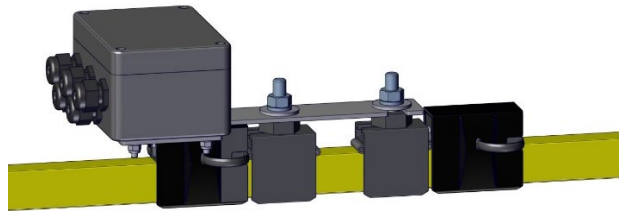
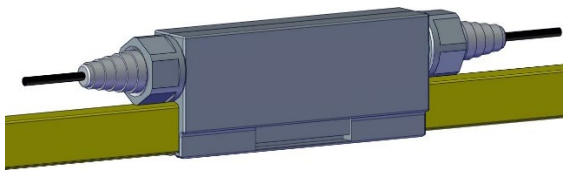
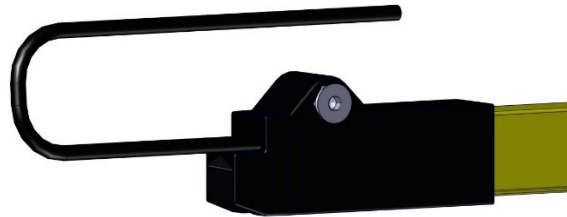
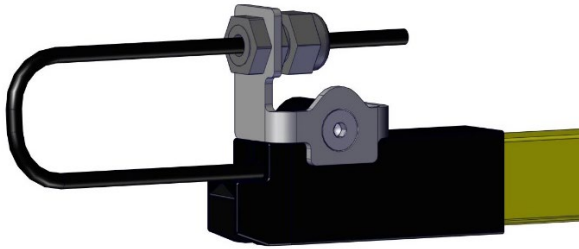


Mounting Instructions



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

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Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

1 General

1.1 Purpose and field of application

These mounting instructions describe the installation of the heating in the conductor rail system 0812 for a new installation. The described assembly process does **not** apply to repairs or replacement of heating systems in existing conductor rail systems.

1.2 Functionality and task of a conductor rail heating

To improve system availability during winter operation, conductor rail systems in outdoor installations or similar ambient conditions are additionally equipped with a heating system. The conductor rail program 0812 of Conductix-Wampfler GmbH is suitable for operation in protected outdoor use (IP21). Therefore, a heating system shall protect the conductor rail from hoarfrost formation and the resulting loss of contact to the current collector. The heating system is not designed for de-icing, but for preventive elimination of condensation and frost. Heating of the conductor rail is realized by means of an electrical heating wire, which is drawn into the insulating profile. It is positioned in the cavity of the insulating profile. Each pole of the conductor rail system is heated. For the electrical connection of the heating wire you can use terminal boxes, positioned at the infeed of a heating wire circuit.

The heating is switched on for the temperature range below $+5^{\circ}\text{C}$ (start of hoarfrost formation from approx. $+5^{\circ}\text{C}$). Above 5°C the heating must be switched off to avoid damage to the insulation. The Type of the heating wire must be chosen to a size that the heating capacity per heating wire is between 10 - 20 W/m (the value depends on the application and the system or ambient conditions but should not exceed 25 W/m). The power supply to the heating wire is provided by a control unit with an outdoor temperature sensor (not part of these mounting instructions).

The position of the heating wire in the conductor rail is described in chapter 1.4.



Low temperatures reduce the material breaking strength!

At low temperatures, the material breaking strength is continuously reduced and material damage may occur.

- Due to the risk of material damage (e.g. because of increased risk of breakage), avoid installing the conductor rail system at ambient temperatures below -10°C .
- To protect the conductor rail system from rain and snow we recommend a protective cover.
- Critical ambient conditions must be taken into account (e.g. heavy soot deposits from diesel vehicles or similar result in possible creepage currents, since deposits on the conductor rails are no longer removed, e.g. by rain). If necessary, consult the technical sales division.
- From an outside temperature of below -40°C , the operation of a conductor rail system is not possible (only statically) (risk of breakage of plastics).

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812



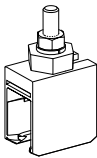
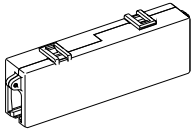
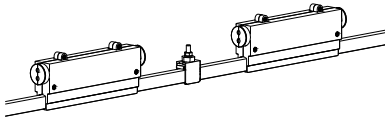
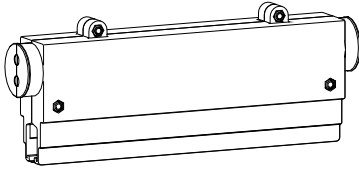
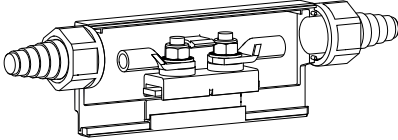
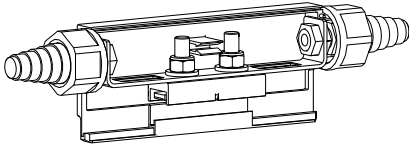
Risk of death due to electrical shock!

Contact with energized components can lead to death or severe injury by electrical shock. There is also a risk of injury from a shock reaction, falling or being thrown across the room as a result of an electrical shock.

- The power supply to the heating wire must be switched off when the conductor rail is switched off for work on the conductor rail system (danger with electrical voltage).
- As far as possible, the heating wire should not be looped over several poles (carryover voltage).
- Heating wire in maintenance sections must always be supplied separately and switched off positively with the phase voltage.

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

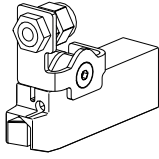
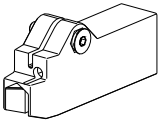
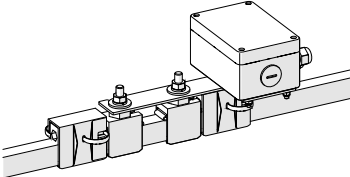
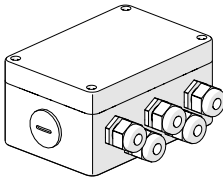
1.3 Assembly description

Description	Component	Order Number
Hanger clamp 0812		08124x-0x
Connector 0812		081221-x
Expansion unit 0812		081261-4xxxx
Expansion connector cap set 0812 for the expansion point of the heating wire		08-V001-0570
Infeed 0812 (can take over the function of a feed-in and a feed-out)		081251-x
Line feed of the heating wire (can take over the function of a feed-in and a feed-out)		08-E015-0635

Mounting Instructions







Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Description	Component	Order Number
End feed of the heating wire 0812 (with strain relief)		08-E012-0438
End feed of the heating wire 0812 (without strain relief)		081272-2
Terminal box unit 0812 heating 400 V (with rail fastening)		08-S261-2813
Terminal box 0812 heating 400 V (without rail fastening)		08010X-5

Mounting Instructions



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Description	Components	Description	Length	Piece	Order Number
Heating wire (double insulated)		Heating wire (quantity, length and diameter according to project planning)	project-specific		
Connection set heating wire		Cold connection cable (cable 1x1.5 mm ² , first insulation Ø2.8 mm, outer sheath Ø4.4 mm, minimum bending radius is 3xd (Ø4.4 mm) for permanent installation)	2 m		080106-000
		Heat shrink tubing	55 mm	3	
		Heat-shrink crimp	37 mm	3	

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

1.4 Position of the heating wire

The system overview of the conductor rail with heating wire is illustrated in Fig. 1:

Example:

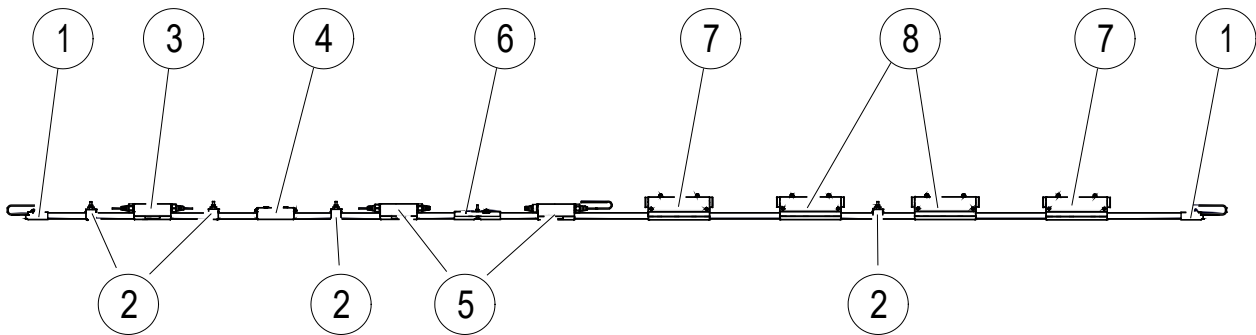


Fig. 1: System overview



NOTE!

The vertical position of the conductor rail (current collector intervention from the side), as in Fig. 3 should be avoided, if possible, in systems with heating!

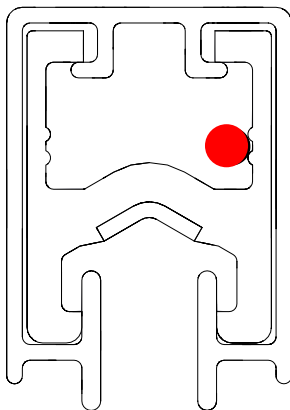


Fig. 2: Horizontal position of the conductor rail

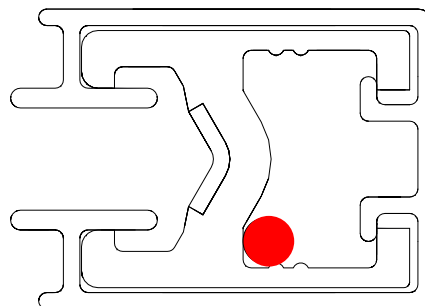
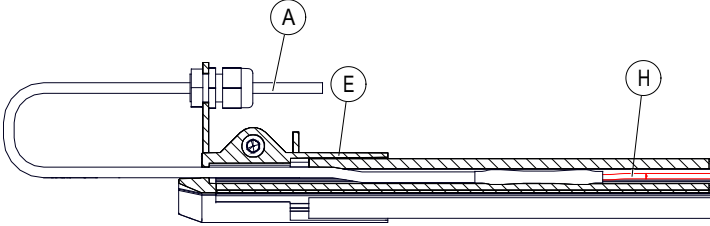
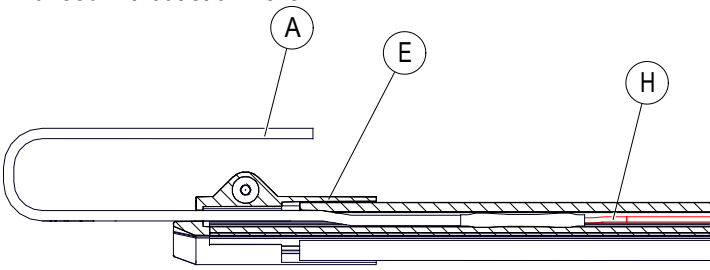
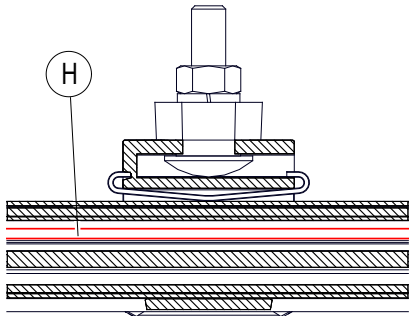
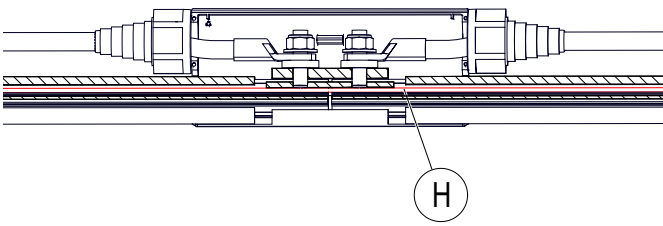
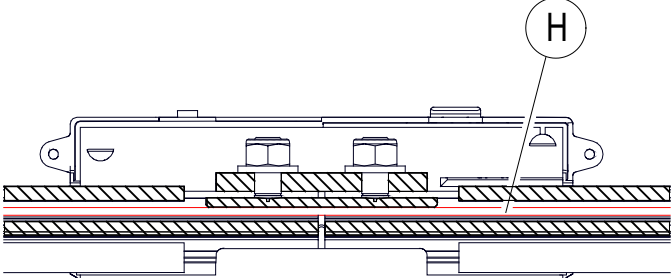
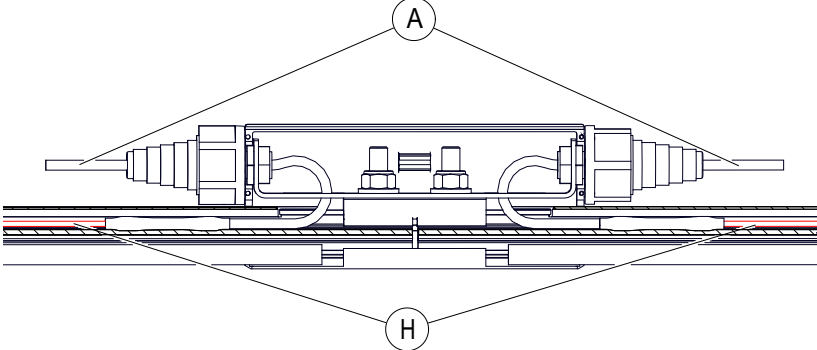
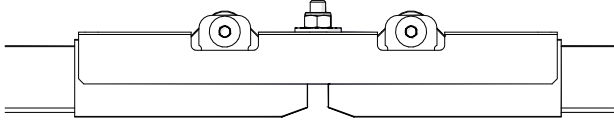
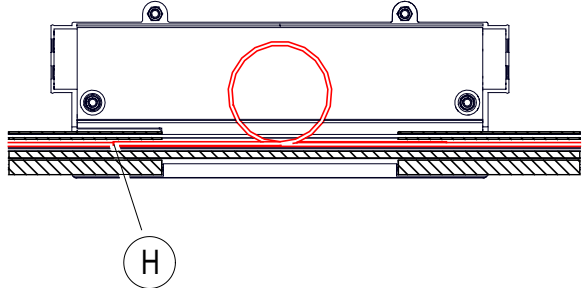


