

**Insulated Conductor Rail System**

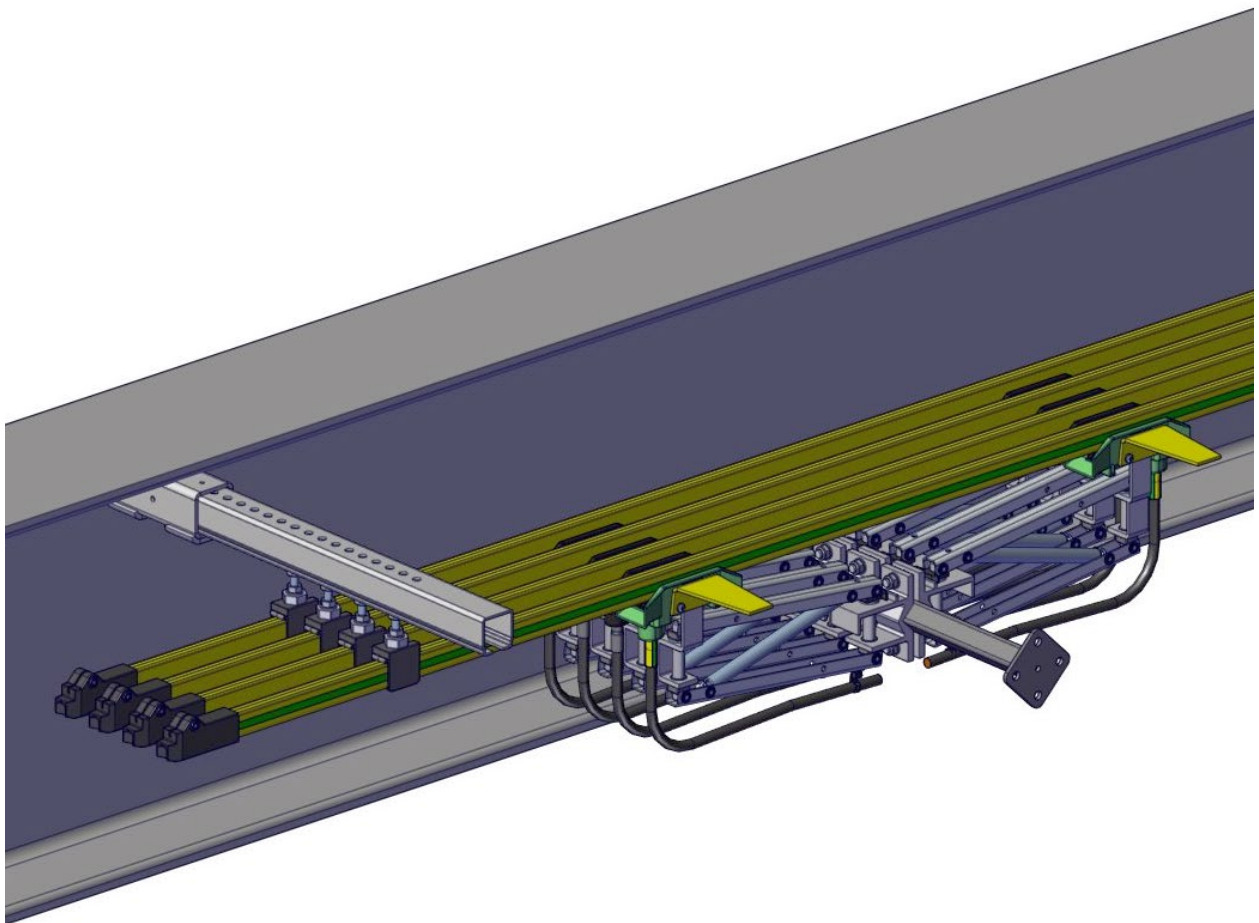
SinglePowerLine Program 0812

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**Order Number:**

0812xx-...

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### SinglePowerLine Program 0812

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## 1 General Information

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### 1.1 About this document

The information provided in this document is designed to enable the Conductor Rail System 0812 to be used safely and efficiently.

This document is a component of the Conductor Rail System 0812 and must be kept accessible to personnel and in close proximity to the Conductor Rail System 0812 at all times. Personnel must read this document carefully and understand it before starting any work. Compliance with all safety and handling instructions provided in this document is a basic requirement for safe working.

Local accident protection regulations and general safety guidelines for the area of use of the conductor rail system also apply.

The illustrations in this document are provided for basic understanding and may deviate from the actual implementation of the product.

