent data. Compare information on trace heater with packing slip and purchase order to verify receipt of correct shipment.

REFER TO INSTALLATION INSTRUCTIONS									
Tag number:			Circuit reference:						
Item / Serial number:				Date of manufacture:					
Master Contract:			"219346"		Usage Designation:		-WS SERIES		
Cable ref		L	Watts	Volts	W/ft	Cold Lead-In			
Classification:			<input type="radio"/> CI I, Div 2, Gr A, B, C & D.; CI II, Div 2, Gr F and G; CI III, Div 2 <input type="radio"/>						
Temperature code:			Rated current:		Linear R		Nom. R		R
Working T:			Rated voltage:						
CAUTION: A GROUND FAULT PROTECTION DEVICE MUST BE USED WITH THIS HEATING DEVICE ATTENTION: CE PRODUIT DOIT ETRE UTILISE AVEC UNE PROTECTION DE MISE A LA TERRA									
Customer:			Order number:			TRM job number:			

- Visually inspect materials for damage incurred during shipment. Any defective component of the kit must be replaced before installation.
- Store in a clean and dry place. The cold lead ends must be kept dry before, during, and after installation.
- Do not connect power to the trace heater while in shipping carton or before installed on the pipe/vessel.

**Measurement of the insulation resistance**

Before installation, test the MI trace heater to ensure that it has no damages. To do the measurement, proceed as follows:

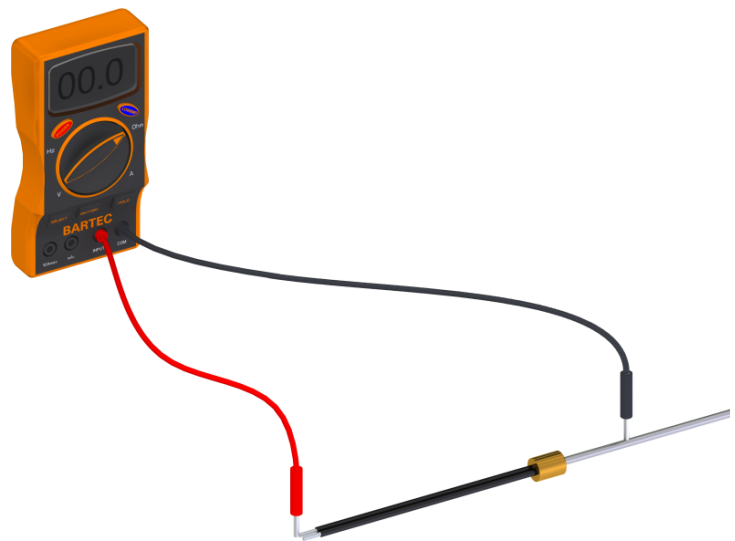
- Use an insulation resistance meter with a minimum testing voltage of 500 V<sub>DC</sub> (recommended testing voltage: 1000 V<sub>DC</sub>).
- Measure the resistance between each bus wire and the metallic outer jacket. The required insulation resistance is 20 MΩ min.

**⚠ WARNING**

Risk of fire or electrical shock. If the insulation resistance is insufficient the trace heater is likely to be defective and must not be installed. Contact your local BARTEC distributor for assistance.

**⚠ AVERTISSEMENT**

Risque d'incendie ou d'électrocution. Si la résistance d'isolation est insuffisante le câble chauffant ne doit pas être utilisé car il est probable qu'il soit défectueux. Contactez votre distributeur BARTEC local pour obtenir de l'aide.

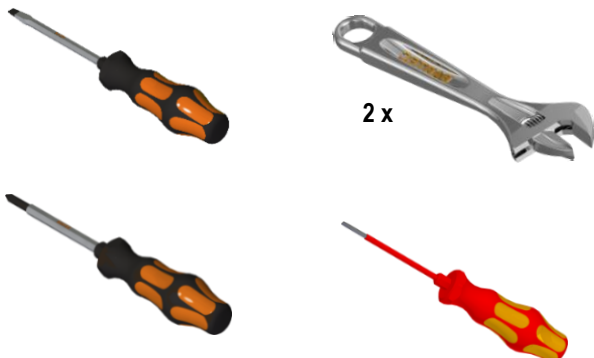




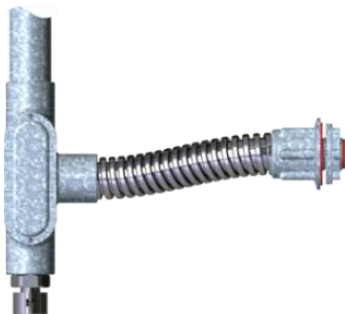
## Required tools / equipment

The following tools and equipment are required for installation of the PBS-400-A/A10 Single entry power junction box:

- Flat screwdriver
- Cross-head screwdriver
- Adjustable wrenches (2x)
- Electricians screwdriver



- NEMA Type 4X rated conduit pipe and conduit hub with conduit drain.



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## Installation on pipes

### ⚠ WARNING

Risk of fire. Do not cross, overlap, or group the trace heaters.

### ⚠ AVERTISSEMENT

Risque d'incendie. Ne croisez ni ne chevauchez ni ne groupez les câbles chauffants de type MI.



### ⚠ CAUTION

Risk of injury and/or material damage. Never tread on or drive over the trace heater. Do not use it as a loop for stepping on.

### ⚠ ATTENTION

Risque de blessures et/ou de dommages matériels. Ne pas marcher ni rouler sur le câble chauffant. Ne pas s'en servir comme cordage.

- 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. Furthermore the trace heater can be easily located later on.