Fig. 3: Vertical position of the conductor rail (current collector intervention from the side)

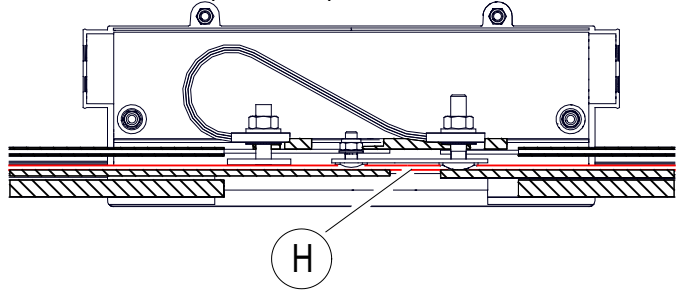
Heating Wire for Insulated Conductor Rail
SinglePowerLine Program 0812

Item	Description	Position of the heating wire within the component
1	End feed of the heating with end cap 0812 (with and without strain relief)	<p>End feed with strain relief</p>  <p>End feed without strain relief</p>  <p>H = heating wire A = cold connection cable E = end cap</p>
2	Hanger clamp	 <p>H = heating wire</p>
3	Infeed of the conductor rail system 0812	 <p>H = heating wire</p>

Heating Wire for Insulated Conductor Rail
SinglePowerLine Program 0812

4	Connector 0812	 <p>H = heating wire</p>
5	Line feed of the heating wire	 <p>H = heating wire A = cold connection cable</p>
6	Air gap insulation section	 <p>Air gap insulation sections must not be bridged with heating wires. The heating wire circuits must be laid in such a way that each of them ends at the air gap insulation sections. When using air gap insulation sections, please consult the technical sales department.</p>
7	Expansion point of the heating wire (expansion loop)	 <p>H = heating wire</p>

Heating Wire for Insulated Conductor Rail
SinglePowerLine Program 0812

8	Expansion unit of the conductor rail system 0812	<p>Illustration of an expansion cap:</p>  <p>H = heating wire</p>
---	--	---

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

1.5 Project planning

For the project planning of the conductor rail heating, the following is established on a project-specific basis:

- the length of the heating wire
- the heating wire resistance
- the supply voltage
- Segment division or separation (e.g. maintenance sections or sections with air gap sections)

An appropriate heating wire layout plan is created and provided to the customer.



NOTE!

If the heating wire layout plan is missing, please request it from Conductix-Wampfler!

1.6 Required tools, devices and materials

Required tool for the crimping:

- Side cutter
- Wire stripper
- Crimping tool for insulated heat-shrink crimp (e.g. Klauke K 82)
- Industrial hot air blower (e.g. Leister 1502 A with reflector PR 12)
- Battery-powered screwdriver

Required tool for electrical measurements:

- Insulation measuring device
- Continuity tester

Required tool for line feed of the heating wire:

- Battery-powered drilling machine (attachments: metal drill Ø 10 mm)
- Cutting tool for the recess in the insulating profile

Required tool for shortening the conductor rail:

- Fine saw or angle grinder with a fine cutting wheel
- File for deburring (e.g. needle file or similar)

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

The following device is required:

- On-site axis for suspension of the heating wire spool ($\text{Ø}35 - 50 \text{ mm}$)

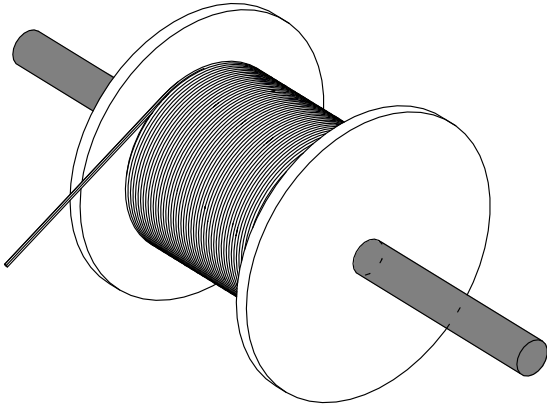


Fig. 4: Wound-up heating wire

Required material for 1 crimping:

- 1 heat-shrink crimp DR 1 (red)
- Cold connection cable (minimum bending radius is $3 \times \text{Ø}4.4 \text{ mm}$) for permanent installation)
- 70 mm heat-shrink tubing
- Heating wire minimum bending radius is $5 \times \text{Ø}2.3 \text{ mm}$)

1.7 Personnel requirements



Risk of injury due to insufficient qualification!

Improper use can result in serious injury to people and property damage.

→ All activities must only be performed by qualified personnel.

- Only people who can be expected to perform their work reliably are acceptable personnel.
- People whose responsiveness is influenced e.g. by drugs, alcohol, or medications, for example, are not permitted.
- When selecting personnel, all age- and occupation-specific regulations applicable at the place of use must be observed.

The following qualifications are specified in the instructions for certain fields of activity.

■ **Specialist personnel**

consists of people capable of performing assigned tasks and independently identifying and avoiding potential hazards based on their specialist training, knowledge and experience as well as their understanding of the applicable regulations.

Personnel are considered qualified if they have successfully concluded training, for example, as electricians, master electricians, electrical engineers, or electrical technicians. Personnel are also considered qualified who have been employed correspondingly for several years, have been educated in theory and practice during that time, and whose knowledge and skills in the trade required have been tested.

The operator of the machine or system must document that the corresponding certification, or other documentation of qualification, is available or had been submitted previously.

The installation, maintenance and commissioning of electrical equipment may only be carried out by qualified personnel (electricians) in accordance with local regulations. Work with higher installation positions usually requires additional qualifications and certificates for the use of lifting devices and protective equipment. On the part of the manufacturer, professional and proper handling of components is required. It is recommended that the installation personnel be trained by the manufacturer or that accompaniment of the installation by specialist fitters/supervisor be scheduled.



It is recommended that the installation personnel be trained by the manufacturer or that accompaniment of the installation by specialist fitters/supervisor be scheduled.

Heating Wire for Insulated Conductor Rail

SinglePowerLine Program 0812

2 Assembly

2.1 Assembly preparations

The following preparations must be made before starting to install the heating wire:

- Mount the hanger clamp to the customer's support structure (for further assembly see BAL0812-0001).
- Mark all feed points on the rail (both infeed of the conductor rail and infeed of the heating) (for further assembly see chapter 2.3.2 and chapter 2.3.4).
- At the **feed points of the heating wire** on the conductor rail track (line feed), a recess for the heating wire must be sawn in the insulating profile to prevent crushing of the heating wire or the cold connection cable (observe the minimum bending radius of $3xd$).
- Determine and mark the rail sections that need to be shortened (for further assembly see chapter 2.2 or BAL0812-0001).
- Mark all expansion points of the heating on the rail (for further assembly see chapter 2.3.4).
- Determine and mark the position of the terminal boxes (for further assembly see chapter 2.5).

Determine the position of the terminal boxes (optional) prior to the assembly!

Terminal boxes are available in two versions and can be mounted in two ways:

- on the conductor rail (see 2.5.1 and Fig. 52)
- to on-site mounting options (e.g. steel construction, wall, etc.) (see Fig. 52)



NOTE!

Determine the position of terminal boxes prior to the assembly, since the mounting parts, consisting of hanger clamp and, if necessary, anchor points, must be preassembled for the terminal boxes (see chapter 2.5). Anchor points cannot be mounted subsequently.



NOTE!

All sharp edges must be deburred!

Heating Wire for Insulated Conductor Rail

SinglePowerLine Program 0812

2.2 Assembly work steps for the conductor rail 0812

Work steps:

→ Hang the conductor rail sections with distance (allow sufficient space for inserting the 0812 connectors) into the mounted hanger clamps (see Fig. 5).

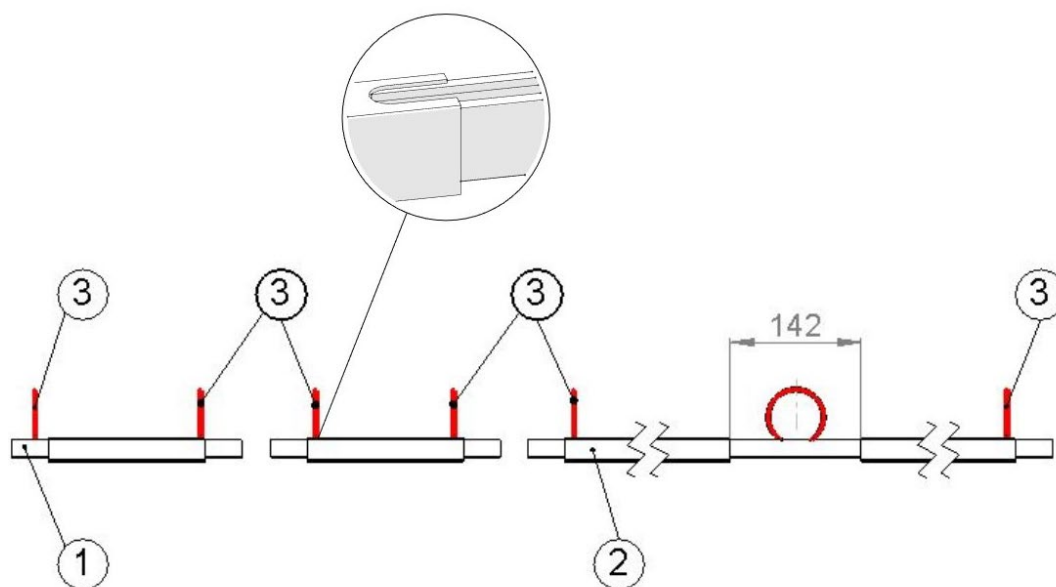


Fig. 5: Conductor rail 0812 without mounted connectors with overview of possible feed points of the heating wire

Item	Description
1	Conductor rail
2	Insulation profile
3	Possible feed points of the heating wire along the track or at the end

→ Drill the insulating profile (Ø 10 mm) (see Fig. 6 and Fig. 7).



Do not drill into the conductor rail!

→ Cut a 15 mm slot on both sides up to the drill hole (see Fig. 8).

→ Clean conductor rail and deburr insulating profile.