In addition to these operator instructions, the instructions located in the appendices for the individual assembled components also apply.

### 1.2 Limitation of liability

All data and information in these operating instructions have been compiled while taking the valid standards and regulations as well as the state of the art and our many years of experience and knowledge into consideration.

The manufacturer accepts no liability for damages resulting from:

- Failure to comply with operator instructions
- Unintended use
- Use by untrained personnel
- Unauthorized modifications
- Technical changes
- Use of unauthorized replacement parts or accessories

The actual scope of delivery may differ from the explanations and descriptions provided here if the model in question is a special one, if additional equipment has been ordered or due to recent technical changes.

The obligations agreed upon in the delivery agreement and our General Terms and Conditions of business apply, as do the delivery conditions of the manufacturer and the legal regulations applicable at the time the contract was concluded.

All products are subject to technical modifications within the context of improvement of function and further development.

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#### 1.3 Copyright

This document is protected by copyright and is exclusively intended for internal use by customers.

Provision of the operating instructions to third parties, reproductions in any form – even in part – as well as the reuse and/or disclosure of their content are not permitted without the written approval of the manufacturer, except for the customer's internal use.

Breach or infringement will result in liability for damages. Our right to further claims remains unaffected.

#### 1.4 Replacement parts



**WARNING!**

**Incorrect replacement parts are a safety hazard!**

Incorrect or faulty replacement parts can impair safety and result in damage, malfunctions or complete failure.

→ Always use original replacement parts from the manufacturer!

Order replacement parts from your contracted dealer or directly from the manufacturer.

Contact information: See the last page of this document.

Replacement parts list: See Section 12.1 Applicable documents.

#### 1.5 Material defects

The terms governing material defects can be found in the General Terms and Conditions of Business.

#### 1.6 Technical support

Our Customer Support staff is available for technical support.

We are also always interested in new information, experiences and feedback from the field that can help us improve our products.

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## 2 Safety Instructions

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### 2.1 Explanation of symbols

Safety and hazard information is identified in these operator instructions using symbols. Safety instructions are introduced by signal words that indicate the degree of the hazard. Always observe safety and hazard instructions, and work carefully to avoid accidents, bodily injury and damage to property!



**DANGER!**

... indicates an immediately hazardous situation, which if not avoided, may result in death or serious injury.



**DANGER!**

... indicates an immediately hazardous situation due to electricity, which if not avoided, may result in death or serious injury.



**WARNING!**

... indicates a possibly hazardous situation, which if not avoided, may result in death or serious injury.



**WARNING!**

... indicates a possibly hazardous situation due to electricity, which if not avoided, may result in death or serious injury.



**CAUTION!**

... indicates a possibly hazardous situation, which if not avoided, may result in moderate or minor injury.



#### **Tips and recommendations:**

... refers to useful tips and recommendations as well as information for efficient and trouble-free operation.



**NOTE!**

... indicates actions that will help you prevent material damage.

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## 2.2 Personnel requirements

### 2.2.1 Qualifications



#### **Inadequately trained persons are at risk of injury!**

Unintended use can result in serious injury to persons and property.

→ All activities must only be performed by qualified personnel.

- Only persons who can be expected to perform their work reliably are acceptable personnel. People whose reactions are impaired by drugs, alcohol or medications, for example, are not authorized.
- 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 operator instructions for certain fields of activity.

#### ■ **Specialist personnel**

Consists of persons capable of performing assigned tasks and independently identifying potential dangers and avoiding hazards based on their specialist training, knowledge and experience as well as their understanding of the applicable standards and 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 conducted by qualified personnel (electricians) according to 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 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/supervisors be scheduled.

#### ■ **Users**

Have been instructed in a training session by the operator with respect to the tasks assigned to them and the potential dangers arising from improper actions.

The operator of the machine or facility must document that the corresponding training has taken place.

#### ■ **Transport personnel**

Trained persons with appropriate training to transport goods safely, who transport the material internally and externally according to safety regulations.



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#### 2.2.2 Unauthorized persons



**WARNING!**

**Hazard due to unauthorized persons!**

Unauthorized personnel who do not meet the requirements described here are not acquainted with the dangers in the working area.

- Keep unauthorized personnel away from the working area.
- In case of doubt, address such persons and direct them away from the working area.
- Stop working as long as unauthorized personnel are in the working area.

#### 2.2.3 Training

Before commissioning the equipment, personnel must be trained by the operator. Log the implementation of training for better traceability.