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## Cautions and warnings

### ⚠ WARNING

Risk of fire or electrical shock. De-energize all power circuits before installation or servicing. Always use ground fault equipment within the heat tracing system.

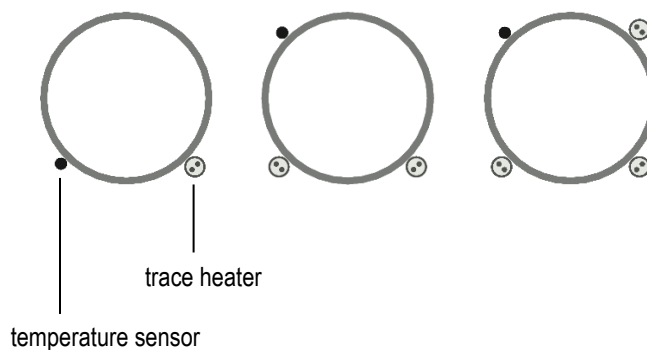
### ⚠ AVERTISSEMENT

Risque d'incendie ou d'électrocution. Mettre tous les circuits électriques hors tension avant toute installation ou opération de maintenance. Toujours utiliser un dispositif de protection contre les défauts à la terre au sein du système de traçage électrique.

- Double-check that all power circuits are de-energized before you begin your work.

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- 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°.



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**Fastening**

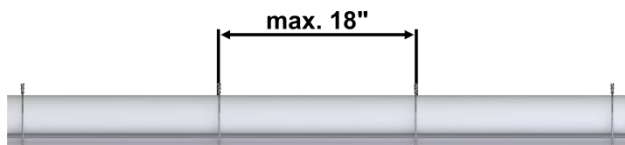
At first, select the correct fastening material:

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



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- Fasten the trace heater on the pipe at intervals of at least 18" (450 mm).



**NOTICE**

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

**AVIS**

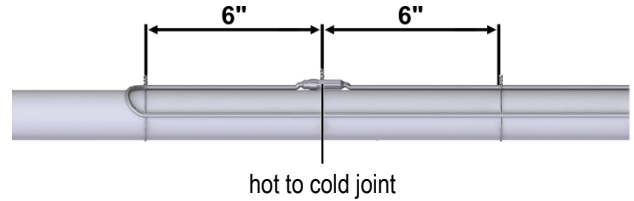
Pour assurer une bonne conduction thermique, le câble chauffant doit être posé bien à plat et bien au contact de la tuyauterie sur toute la longueur. Au besoin, réduisez l'écartement entre les points d'attache.

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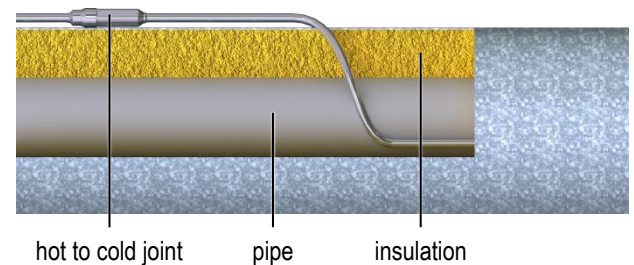
**Placement of the hot-to-cold joint**

The suitable placement of the hot-to-cold-joint depends on the expected pipe temperatures:

**For pipe temperatures up to 302 °F (150 °C): On-pipe installation of the hot-to-cold-joint**



**For pipe temperatures exceeding 302 °F (150 °C): Off-pipe installation of the hot-to-cold-joint**



**NOTICE**

Keep the cold lead and the hot-to-cold-joint below 600 °F (315 °C) to prevent damage to the trace heater.

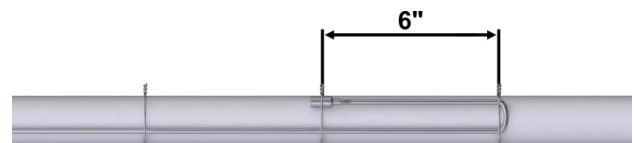
**AVIS**

Gardez la liaison froide et le raccord froid/chaud à une température inférieure à 600 °F (315 °C) pour éviter tout dommage au câble chauffant.

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**Placement of the hot end seal**

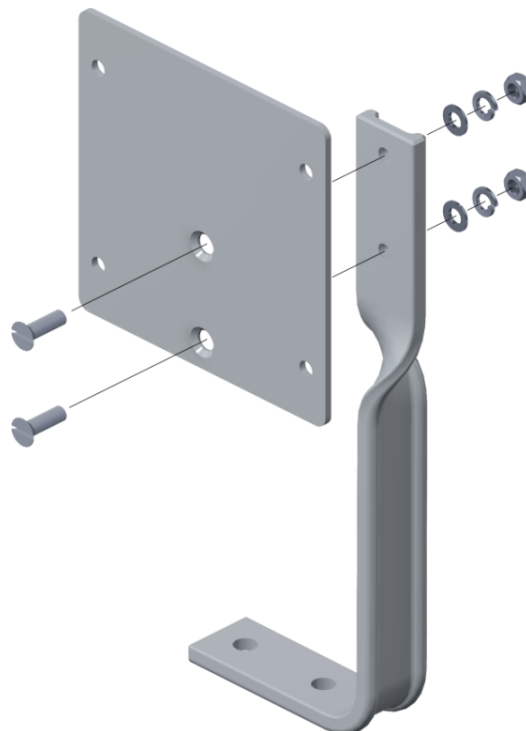
- Route the trace heater in a loop of 6" (15 cm) and fasten the trace heater and the hot end seal on the pipe.