Mounting Instructions



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

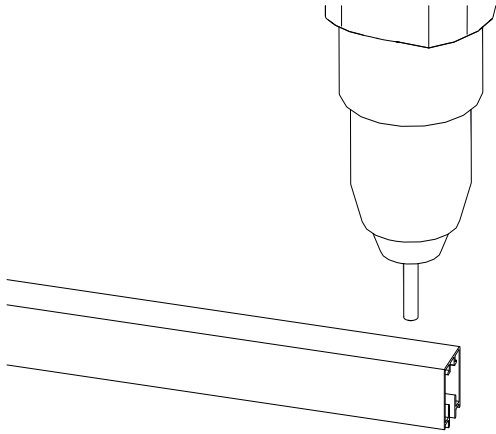


Fig. 6: Drill hole for recess in the insulating profile

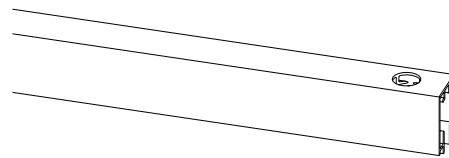


Fig. 7: Hole for recess is drilled

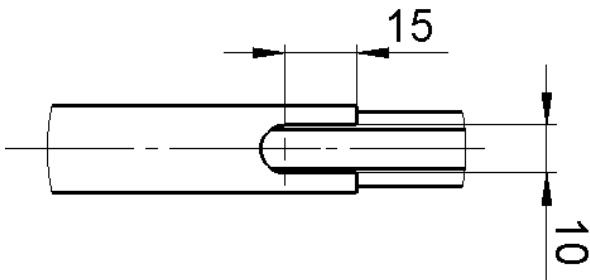


Fig. 8: Cut hole for slot up to the drill hole

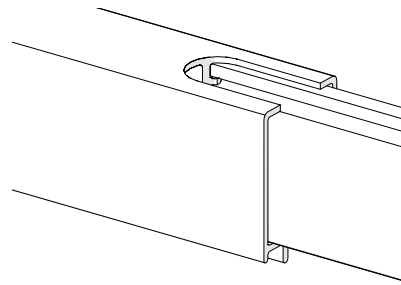


Fig. 9: Recess in insulation profile for heating wire

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Two expansion loops are to be installed at each of the **expansion points of the heating wire** (\varnothing 60 mm) (see Fig. 11). For this purpose, a stripped rail section (142 mm) must be manufactured for each position (see Fig. 12).

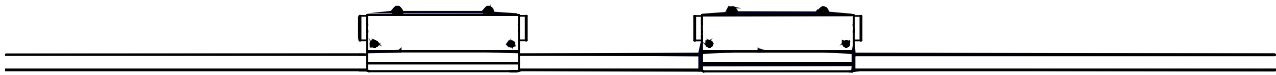


Fig. 10: Expansion unit 0812 (delivery status)

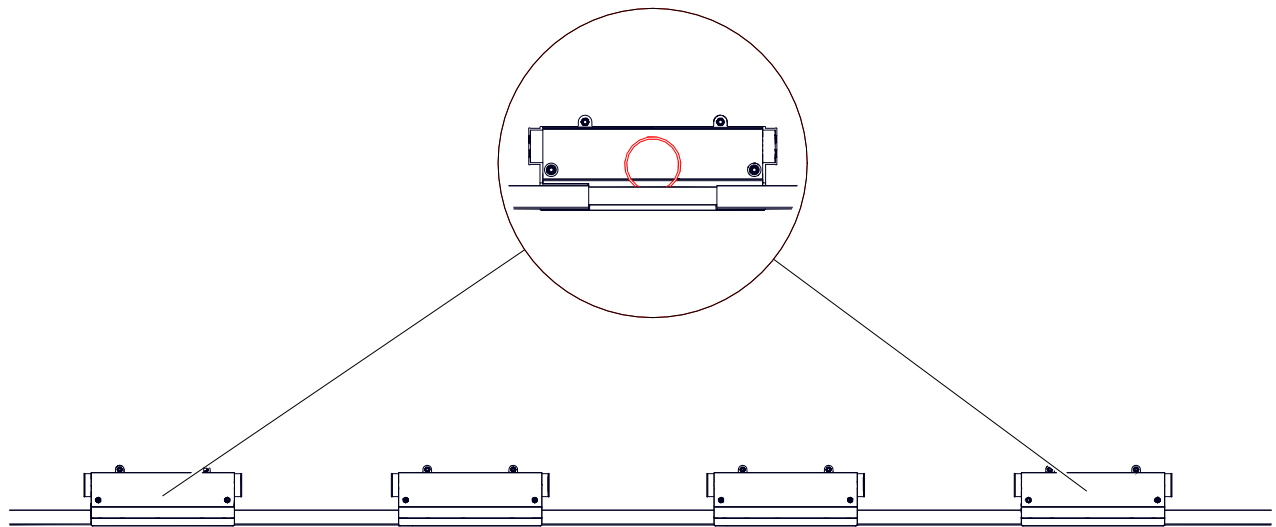


Fig. 11: Expansion unit 0812 with additional expansion points of the heating wire (order number: 08-V001-0570)

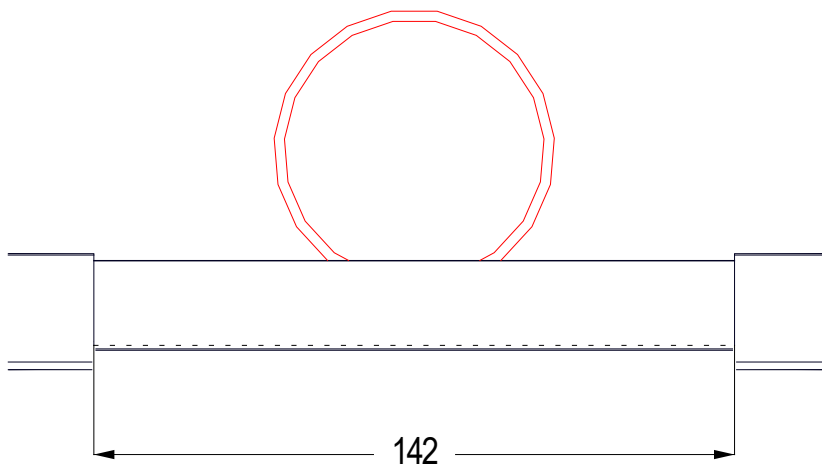


Fig. 12: Stripped conductor bar with expansion loop of the heating wire

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

→ Observe the notes in the operating instructions (BAL0812-0001) for the conductor rail system 0812, if conductor rails must be shortened on site.



NOTE!

Burrs damage the insulation of the heating wire!

Deburr all edges well.

At the point where the heating wire is located (A in Fig. 13) and the contact surface for the sliding contacts (B in Fig. 13), the edges must be free of burrs! Absence of burrs on the edges must be maintained for all conductor bars and insulation profiles.

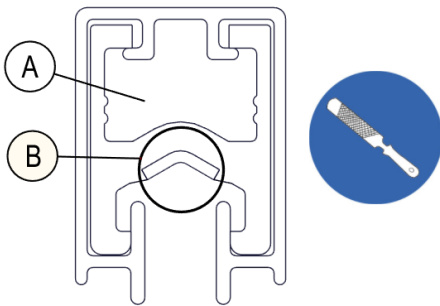


Fig. 13: Deburr conductor bar and insulation profile

As soon as the preparatory assembly work steps of the conductor rail 0812 (see Fig. 5) have been completed, the assembly of the conductor rail heating can be started (see chapter 2.3).

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.3 Assembly work steps for the conductor rail 0812



Fire hazard or destruction of the conductor rail system!

Disregard of/deviation from a correct connection of the heating wires can lead to the destruction of the conductor rail system (e.g. fire/burning/fusing/short-circuit) or to a functional failure of the conductor rail system.

- Connect heating wire appropriately.
- Ensure correct heating wire length and type (Ω/m) according to the project planning or the heating wire layout plan.
- Operate the heating wire with provided voltage/power.

2.3.1 Insert heating wire

Prerequisite:

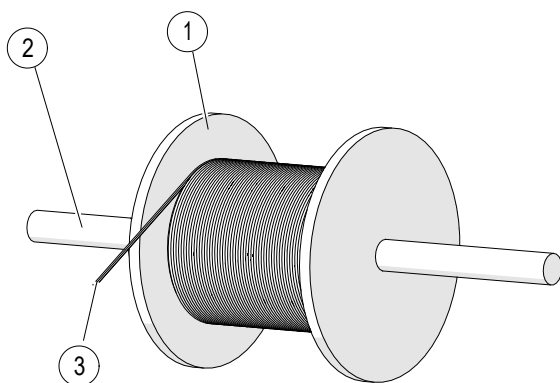
- At least two skilled workers are required for these working steps.
- Do not unwind the heating wire beforehand but pull it in directly from the spool.
- Hanger clamps are already mounted.

Required tool:

- On-site axle for the suspension of the spool ($\text{Ø}35 - 50 \text{ mm}$)
- Metal file (needle file)

Work steps:

- Place the spool with the wound-up heating wire near the infeed of the heating wire by means of an on-site axle for the suspension (item 2). (see Fig. 14).



Item	Description
1	Spool
2	On-site axle for suspension of the spool (approx. $\text{Ø} 35 - 50 \text{ mm}$, stated dimensions may deviate)
3	Heating wire

Fig. 14: Wound up heating wire with suspension

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812



NOTE!

Observe the heating wire layout plan!

For the assembly of a new heating wire, carry out the following work steps:

- Wind the end of the heating wire from the spool (see Fig. 15) and at the feed point of the heating pull it through the cavity of the insulating profile straight to the next feeding point, before mounting the 0812 connectors and the 0812 infeeds (see chapter 2.3.2) (see procedure/organization of the insertion process).



NOTE!

When inserting the heating wire (see Fig. 16) ensure that the heating wire is not pulled over sharp metal edges (e.g. in the cavity of the conductor bar). The upper groove/indentation of the insulating profile can ideally be used here as an insertion aid (see Fig. 17), since the heating wire will not be damaged here when being contacted. It should be inserted at a flat angle, if possible.



WARNING!

Replace damaged heating wire!

If an existing heating wire is damaged, it must be replaced. For this, the damaged heating wire must be dismantled, and a new heating wire must be mounted or partially replaced (e.g. by crimping).

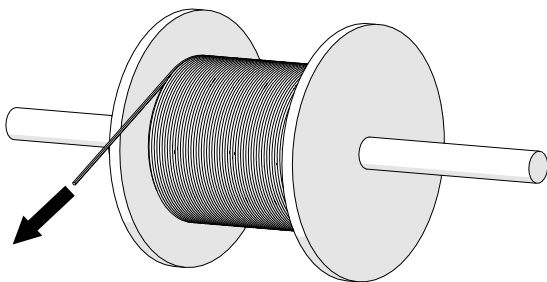


Fig. 15: Unwind heating wire end from the spool

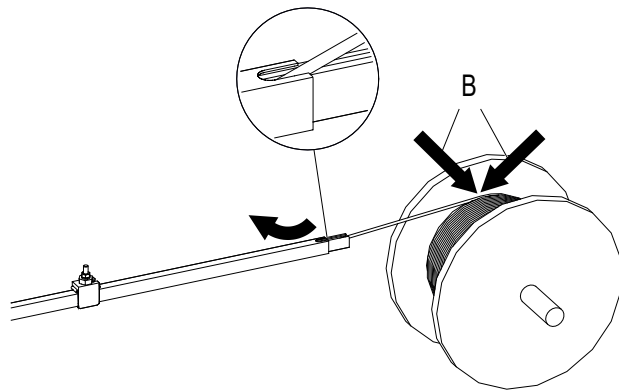


Fig. 16: Insert the heating wire from the spool into the insulating profile at a flat angle. Decelerate the unwinding speed from the spool manually in a controlled manner (B).

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

The following must be observed when inserting the heating wire:

- Pull off the heating wire straight and steadily. Keep the heating wire under a constant and light tension, do not pull it off too quickly or jerkily.
- No formation of loops.
- Avoid high tensile strengths acting on the heating wire.
- Avoid bending and crunching of the heating wire.
- Do not pull the heating wire over sharp edges.
- Avoid a too tight bending radius at the heating wire.
- Insert the heating wire manually in a flat angle. Decelerate the heating wire and the spool step by step (B in Fig. 16), to avoid the formation of loops.
- Use indentation/groove in the insulating profile as guidance, if possible (see Fig. 17).