Example of instruction log:

Date	Name	Type of Training	Training provided by	Signature
07/22/2021	John Doe	First safety training for personnel	Horst Müller	

### 2.3 Personal protective equipment

Always to be worn

Depending on local conditions and regulations, the personal protective equipment includes the following elements:



**Protective headgear**

For protection against falling or flying parts and materials.



**Protective gloves**

For the protection of hands against friction, scrapes, puncture or deeper wounds, as well as against contact with hot surfaces.



**Protective clothing**

Primarily for protection against entrapment by moving machine parts. Work clothing must be close fitting with a low resistance to tearing; it must have close-fitting sleeves and no protruding parts.



**Protective footwear**

For protection against heavy falling parts and slipping on slippery floors.

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To be worn for special tasks

When carrying out special work, special protective equipment is recommended. Separate reference to this is made in the individual sections.



#### Protective eyewear

For eye protection against harmful influences such as strong light, chemicals, dust, splinters or weather effects.



#### Hearing protection

For protection against loud noises and to prevent acoustic trauma.



#### Breathing mask (FFP-3 — according to country-specific requirements)

For protection against materials, particles, and organisms. In this case, for protection against the dust produced by the sliding contacts and the insulation of the conductor rail.

## 2.4 Intended use

The product is designed and built exclusively for the usage described here (intended use).



**WARNING!**

#### Hazard due to unintended use!

Any application that deviates from or goes beyond the intended use of the product can result in hazardous situations.

- Strictly follow all information in these operating instructions.
- Refrain from unintended use of the system
- Respect the instructions on unintended use in Section 2.5.

Claims of any kind due to damages from unintended use are excluded.

The operator bears sole liability for all damage that results from unintended use.

#### Intended use

The SinglePowerLine 0812 Conductor Rail System is an operating resource for the customer to set up an electrical power supply system indoors and in protected outdoor areas, in areas that are not accessible to the public. The conductor rail is an operational resource and thus has no actual operating mode since this is determined by the application. Risks are limited only to the failure of mechanical components (e.g., falling components) and the danger from electrical current.

The SinglePowerLine 0812 Conductor Rail System is used to supply electricity to mobile electrical consumers.

A typical use is, for example, in the area of bridge and process cranes.

Use other than in the application approved by the manufacturer must be examined by the system engineer as part of a risk assessment for the final product and is under the responsibility of the system engineer.

An extended approval by the manufacturer for the application is possible in certain cases and requires written approval after examination of the use case and ambient conditions.

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#### Compliance with these technical conditions is mandatory for the installation:

- The maximum travel speed is up to 600 m/min depending on the system (straight line without interruption).
- The conductor rail should preferably be installed horizontally with current collector insertion from below. With indoor areas, it is also possible to insert the current collector from the side (use current collector for lateral insertion).

#### Electrical engineering operational requirements

- The electrical system must be secured in compliance with the locally applicable regulations.

## 2.5 Unintended use

Claims of any kind due to damage incurred during use that deviates from the intended use described above ("use other than the intended use") are excluded. The operator bears sole liability for all damage that results from unintended use.

Unintended use in particular includes the following forms of use:

- Operation in unsuitable/unauthorized environmental conditions (see Section 3.3). The conductor rail system must **only** be operated under the environmental conditions detailed in Section 3.
- Installation in an area accessible to the public
- Operation within manual reach.
- Use in non-industrial applications.
- Overloading of the conductor rails by excessive current or voltage.
- Overloading of individual current collectors by excessive current or voltage.
- Use as a walking or climbing aid.
- Walking on the conductor rail.
- Use of unsuitable cleaning agents (e.g., silicone oils or aromatic compounds).
- Use of the system with accessories that are not approved and not authorized by the manufacturer.
- Use of the system by untrained personnel.

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#### 2.6 Protective measures by the operator/ user

The product is used in the industrial sector. The operator of the conductor rail system is therefore subject to the legal obligations concerning work area safety. In addition to the safety instructions in these operator instructions, all safety, accident protection and environmental regulations applicable to the use of the conductor rail system must also be observed. This particularly applies to the following:

- Work on electrical components of the system may only be conducted when in a **de-energized state**.
- The manufacturer/system engineer who installs the electrical equipment from Conductix-Wampfler must inform their self about the applicable occupational safety regulations and determine additional hazards in a risk assessment that result from the special working conditions at the place of use of the product. They must implement these in the form of operating instructions for the operation of the conductor rail system.
- During the entire time the conductor rail system is in use, the operator must check that these operating instructions still correspond to the current state of regulations and adapt them as necessary.
- The operator must clearly manage and define responsibilities for installation, operation, troubleshooting and maintenance.
- The operator must ensure that all employees involved with the conductor rail system have read and understood these operating instructions. In addition, the operator must also train the personnel at regular intervals and inform them of hazards.
- The operator must provide personnel with all required protective equipment (work clothes, safety shoes, hearing protection, protective gloves, safety helmet, protective eyewear, breathing mask).
- The operator must keep the keys for the switching cabinets in a safe place. "Safe" means that only explicitly authorized personnel may have access to the keys. The keys may only be issued to technical personnel as described in Section 2.2.1.