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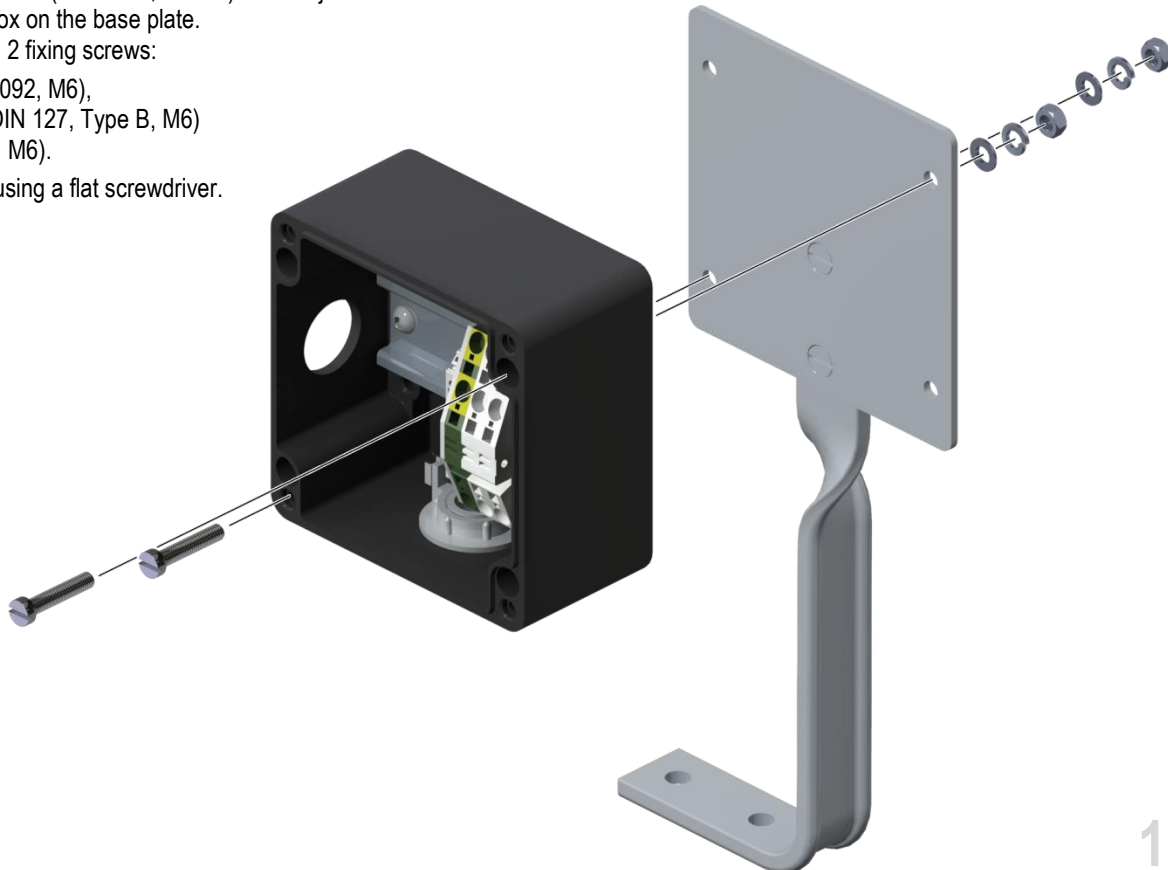
## Installation of the mounting stand

- 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.



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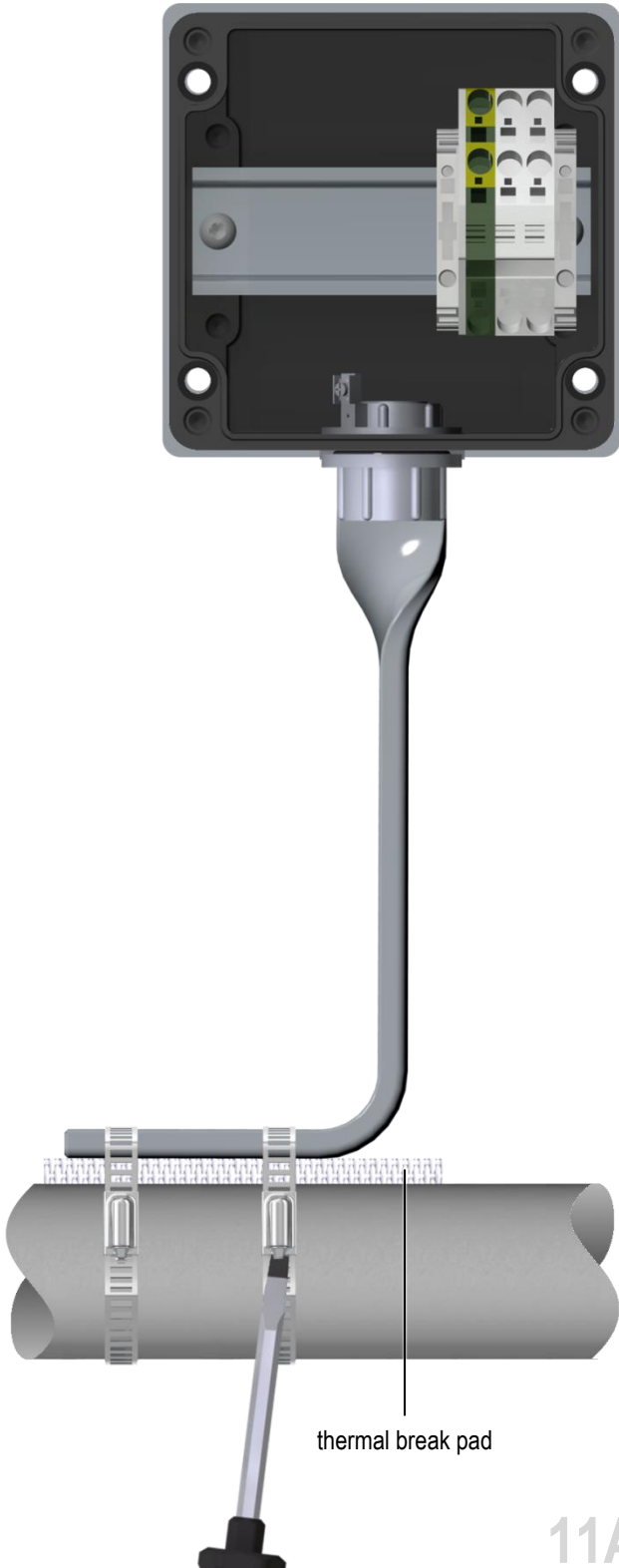
- Insert the 2 fixing screws (ISO 1207, M6x35) into the junction box.
- Install the junction box on the base plate.
- Install on each of the 2 fixing screws:
  - a washer (ISO 7092, M6),
  - a split washer (DIN 127, Type B, M6)
  - a nut (ISO 4032, M6).
- Tighten the screws using a flat screwdriver.