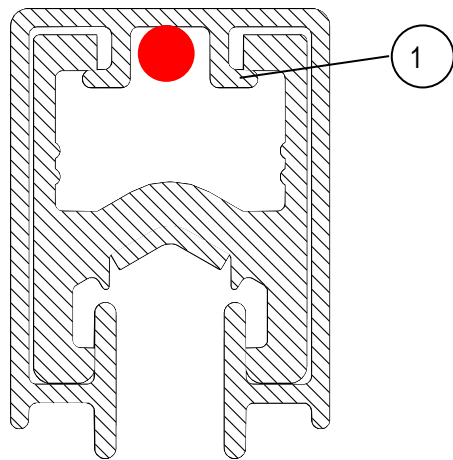


Fig. 17: Position of the heating wire during the insertion process

1 = Indentation/groove in the insulating profile

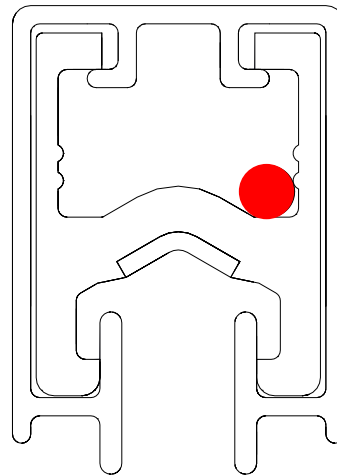


Fig. 18: Position of the heating wire after the insertion process

Assembly without air gap insulation section and expansion point

- Let the heating wire project by 500 mm at the beginning and at the end (infeed) (see chapter 2.3.3).

Assembly with expansion point:

- Let the heating wire project by 1 m at the beginning and at the end (see chapter 2.3.4). For each expansion unit within a heating wire circuit, it is required to add 500 mm of additional material.

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Procedure / Organization of the insertion process:

- One person (1) pushes the heating wire through the cavity of the insulating profile, while the second person (2) takes and holds the pulled-through end of the heating wire at the conductor rail end. Lead the heating wire through the cavity of the first rail section. While inserting the heating wire, ensure that it is carefully and evenly pulled from the spool, so that no loops or bends will be formed (see note on page 22 and Fig. 16).
- At the next rail section, person (2) takes the heating wire end from the end of the first rail and continues to insert the heating wire through the conductor rail. This ensures that there is a slight constant pull on the heating wire during the insertion, so that no jerky tensile forces may be generated at the spool.
- Connect the two rail sections using the 0812 connector (see chapter 2.3.2).
- During the entire insertion process of the heating wire, person (1) stays at the beginning of the conductor rail at the spool and observes the careful unwinding from the spool section by section. Thereby he inserts the heating wire via the insulation (see Fig. 16 and Fig. 17) with slight tensile stress and at the same time decelerates the spool, to prevent the heating wire from unwinding by itself. This is especially to avoid the formation of loops.
- In the case of long and/or unclear conductor rails, an additional person (3) may give support as a coordinator between the other two persons (1 and 2) (if necessary, by radiotelephony).
- Mount the other rail sections in the same way (see heating wire layout plan).

Heating Wire for Insulated Conductor Rail

SinglePowerLine Program 0812

2.3.2 Mount the heating wire in the connector 0812 or the infeed 0812

→ After the heating wire has been installed through the connecting point (see chapter 2.3.1), mount the connector or the infeed of the conductor rail as described in the documentation of the conductor rail system 0812 (see BAL0812-0001).



The heating wire must not be damaged during the installation!

Connectors and infeed are bottlenecks for the heating wires, therefore special care must be taken during installation.

Check that the clamping plates (2) are free of burrs before screwing them on and deburr them, if necessary. When screwing on the clamping plates (2) at the connector and the infeed, ensure that the heating wire (1) is not jammed, but can be moved smoothly and freely.

Position of the heating wire in connector and infeed see Fig. 19 and Fig. 20.

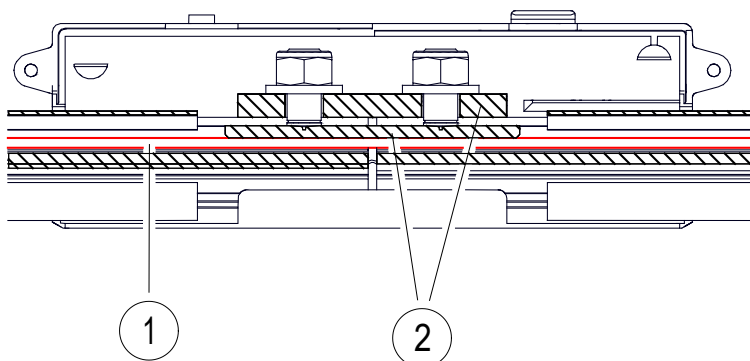


Fig. 19: Position of the heating wire in the 0812 connector

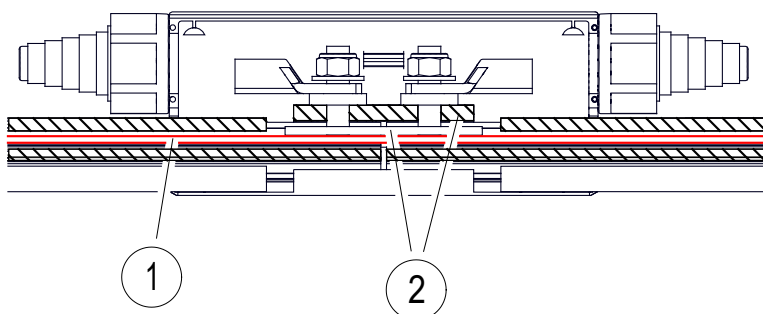


Fig. 20: Position of the heating wire in the line feed 0812

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.3.3 Heating wire in the expansion unit 0812



The heating wire must not be damaged during the installation!

During the installation of the expansion unit 0812, ensure that the insulation of the heating wire (1) is not damaged. Check that the clamping plate (2) is free of burrs before screwing and deburr, if necessary.

The heating wire (1) is located below the clamping plate (2) (see Fig. 21) and below the expansion gap (0-25 mm) of the expansion point. The heating wire must not have any bends, especially at this point, to ensure free sliding over the expansion gap.

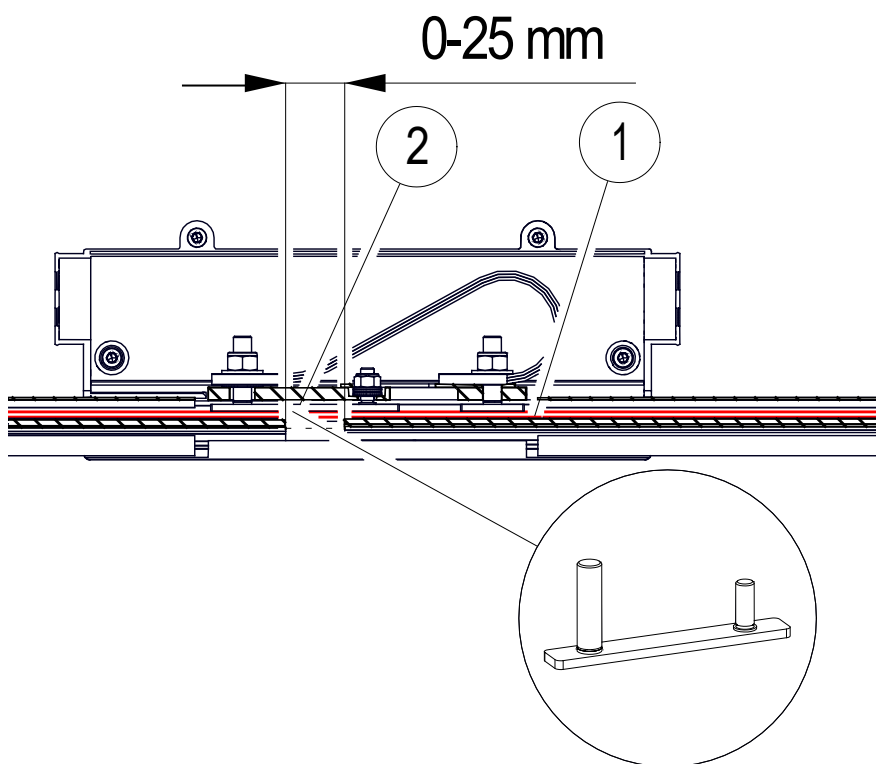


Fig. 21: Position of the heating wire (1) in the expansion unit 0812

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.3.4 Mount expansion point for heating wire

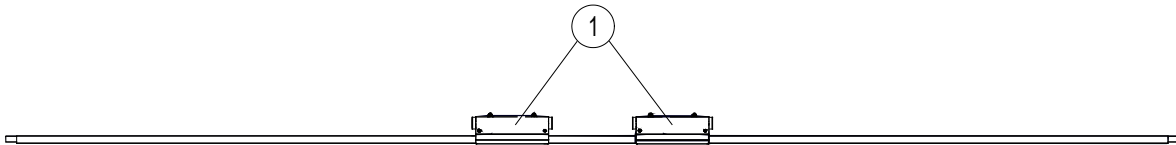


Fig. 22: Expansion unit 0812

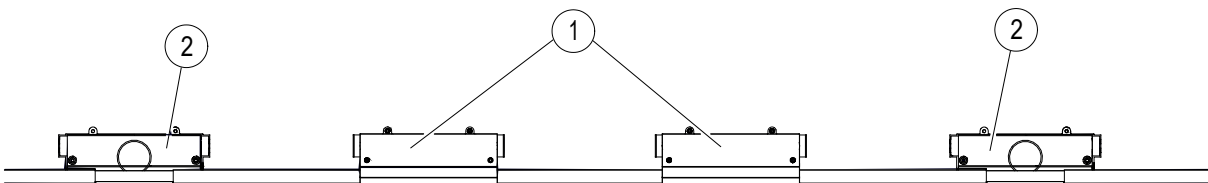


Fig. 23: Expansion unit 0812 with expansion point of the heating wire

Long systems require expansion units according to the project planning. If an expansion unit is required, compensation movements of the heating wire must be considered as well. The supplied expansion units of the conductor rail contain two expansion points (item 1) with 25 mm expansion distance each (see Fig. 21) for the conductor rail system 0812 (see Fig. 22), while the expansion of the heating wire is realized via to expansion loops (item 2) (see Fig. 23). For this purpose, each built-in expansion unit of the conductor rail (item 1) shall be provided at the left and the right with an expansion loop (item 2) with caps at the expansion point of the heating wire (see Fig. 28 and Fig. 23). For the installation of the expansion loop (item 2), the insulation profile must be interrupted to a length of 142 mm (see Fig. 12 and Fig. 24).

On shorter systems, the possible compensation movement by the loop of the cold connection cable at the end feed is sufficient. To compensate the expansion of the conductor rail here as well, the heating wire must be laid without tensile stress, i.e. loosely and slackly.

Observe the following dimensions for the assembly:

Position of the heating wire expansion point to the expansion unit 0812:	min. 350 mm – max. 800 mm (see Fig. 24)
Distance of the cap for the expansion point of the heating wire until the next hanger clamp:	250 mm (see Fig. 25)
Length of the stripped conductor bar:	142 mm (see Fig. 12)

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

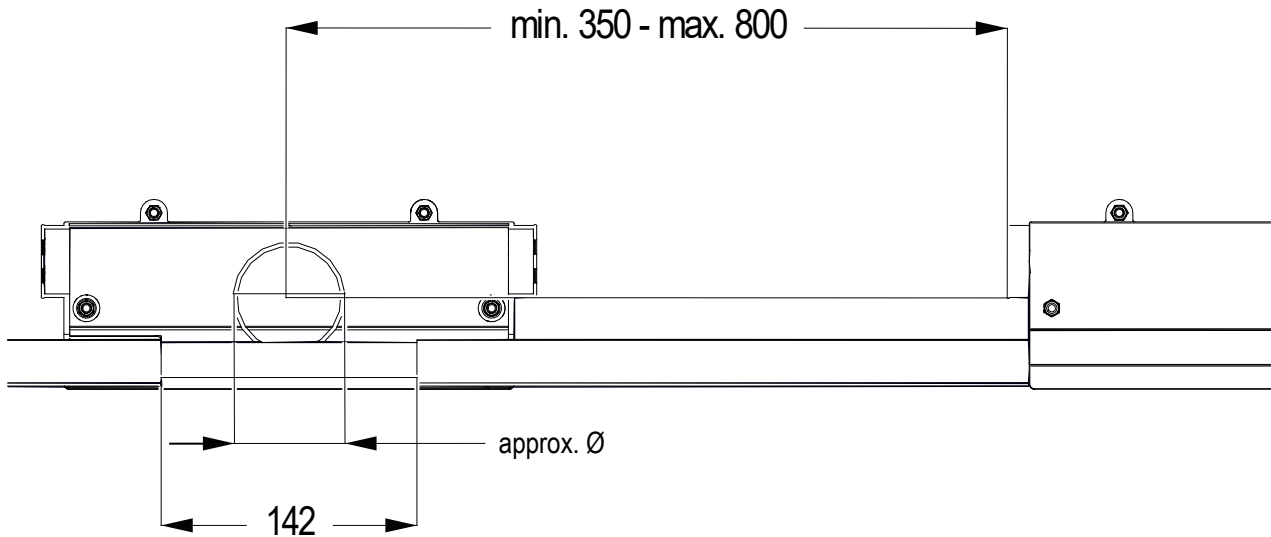


Fig. 24: Distance from the expansion point of the heating wire (expansion loop) to the cap of the expansion point of the conductor rail system 0812

The minimum distance between hanger clamp and components that are able to move due to expansion, such as connectors, pick-up guides, air gap insulation sections etc., is 250 mm (see KAT0812-0002)! Especially infeeds require a larger distance so that the compensation movement is not blocked by the cables.