The operator is furthermore responsible for ensuring that the product is always in perfect working order. The following therefore applies:

- The operator must ensure that the service intervals described in these operating instructions are observed.
- The operator must have all safety systems regularly inspected for functionality and completeness. If possible, this inspection should be carried out once a year, but at least as often as required under the applicable national regulations.
- If the conductor rail system has been modified, the safety systems must be inspected again and adapted to the changed conditions in such a way that the conductor rail system is safe again.

#### 2.7 5 Safety Rules for working on electrical systems



##### **Disconnect the entire system from the power supply and secure against unintentional switching on!**

Work on electrical systems must only be conducted when they are in a de-energized state. The 5 Safety Rules (see DIN VDE 0150-100:2009-10/EN 50110-1:2004-11).

Observe before starting work:

- Disconnect the system from power using the main switch.
- Secure the main switch against being turned back on.
- Verify the absence of a voltage by measuring.
- Ground and short-circuit parts of the system on which work will be done.
- Cover or block off neighboring parts that are still energized.

→ Only electricians or personnel trained in electrical work may disconnect power or approve reconnection of power after work is carried out in a de-energized state!

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## 2.8 Special hazards

The following section lists residual risks determined on the basis of a risk assessment.

- Follow the safety instructions and the warnings in these operator instructions in order to reduce health hazards and avoid dangerous situations.

### 2.8.1 Electrical hazards and sources of danger



**DANGER!**



#### **Risk of death due to electrical shock!**

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

Work on the following components is dangerous:

- Main power supply
- Parts under voltage: Line feed, cables, connections, conductor rail, connectors, current collectors, products and connections within switching cabinets, control systems, etc.
- Parts that have come under voltage due to a fault.

#### **Before working on the parts listed above:**

- Disconnect the conductor rail system from the power supply and **secure it against switching on again** according to the 5 Safety Rules (see Section 2.7)

#### **During work:**

- Use insulated tools

#### **Before switching on:**

- Each time before the product or system is started, test the insulation resistance according to locally applicable technical standards, directives and legal regulations.
- Conduct locally required electrical tests.

#### **Maintain electrical safety:**

- Regularly test and maintain electrical equipment.
- If dangerous defects are identified, immediately take measures to correct the defects. Inform the system operator immediately.
- If it is not possible to correct the dangerous defect, block off/secure the area involved or turn the operating resource off and secure it against switching on again. Inform the system operator immediately!
- Immediately secure loose cables and replace damaged cables.
  - Always replace blown fuses with fuses of the same rating.

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**DANGER!**

#### **Fire hazard due to overload or sparking!**

Fire hazards occur due to overloaded cables, electrical arcs, short circuits or sparking. Sparking can occur with poorly serviced, soiled conductor rails or if installation does not comply with the required tolerances.

- Permissible current values must be observed.
- Comply with tolerances during installation.
- Design and dimension systems in accordance with the permissible system load capacity and provide appropriate protection devices.
- Do not store combustible and/or easily ignited materials near conductor rails.
- Check, service and clean conductor rails regularly and as prescribed. See Section 8 and 9.

### 2.8.2 Mechanical hazards and sources of danger



**DANGER!**

#### **Risk of injury due to ensnarement or impact!**

An ensnarement and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.

- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices, etc.) have been removed or disabled.
- Use caution when working in the vicinity of the danger zone, particularly below the conductor rail.
- Wear personal protective equipment!



**WARNING!**

#### **Secure components against falling!**

Possible falling components must be determined in the customer analysis as part of the operator's risk and hazard analysis.

- The operator must take appropriate measures.

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#### 2.8.3 Hazard due to dust and vapors



**WARNING!**



**DANGER!**

#### **Danger of sensitization, mucous membrane irritation and respiratory disease due to dust!**

Abrasion from the carbon brushes/sliding contacts collects in the conductor rails and the guideway. This dust is very fine and is a health hazard. Frequent handling can result in sensitization. Persons who frequently spend longer periods in a heavily used system without protective equipment must reckon with the **following** consequences:

- Irritations of the mucous membranes
- Respiratory diseases
- Cancer

These consequences must also be expected if accumulations of dust are handled without proper care (e.g., removal of dust using compressed air).