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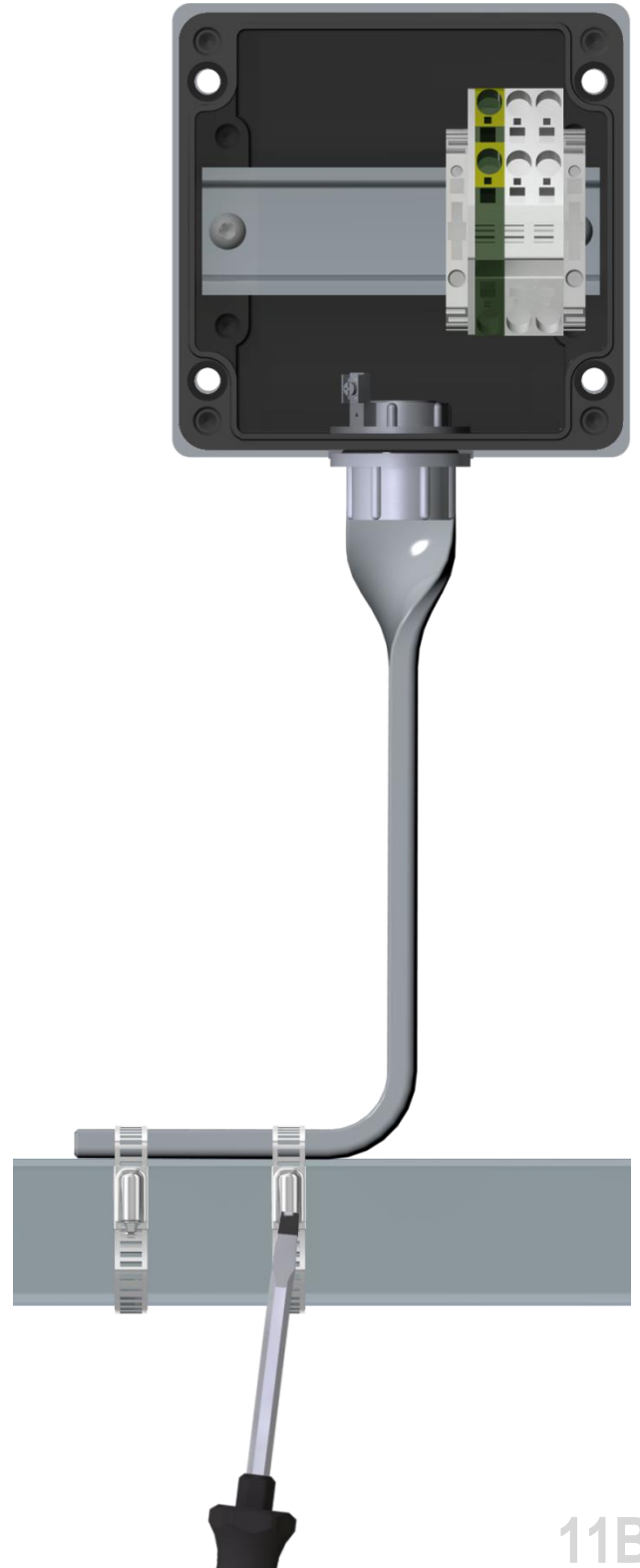
For pipe temperatures up to 302 °F (150 °C) the mounting stand can be installed directly on the pipe (“on-pipe”).

- Place the mounting stand on the pipe.
- Put the thermal break pad under the mounting stand.
- Install the pipe straps and tighten them firmly using a screwdriver.