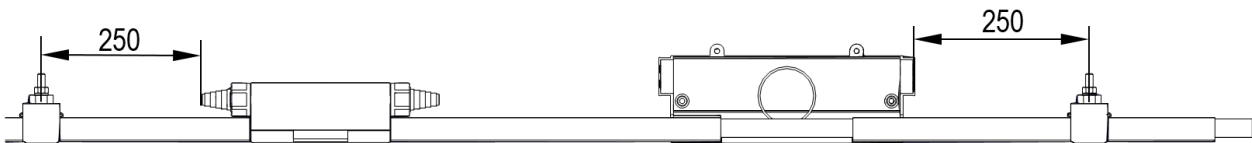


Fig. 25: Distance between the cap of the expansion point of the heating wire until the hanger clamp

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Work steps:

- Pull the heating wire through up to its feed-out point. The expansion loop (see Fig. 27) can only be formed after the heating wire has been pulled through completely. Especially in the 25 mm expansion area of the conductor rail system 0812 the heating wire must be laid straight and without bends (see chapter 2.3.3 and Fig. 21), so that it can move freely and not get jammed.



NOTE!

To make it easier to remove the heating wire from the conductor bar later and to form the expansion loop, Conductix-Wampfler recommends to put a tape (e.g. insulating tape) underneath at the expansion point before inserting the heating wire.

- Ensure that there is enough heating wire projecting at the beginning and end of the system. When using expansion elements, the heating wire must project by 1000 mm at both ends (see Fig. 26). From the 4th expansion unit, add 500 mm for each.



Fig. 26: Heating wire projects 1000 mm at the end

- At the expansion point, lead the heating wire out of the conductor rail in a spiral (with a diameter of approx. 60 mm) and fix it temporarily with cable ties so that the loop cannot come loose in the further course of the assembly. Remove again after completion of the assembly and before commissioning.

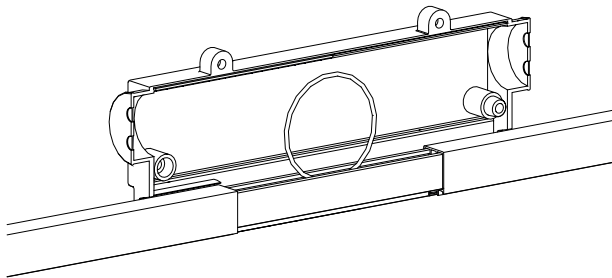


Fig. 27: Cap for the expansion point of the heating wire

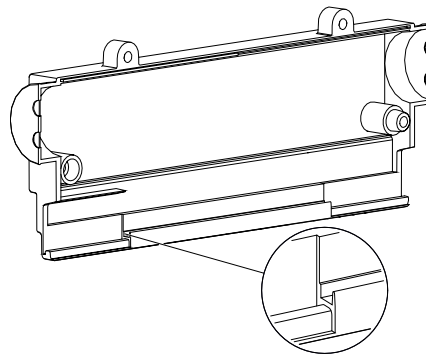


Fig. 28: Cap half with arrester

- Do not mount the caps of the expansion unit (analogous to the connector cap assembly, see BAL0812-0001) before the cold connection cable at the heating wire feed-in and feed-out has been strain-relieved (for the further procedure regarding the crimping of the heating wire, see chapter 2.4). The insulating profile ends serve as an arrester (see Fig. 28) for the caps for the expansion point of the heating wire and fix those on the conductor rail.

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.3.5 Mount the infeed of the heating wire

There are 2 types of infeed:

- along the conductor rail (line feed) (see Fig. 29) or
- at the end of the conductor rail system (end feed) (see Fig. 30).

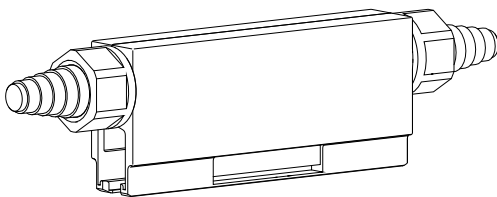


Fig. 29: Line feed (order number: 08-E015-0635)

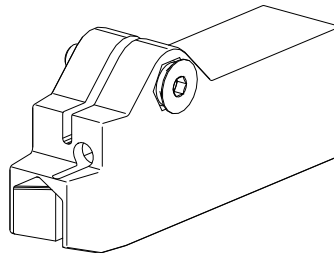


Fig. 30: End cap for end feed (order number: 081272-2)

2.3.5.1 Line feed

Prerequisite:

- Heating wire is inserted up to the feed point (see chapter 2.3.1)
- Recess in the insulating profile of both conductor rails is existing (see chapter 2.1)
- The rails to be connected are clipped into the hanger clamps

Work steps:

The heating wire must not be damaged during the assembly!



- The recess in the insulating profile must be deburred.
- Check that the plate for the heating wire infeed is free of burrs and rework it, if necessary (see Fig. 31).
- The heating wire must not be jammed.

→ Crimp the heating wire ends with the cold connection cable as described in chapter 2.4. To ensure that the crimp connection is in the correct position in the conductor rail, the work steps described in chapter 2.4.1 must be carried out.

→ After having crimped the heating wire with the cold connection cable (item 3), mount the connector (item 1), the plate for the heating wire infeed (item 2) and the strain relief (item 4). The marking (M) must be in contact with the plate (item 2) (see Fig. 31). In particular, the plate (item 2) must be checked to ensure that it is free of burrs and deburred, if required.

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

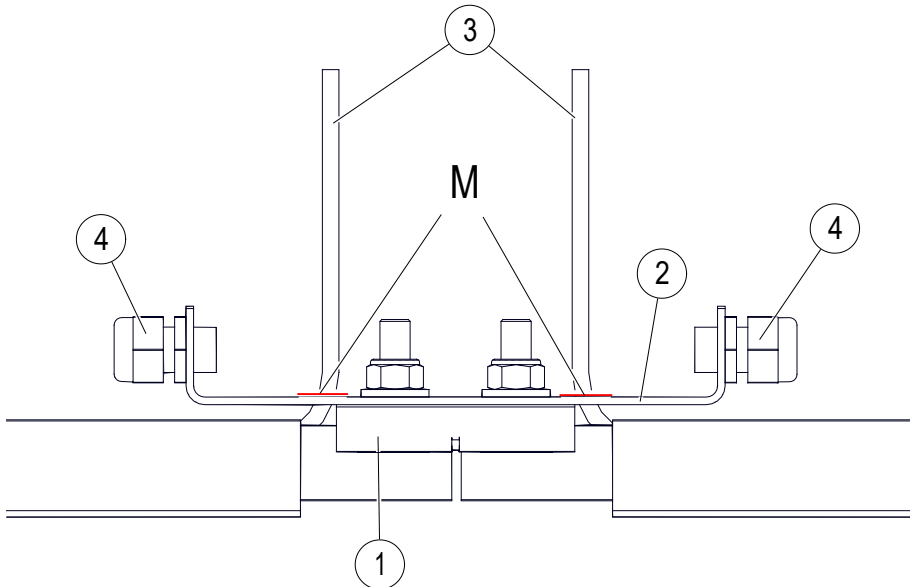


Fig. 31: Heating wire infeed

→ Pull the cold connection cable through the strain relief (item 1) and tighten it. Observe the minimum bending radius of $3 \times d$ ($\varnothing 4.4\text{mm}$) (see Fig. 32).

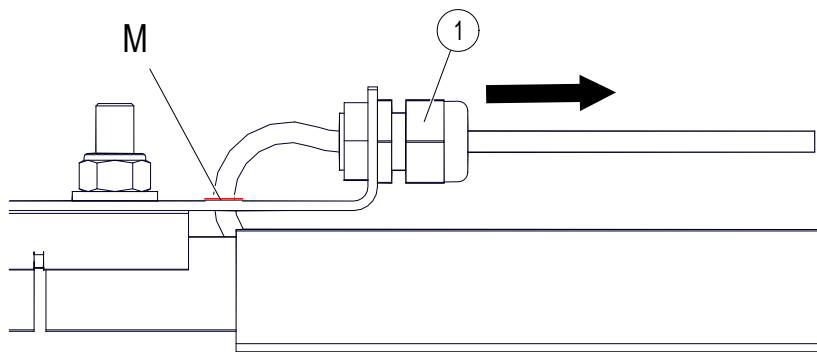


Fig. 32: Pull the cold connection cable through the strain relief (item 1)

Mounting Instructions



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

→ Clip the two cap halves (item 2) together (see Fig. 33 and Fig. 34).

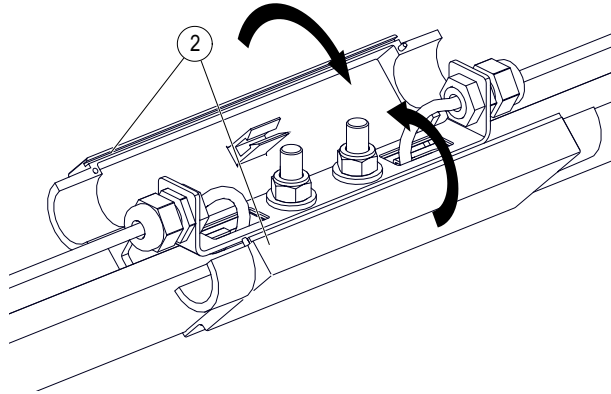


Fig. 33: Clip the two cap halves together

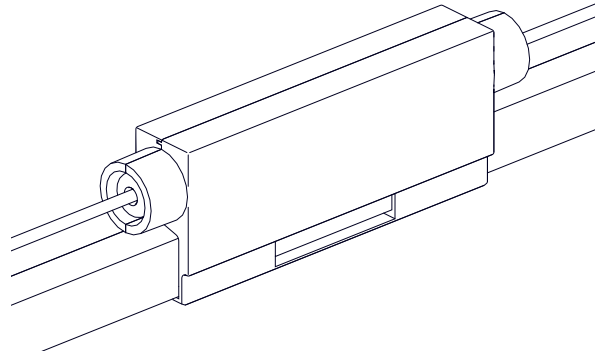


Fig. 34: The two cap halves without cap nut and grommet

→ Cut open the grommet (item 4) to be able to thread the cold connection cable. Mount the cap nut (item 3) and the grommet (item 4) (see Fig. 35).

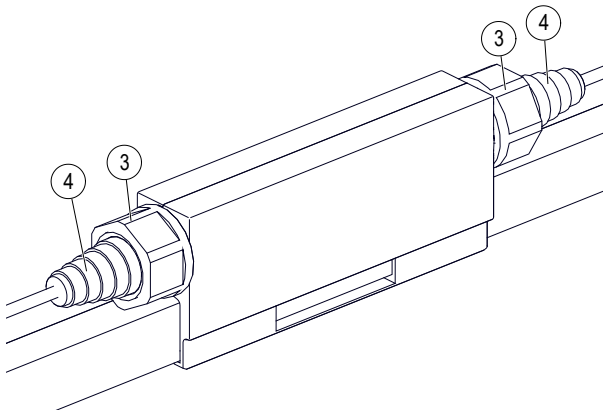


Fig. 35: Grommet (item 4) and cap nut (item 3) are mounted

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

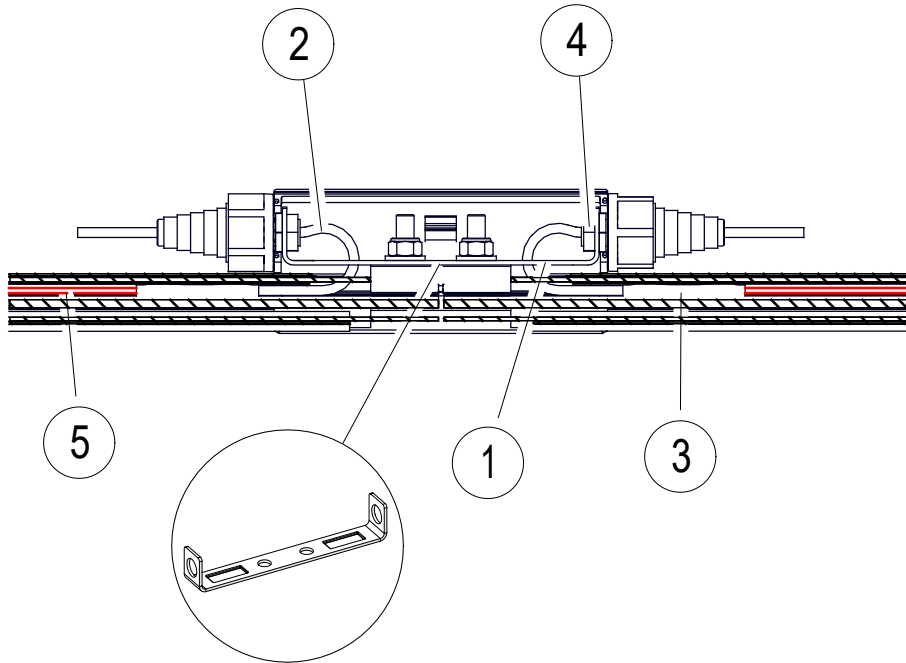


Fig. 36: Line feed with heating wire

Item	Description
1	Plate for the heating wire
2	Cold connection cable
3	Crimp connection
4	Strain relief
5	Heating wire

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.3.5.2 End feed

There are two end feed options:

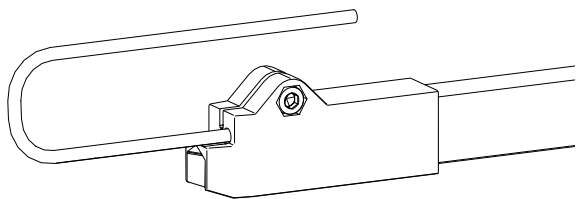


Fig. 37: End feed without strain relief
(order number: 081272-2)

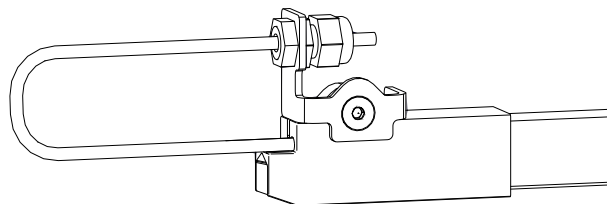


Fig. 38: End feed with strain relief
(order number: 08-E012-0438)

Prerequisite:

- Conductor rail end must be free of burrs. Deburring may be required (see Fig. 9 and Fig. 39).
- Heating wire projects by approx. 100-150 mm or 1000 mm when using expansion units (see chapter 2.3.4)

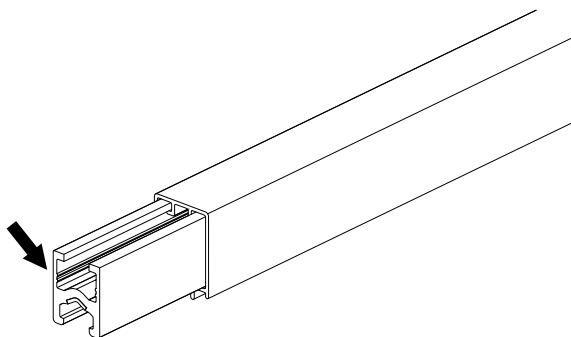


Fig. 39: Conductor rail end must be deburred

Work steps:

- Crimp heating wire with cold connection cable as described in chapter 2.4. To ensure that the crimp connection is in the correct position in the conductor rail, the steps described in the following chapter 2.4.1 must be followed.
- Pull the already crimped heating conductor through the hole in the end cap. Carefully push the end cap onto the rail end with light hammer blows, taking special care not to damage the heating wire. Then tighten the clamping screw of the end caps so that the end cap has a tight fit on the rail end (see BAL0812-0001).

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812



The cold connection cable must not get jammed in the end cap!

- It must be checked if the end cap and cold connection cable have got jammed!
- The cold connection cable must still be free to move. Always pull carefully at the cold connection cable so that the crimp connection is not destroyed.

→ Relieve the cold connection cables from strain.

- The cold connection cables are led loosely out of the end cap without further fixation. For the end cap with order number: 081272-2, the cable gland on the terminal box (see chapter 2.5.3) assume the task of the strain relief.
- For the end cap with strain relief (order number: 08-E012-0438), the cable glands assume the function of the strain relief.

After the strain relief, the marking (M) at the outer edge of the end cap must be visible and the bend projection of the cold connection cable at the end cap should be approx. 50 mm. (see Fig. 40). Ensure that no cables enter the range of movement of the consumers or other moving parts.

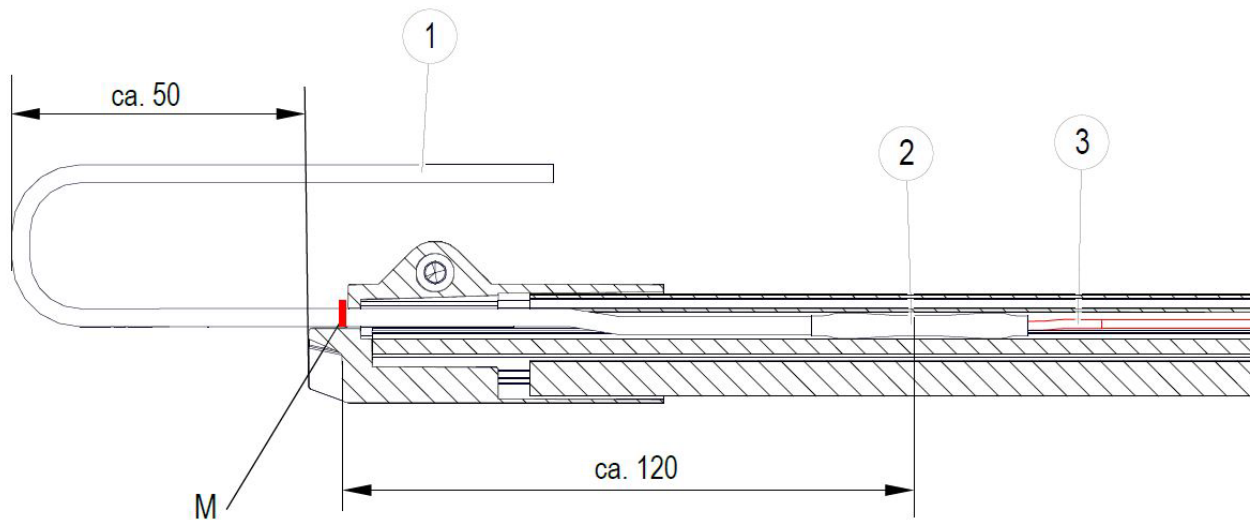


Fig. 40: Overview of the crimp connection and bend projection of the cold connection cable at the rail end

Item	Description
1	Cold connection cable
2	Crimp connection
3	Heating wire
M	Marking

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.4 Crimp heating wire and cold connection cable

Required tools:

- Side cutter
- Crimping tool for insulated heat-shrink crimp (e.g.: Klauke K 82)
- Battery-powered screwdriver
- Cutting tool
- Wire stripper
- Industrial hot air blower (min. > 90 ° C)
- Pen (red or white) for marking

Required material (scope of delivery):

- 1 heat-shrink crimp DR 1 (red)
- Cold connection cable: Cable 1x1.5 mm², first insulation Ø2.8 mm, outer sheath Ø4.4 mm, minimum bending radius is 3xd for permanent installation
- 55 mm heat-shrink tubing
- Heating wire

For the connection to an electrical power supply, the heating wire ends must be crimped with cables, the so-called cold connection cables. These lead into the electrical terminal boxes in which they are connected.

Mounting Instructions



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Prerequisite:

- The infeed was mounted, as described in chapter 2.3.4.



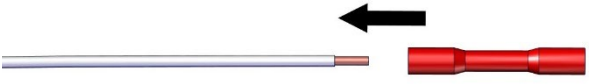

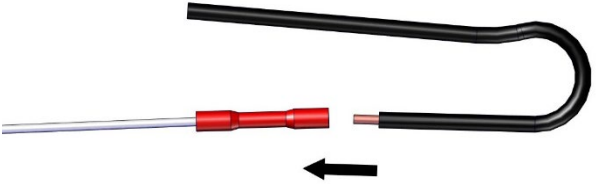

Risk of injury due to insufficient qualification!

Improper use can result in serious injury to people and property damage.

→ All activities must only be performed by qualified personnel.

Work steps:

- Cut heating wire to 500 mm on one side.
- Apply crimping at the first end. Carry out the following work steps:

<ul style="list-style-type: none">→ Strip the heating wire and the cold connection cable to 7 mm.→ Push the heat-shrink crimp DR 1 (red) onto the stripped heating wire end (see Fig. 41).	 <p>Fig. 41: Push the heat-shrink crimp onto the stripped heating wire end</p>
<ul style="list-style-type: none">→ Use a crimping tool (e.g. Klauke K 82) to clamp the shrink-heat crimp (see Fig. 42).	 <p>Fig. 42: Heat-shrink crimp is crimped with the heating wire</p>
<ul style="list-style-type: none">→ Push the stripped end of the cold connection cable onto the other end of the heat-shrink crimp and clamp it with a crimping tool (e.g. Klauke K 82) (see Fig. 43 and Fig. 44).	 <p>Fig. 43: Insert the stripped end of the cold connection cable into the heat-shrink crimp</p>  <p>Fig. 44: Cold connection cable is crimped with the heat-shrink crimp</p>

Mounting Instructions



Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

- With an industrial hot air blower at approx. > 120 °C, first shrink the position with the heat-shrink crimp (see Fig. 44). When heating up the heat-shrink crimp, the adhesive must run out a little bit to ensure watertightness.
- Then push the heat-shrink crimp over the cold connection cable up to the crimping connector point and also shrink it with an industrial hot air blower at approx. > 120 °C and allow to cool down (see Fig. 45).
- Carefully push back the crimping as described in chapter 2.4.1.



Fig. 45: Heating wire, heat-shrink crimp and cold connection cable

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.4.1 Determine and mark the position of the crimp connection

<p>Positioning the first crimped point:</p> <p>→ Pull the heating wire through up to the feed-out point and let the heating wire project by 100-150 mm.</p> <p>Advice: The length of the heating wire must be designed in such a way that the heating wire can be mounted and still be moved easily.</p> <p>→ When using expansion units, the heating wire must project by 1000 mm on both ends. From the 4th expansion unit, 500 mm must be added for each (see chapter 2.3.4).</p>	<p>Fig. 46: Projecting heating wire end without expansion units</p>
<p>→ Crimp the first heating wire end with the cold connection cable, as described in chapter 2.4.</p> <p>→ At the first crimped end (item 1), mark 100 mm from the center of the crimp connection on the cold connection cable (e.g. with a white pen) (M).</p>	<p>Fig. 47: The first heating wire end is crimped with the cold connection cable (1)</p>
<p>→ Push the crimp connection back into the conductor rail (or pull from the other side) until the marking (M) projects by approximately 20 mm from the insulating profile.</p> <p>→ Connect the cold connection cable, as described in chapter 2.5.</p>	<p>Fig. 48: Marking on cold connection cable</p>

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

Positioning of the second crimped point:

- For segments without expansion loops, the crimping at the second end of the heating wire (item 1) should be made as close as possible (max. 50mm) to the conductor rail end.
- When using expansion units, the heating wire must project by 1000 mm on both ends. From the 4th expansion unit, 500 mm must be added for each (see chapter 2.3.4).
- Perform the remaining steps as described above.