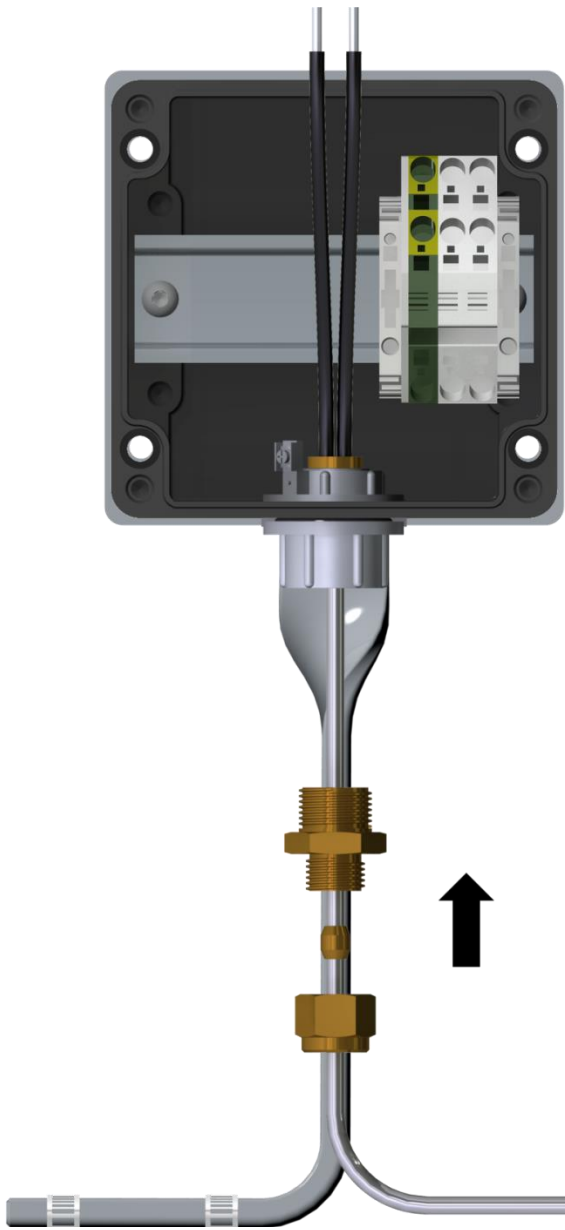


For pipe temperatures exceeding 302 °F (150 °C) install the mounting stand on a support other than the pipe (“off-pipe”).

- Place the mounting stand on the strut channel support.
- Install the pipe straps and tighten them firmly using a screwdriver.

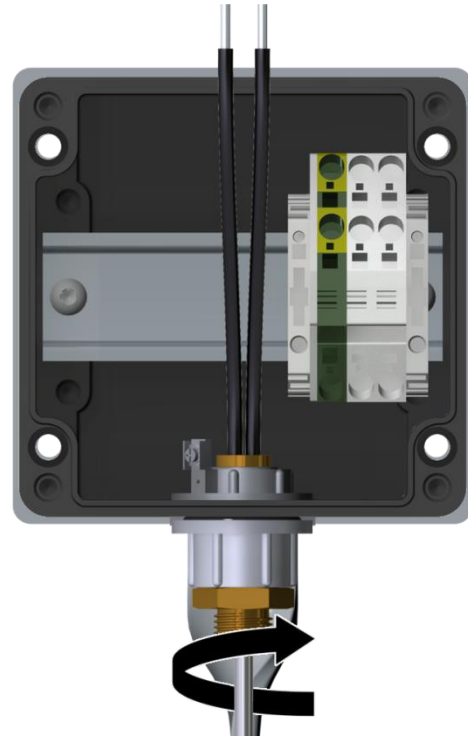


- Feed the trace heater into the junction box.



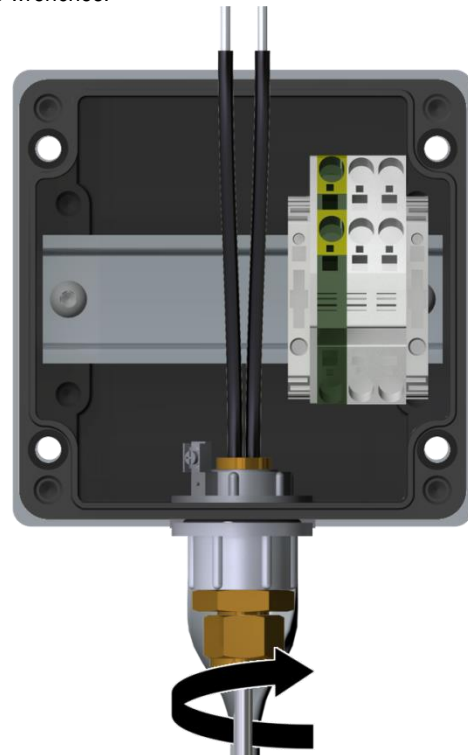
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- Screw the gland body into the conduit hub.
- Tighten the gland body hand tight.
- Add 1/4 of a turn using an adjustable wrench.



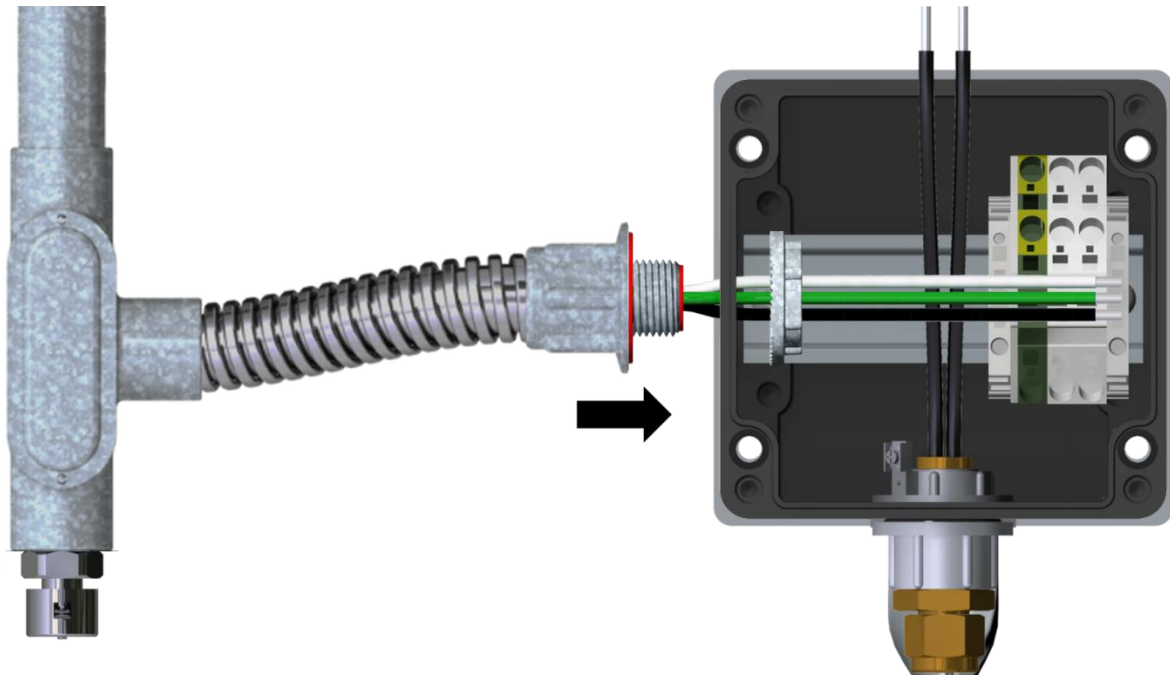
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- Tighten the lock nut hand tight.
- Add 1/2 to 3/4 of a turn while locking the gland body using 2 adjustable wrenches.



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- Install the conduit pipe and conduit hub according to the manufacturer's installation instructions.
- Feed the cold lead cable into the junction box.



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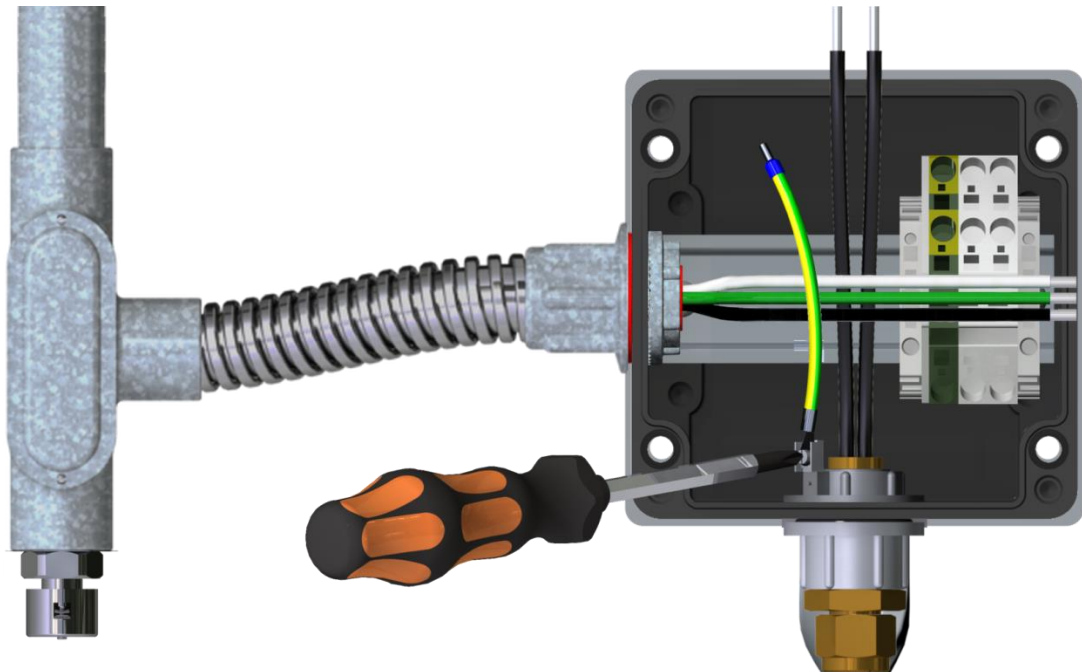
**NOTICE**

The conduit entry size is 3/4" for PBS-400-A and 1" for PBS-400-A10.

**AVIS**

L'entrée de conduit est de 3/4" pour PBS-400-A et de 1" pour PBS-400-A10.

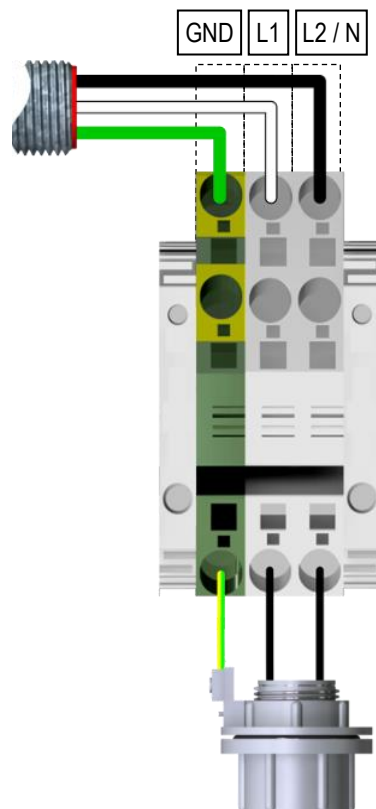
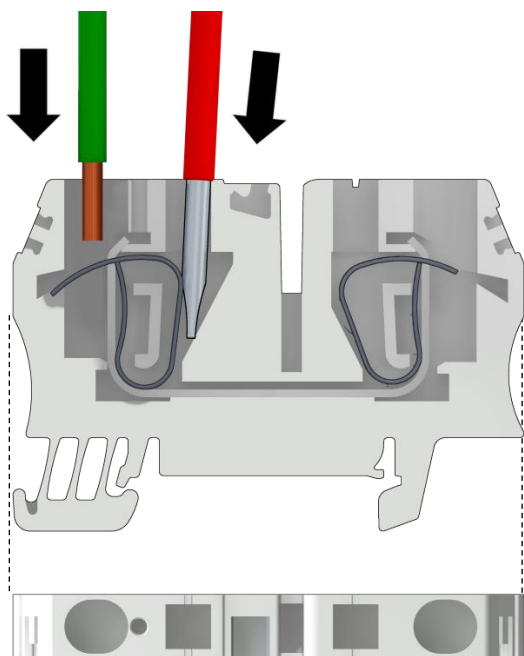
- Install the bounding jumper at the conduit hub and tighten it firmly using a screwdriver.