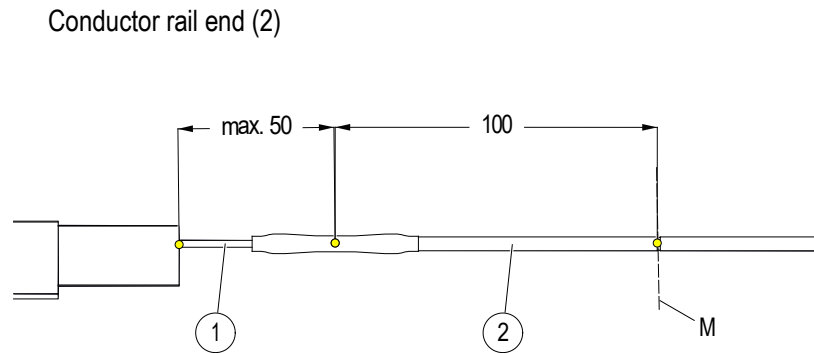


Fig. 49: Second crimped end

Heating Wire for Insulated Conductor Rail

SinglePowerLine Program 0812

2.5 Electrical connection of the heating



DANGER!

Danger of life due to electric shock!

Touching live components may result in death or serious injury from electric shock. There is also a risk of injury due to startle response, falling or being catapult, triggered by electric shock.

- All activities on conductor rails must only be performed by qualified personnel in compliance with the safety rules
- When working on the conductor rail system, disconnect the conductor rail and heating from the power supply, secure them against switching on again and check that they are voltage-free.
- In the case of multiple power feeds and integrated heating wire, switch off all power feeds, secure them against switching on again and check that they are voltage-free.
- Measures must be taken to prevent voltage leak, e.g. when a current collector or vehicle passes over insulation sections and transfer points, and the individual poles must be grounded or short-circuited during the work.
- For systems with heating wire, ensure that the heating is also switched off when the energy side is disconnected.
- In the case of partial lines, such as maintenance lines, segment the heating. When disconnecting the energy side, make sure that the heating system is also disconnected from the power supply.
- As part of the risk assessment of the installation, consider permanently installed monitoring of the heating insulation, if necessary.



WARNING!

Too high voltages will produce failure of the heating system!

- The system-specific parameters (e.g. voltage) must correspond to the project-specific specifications (see heating wire layout plan)!



WARNING!

After short circuits, accidents, and possibly lightning strikes, check the entire system for integrity and full functionality!



WARNING!

After commissioning the system, the following checks must be carried out regularly:

- Regular visual inspection of the connection cables for brittleness due to UV radiation
- Check connection cables for tight fit.
- Regular check of the terminals in the terminal box to see if they have loosened due to vibrations.

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

The following must be observed when connecting the heating wire:



NOTE!

- When connecting the heating wire in the terminal boxes, it is essential to follow the heating wire layout plan supplied with the order.
- Ensure a professional assembly.
- Prior to connecting the heating wire, an insulation measurement according to MV0800-0018 and a continuity test must be performed.
- Ensure that the cables cannot collide with movable components (e.g. current collectors, towing devices, other crane parts).



NOTE!

If the heating wire layout plan is missing, please request it from Conductix-Wampfler!
Observe the cable cross sections of the cold connection cable (1.5 mm²)!

2.5.1 Terminal box

The terminal box can be converted for two different functions by means of the included sealing plugs:

1. Terminal box for **infeeds** of the heating wire for 3 to 5-pole conductor rail designs:

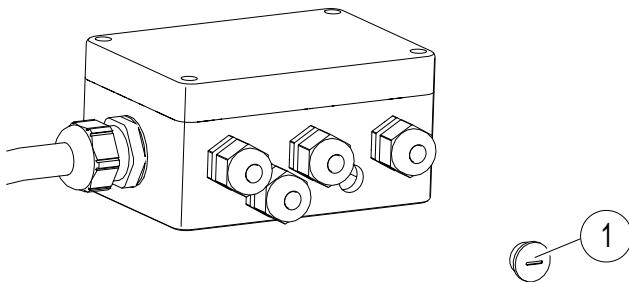


Fig. 50: Example of a terminal box for infeed with sealing plug (item 1)

2. Terminal box for **connections** for 3 to 5 pole conductor rail designs:

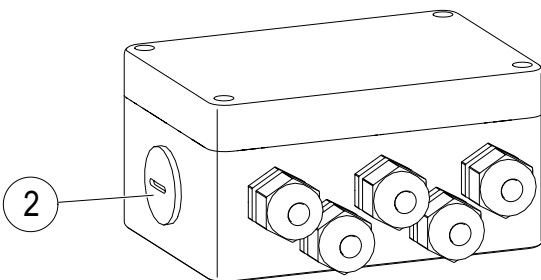


Fig. 51: Example terminal box for connections with sealing plugs (item 2)

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

The terminal boxes (for both variants) are supplied pre-assembled with cable glands for the connection cables. If it is necessary to convert the poles (for example from 5-pole to 3-pole), the enclosed sealing plugs (item 1) must be mounted in the not needed cable gland holes (see fig. 50). The terminal box for connections can be converted into a terminal box for infeeds.

The terminal box is available as a version for on-site fastening to a steel structure, wall, etc. or as a terminal box unit including rail fastening.

2.5.2 Fixation of the terminal box to a steel structure, wall, etc.

If the terminal box (order number: 08010X-5) is mounted to a steel structure, wall or similar, the following dimensions must be observed:

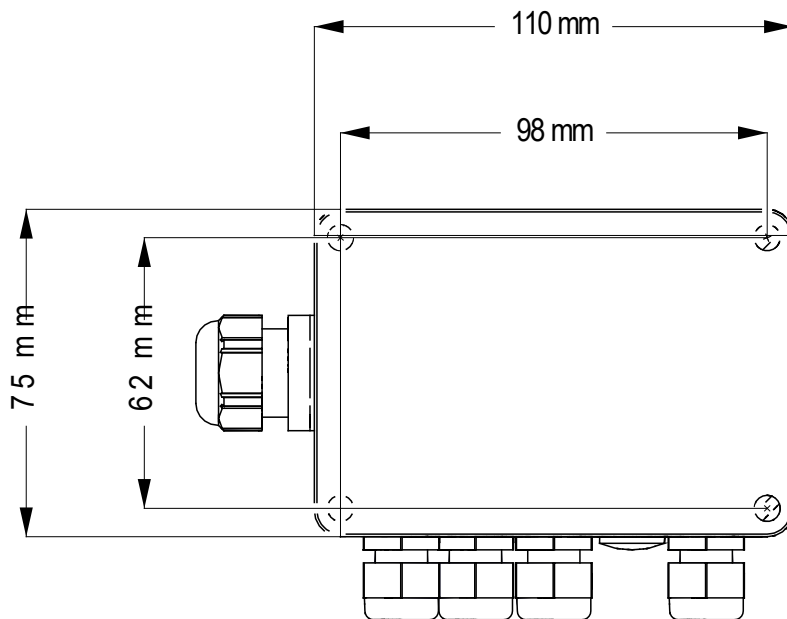


Fig. 52: Drill holes in the terminal box

Heating Wire for Insulated Conductor Rail SinglePowerLine Program 0812

2.5.3 Fixation of the terminal box on the conductor rail

The assembly of the terminal box onto the conductor rail requires the terminal box unit including rail fastening (order number: 08-S261-2813). The terminal box is therefore fixed on a conductor rail pole.

The terminal box unit including rail fastening mainly consists of the following components:

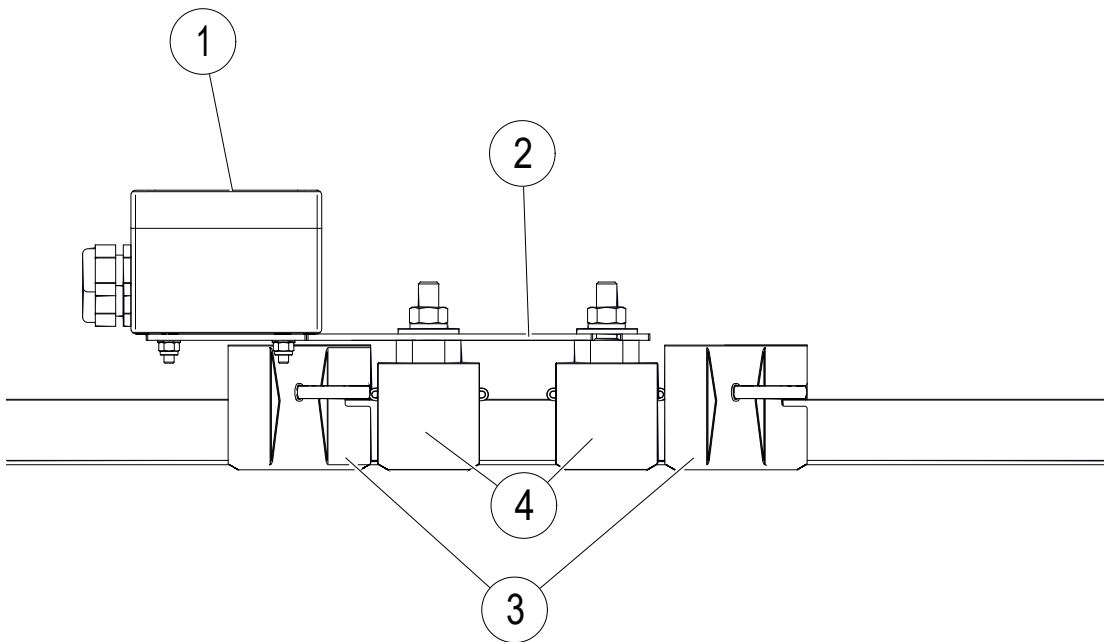


Fig. 53: Terminal box with rail fastening

Item	Description
1	Terminal box
2	Fixation plate
3	Anchor point
4	Hanger clamp

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Work steps:

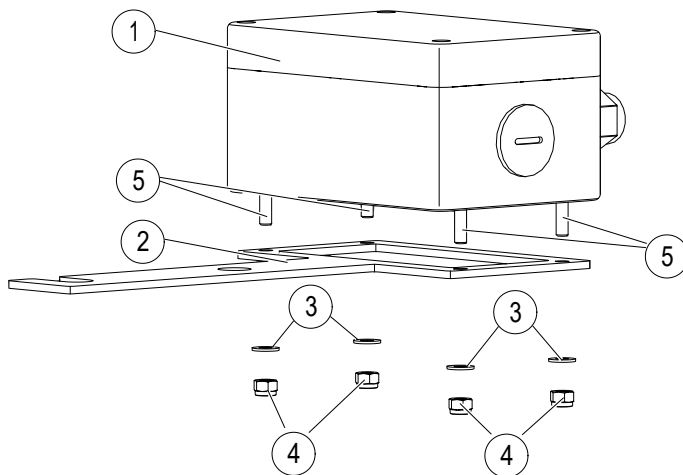
- Determine the position of the terminal boxes depending on the connecting cables (2 m), as close as possible to the line feed (see chapter 2.5.3.1) or at the end feed (see chapter 2.5.3.2) of the heating wire.



NOTE!

The terminal box should be mounted on one of the central poles.

- Mount the terminal box (item 1) onto the fixation plate (item 2) by means of the enclosed screws (item 3, item 4 and item 5) (see Fig. 54).



Item	Description
1	Terminal box
2	Fixation plate
3	Washer DIN125-A4.3-A2
4	Lock nut DIN985-M4-A2
5	Head cap screw DIN912-M4x20-A2

Fig. 54: Assembly of the terminal box on the fixation plate

- Mount the terminal box (item 1) installed on the fixation plate (item 2) onto the conductor rail. A distinction is made between fastening by means of anchor points (see chapter 2.5.3.1) and fastening by means of hanger clamps at the on-site support structure (see chapter 2.5.3.2).
- Connect the cold connection cables in the terminal box according to the heating wire layout plan (see chapter 2.5.4).

2.5.3.1 Fastening by means of anchor points

Fastening by means of anchor points must be selected if the terminal box unit on the conductor rail cannot be fastened to the on-site support structure (e.g. support bracket, support arm or similar) by means of a hanger clamp (item 4a, Fig. 55).

However, to prevent the terminal box from moving on the rail in the area of the infeed, anchor points (item 3) must be mounted around the hanger clamps (see Fig. 55).