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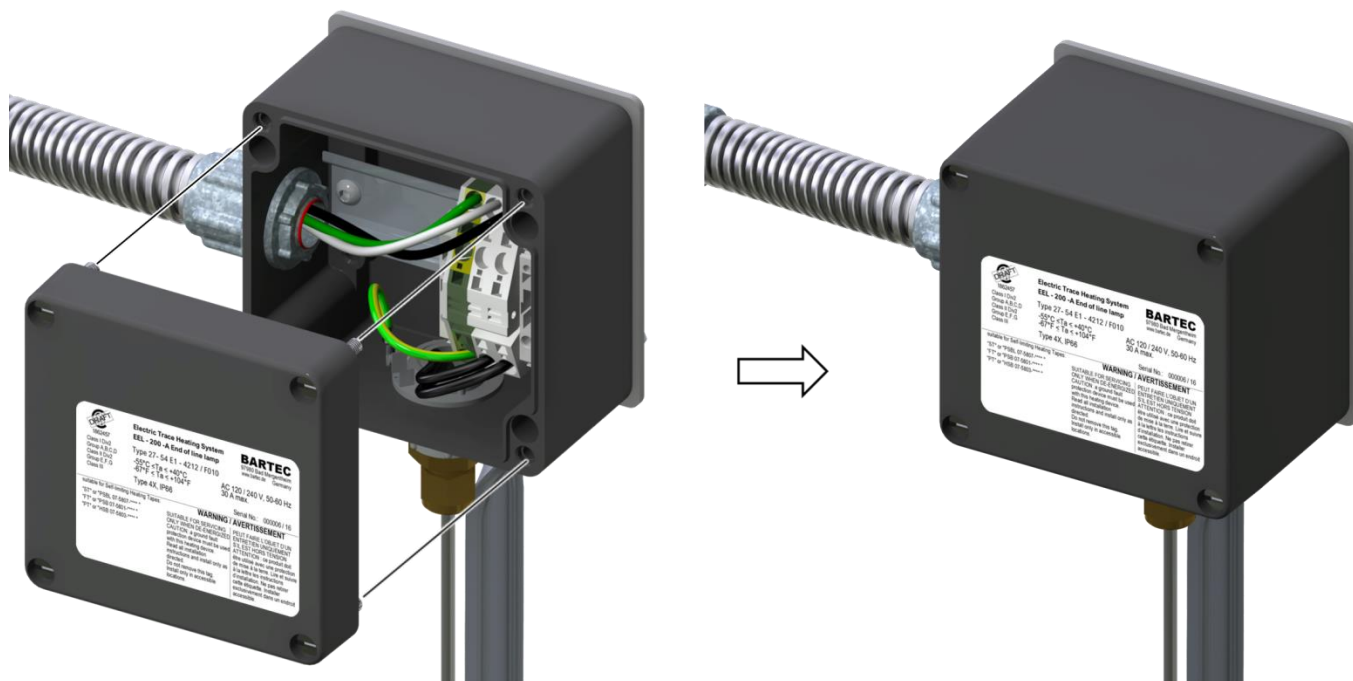
## Wiring

- 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.