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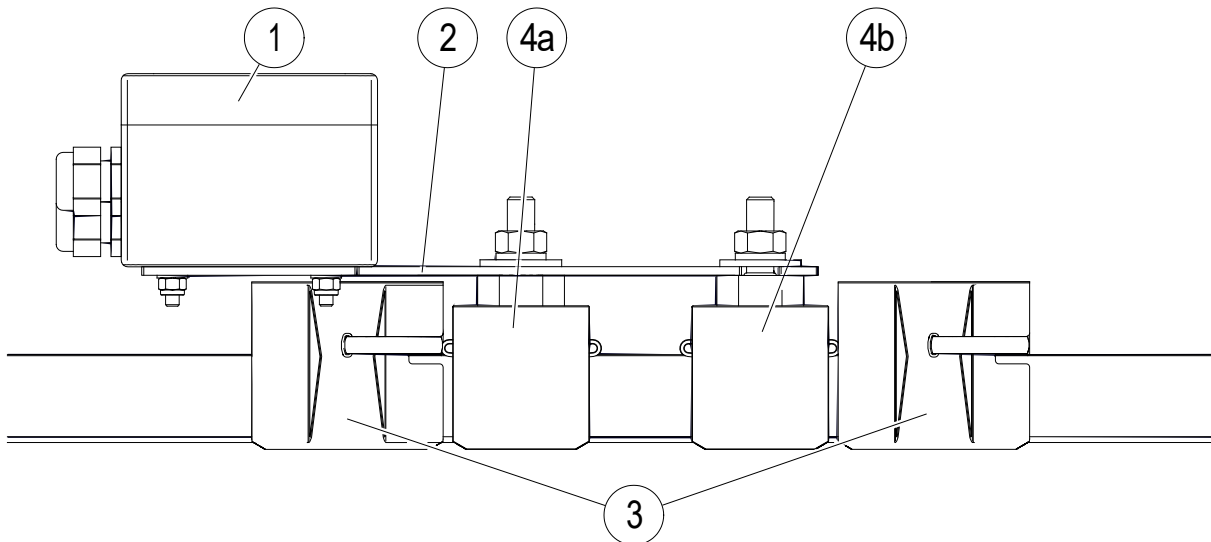


Fig. 55: Terminal box unit including rail fastening

Item	Description
1	Terminal box
2	Fixation plate
3	Anchor points
4a	Hanger clamp
4b	Hanger clamp

Mounting Instructions



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The following dimensions must be observed for fastening by means of anchor points:

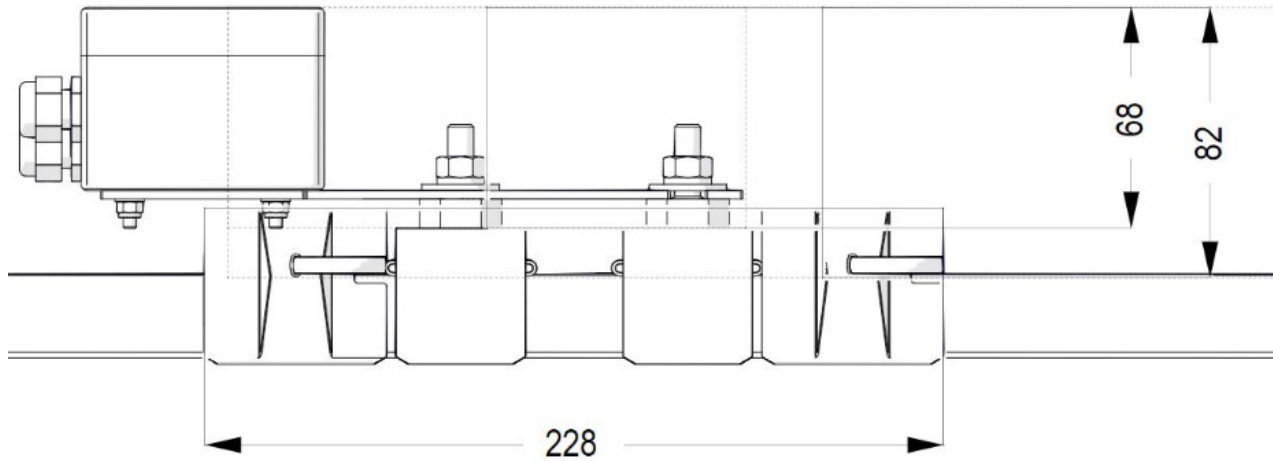


Fig. 56: Terminal box from the side (functional dimensions)

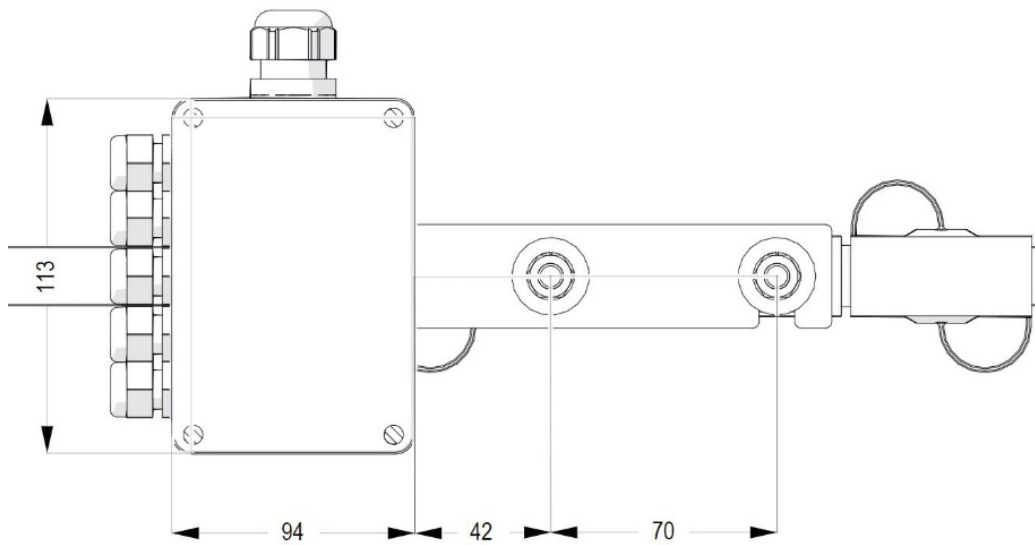


Fig. 57: Terminal box from above (functional dimensions)

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2.5.3.2 Fastening by means of hanger clamps at the on-site support structure

Wherever possible, the terminal box unit should be fastened directly to the on-site support structure (e.g. support bracket; support arm, or similar). This is done via one of the hanger clamps (item 4a, Fig. 58). Therefore no anchor clamps are required (item 3, Fig. 55).

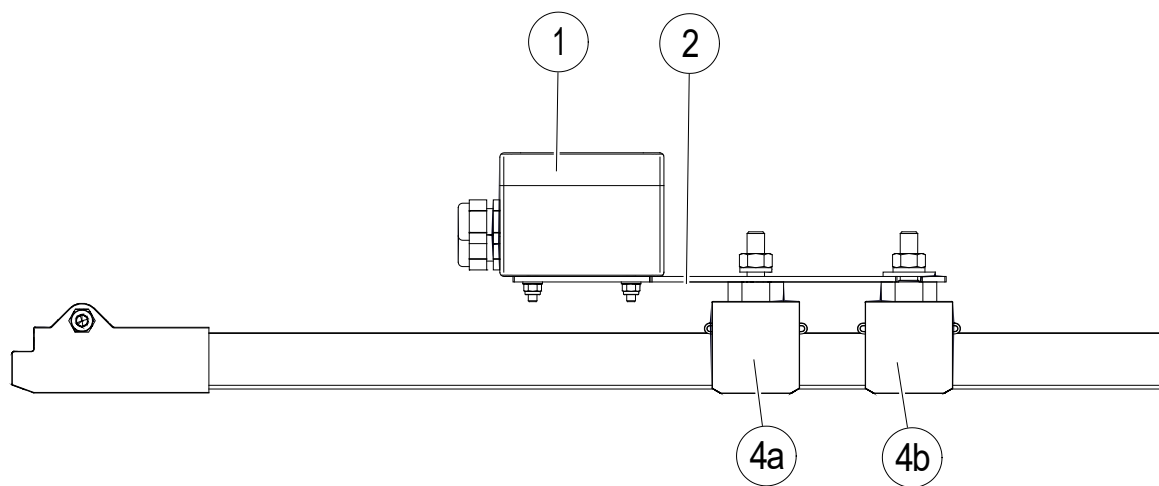


Fig. 58: Terminal box around the end feed (end cap)

Item	Description
1	Terminal box
2	Fixation plate
4a	Hanger clamp
4b	Hanger clamp

The following dimensions must be observed for fastening to an existing hanger clamp:

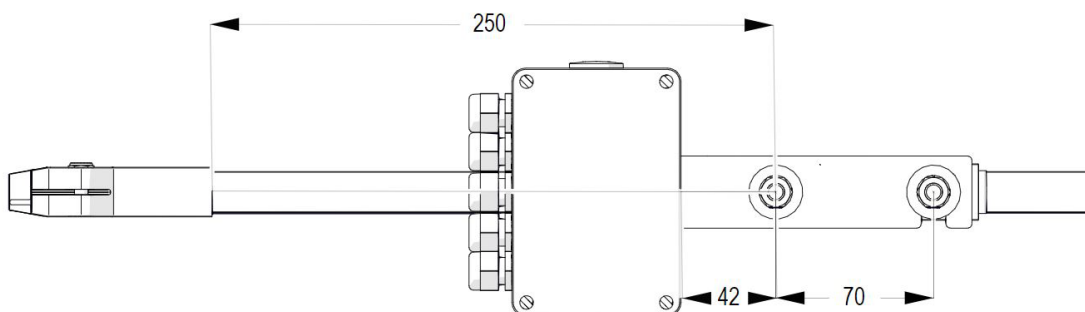


Fig. 59: Terminal box from above (functional dimensions)

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2.5.4 Connecting the connection cable of the terminal box

- For fixation of the conductor rail (see chapter 2.5.3): Fasten the connecting cable of the terminal box in such a way that it can compensate for expansions (e.g. by a loop).
- Avoid a collision with moving components (e.g. current collectors).
- To prevent the formation of water in the terminal box, the connecting cable must be led into the terminal box from below (see Fig. 60). If the sealing plug is not fitted correctly, water may enter into the terminal box through the sealing plug.

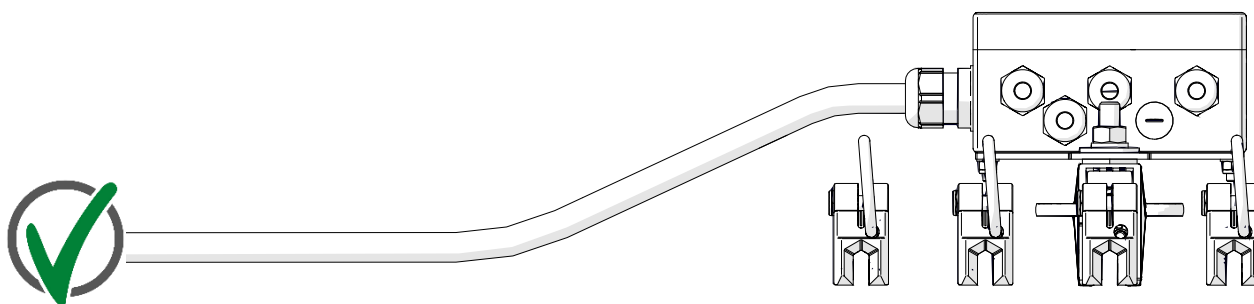


Fig. 60: Connecting cable of the terminal box comes from below (correct)

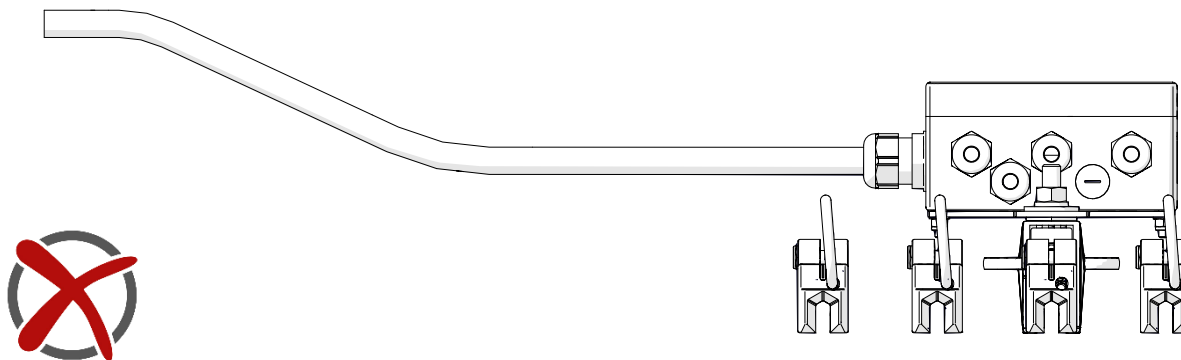


Fig. 61: Connecting cable of the terminal box comes from above (incorrect)

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