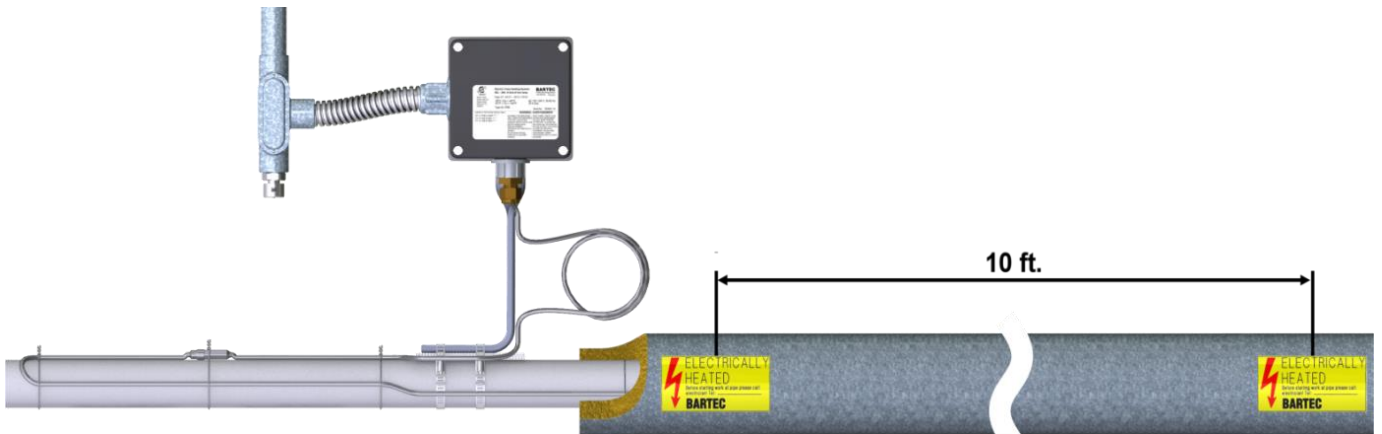
17

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

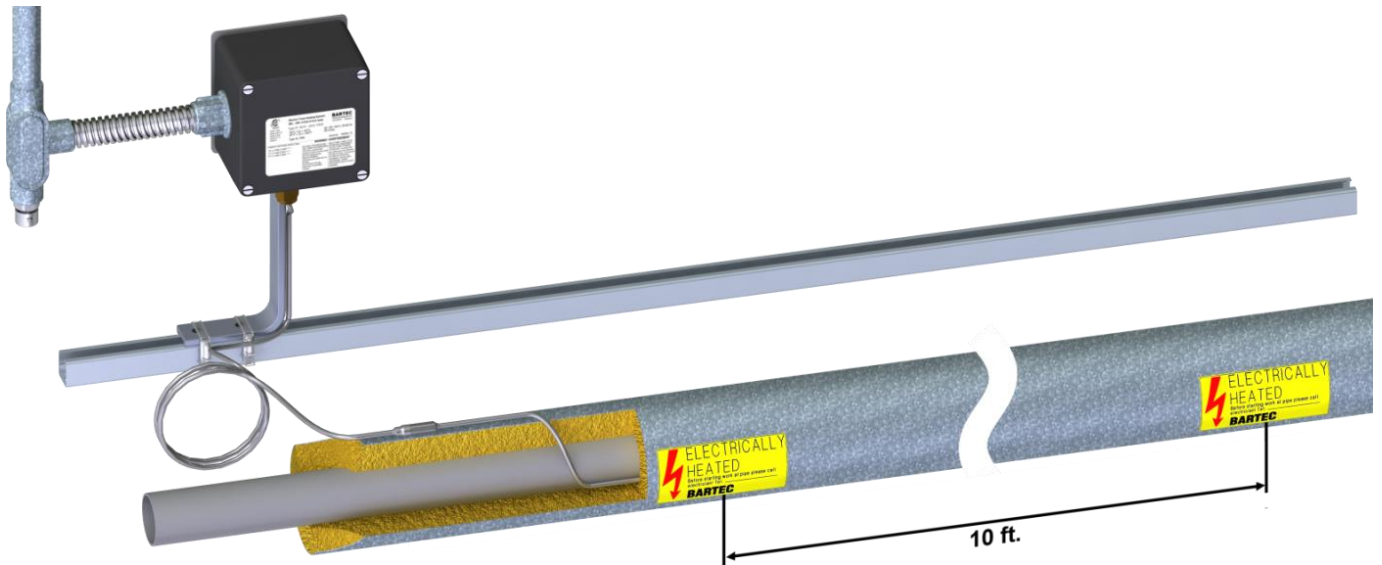


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- Apply the pipe's insulation according to the manufacturer's installation instructions.
- Apply an electrical warning label every 10 ft. (3 m) on a clearly visible place.



For pipe temperatures up to 302 °F (150 °C):



For pipe temperatures exceeding 302 °F (150 °C):



## Troubleshooting

Problem	Possible cause	Remedy
Trace heater remains cold	No power supply	Check the supply line for voltage, ensure the circuit breaker is energized.
	MI trace heater or cold lead cable not properly connected	Connect the MI trace heater and cold lead cable according to the installation instructions.
	Control unit adjusted incorrectly	Adjust the control unit according to the installation instructions.
Automatic circuit breaker disengages	Circuit breaker defective	Replace the circuit breaker.
	Circuit breaker has wrong tripping characteristics, e. g. "B" instead of "C"	Install a circuit breaker with Type-C tripping characteristics.
	Nominal circuit breaker size is insufficient	Replace circuit load current. Resize with a circuit breaker with higher capacity. Split the heating circuit into separate circuits, replace MI heaters as required.
	Short circuit	Visually inspect the trace heater for damage. Identify the cause and remedy of the fault.
	Humidity inside the connection system	Ensure connections are dry. Install conduit drains as required. Repair damaged section or replace the trace heater.
Ground fault protection is disengaged	MI Trace heater damaged	Visually inspect the trace heater for damage, especially at flanges, valves or pumps. Look for crushed or damaged insulation along the pipe. If damaged replace the MI trace heater.
	Ground Fault Protection Device (GFPD) is undersized (e.g. 5 mA instead of 30 mA)	Replace undersized GFPD with 30 mA GFPD and check the GFPD wiring instructions. For long circuits or high maintain temperatures a higher GFPD (up to 300 mA) may be required. Check with the factory for verification of the design criteria.
	Moisture in the junction box	Dry the junction box. Dry tails and face of seal. Be sure that the conduit drain is installed and breathing properly.
	Ground fault protection defective	Replace the ground fault protection device(s).

**Insulation Test Report for MI Trace heater Document "B"**

Item	Trace heater information		After installation of the trace heater				
	Trace heater tag number	Trace heater catalog number	Visual check by	Date	Insulation resistance test by	Reading (MΩ)	Date
1							
2							
3							
4							
5							

Name	Initials	Date

Customer: \_\_\_\_\_

Project Reference: \_\_\_\_\_

Contractor: \_\_\_\_\_

Megohmmeter Voltage: \_\_\_\_\_



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