- In work areas with long-term exposure and heavily trafficked plants, take effective measures to protect employees from the dust.
- During all work on the conductor rail system in which collected dust can be stirred up, wear personal protective equipment. In particular, wear personal protective equipment when cleaning the system:
  - Protective eyewear
  - Dust protection mask class FFP3 (observe local regulations)
  - Protective gloves
  - Disposable coveralls

- For soiled and dusty conductor lines, clean them as prescribed before starting work. There are special instructions for this task; see Section 9.
- During cleaning operations, protect the surrounding area, for example by covering or removing stored materials and blocking off areas in which dust could fall down on persons.
- Do not **blow out dust with compressed air**, but rather vacuum it away. The vacuum must be equipped with a HEPA Class H fine filter.
  - Do not eat, drink or smoke during work!

#### **Poisonous vapors/gases during fire!**

The standard insulation material contains PVC. Poisonous vapors/gases can be produced during a fire in the facility.

- System manufacturers/operators must take this into account when planning the entire system and provide appropriate protective measures against fire.
- Halogen-free materials can be used on request.
- The building must be evacuated immediately.
  - Notify the fire department.

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#### 2.8.4 Dangers related to the operational environment

The following factors can give rise to hazards if the conductor rail is installed in this operational environment:

- Dusts
- Gases
- Fog
- Chemical substances
- Moisture
- Liquids
- Radiation
- Temperature
- Contamination

The **most important measure** to protect against these hazards is to only install the conductor rail system in locations where **appropriate operating conditions** prevail; see Section 3.3.

The system must be designed and operated according to the prevailing ambient conditions.

#### **Danger of materials and components being damaged by environmental influences!**

Environmental influences (dust/gases, chemical substances, liquids, etc.) can damage materials and components, particularly plastic parts, so that they pose a danger (breakage, loss of function). For example, hanger clamps can break, and the conductor rail system can fall down.

- The chemical environmental influences on the components, particularly on the plastic parts, must be checked for each application. The chemical resistance is dependent upon the temperature, exposure time, concentration and interactions and must be checked in each case.
- For applications in critical environmental conditions such as chemical operations, galvanizing plants, electroplating plants, compost works, warehouses and locations for the processing of aromatic compounds, benzene and other substances from these material groups, we ask that you please contact us for the purpose of alternative installation positions and materials and possible necessary additional components.



**DANGER!**

The chemical resistance of plastic parts is critical when in contact with oils, greases and various cleaning agents.

Major temperature variations can cause large expansions in the conductor rail system, particularly for long systems. For example, hanger clamps can break, and the conductor rail system can fall down.

The conductor rail cannot adapt to changes in temperature if the design and/or installation is incorrect. Component damage can arise through the occurring forces, which can result of the conductor rail falling down.

**The system must be designed and operated according to the prevailing ambient conditions within the framework of the permissible operating conditions!**



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**DANGER!**

#### **Fire hazard due to sparking!**

Highly flammable dusts, substances or gases in the vicinity of the conductor rail can be ignited by sparks! These substances must not be present in the vicinity of the conductor rail.



**DANGER!**

#### **Hazard due to energy storage!**

If consumers with energy storage are supplied by the conductor rail, these must be disconnected from the conductor rail or the energy storage system must be discharged according to the manufacturer's specifications before starting work and system checked for the absence of voltage.

## 2.9 Conduct in the event of accidents and malfunctions

### **Measures in the event of accidents:**

- Shut down the system and secure it against unauthorized, unintentional, and/or erroneous reactivation.
- Secure the danger zone.
- Remove persons from the danger zone.
- Initiate first aid measures.
- Alert the rescue services.
- Inform responsible parties at the operating site.
- Make access available to rescue vehicles.

### **Actions to take in the event of malfunctions:**

- Shut down the system and secure it against unauthorized, unintentional, and/or erroneous reactivation.
- Secure the work area against entry.
- Consult qualified personnel when analyzing the fault.
- Check for disconnection from power.
- Remove the product and replace it with a new product.
- Determine the cause of the fault and repair the product.

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### 3 Technical Data

System	Insulated conductor rail system for use in supplying energy to crane systems, the construction of larger slip ring arrangements, transfer carriages, cable tracks or similar moving consumers mounted in non-publicly accessible areas, out of hands' reach in indoor areas and weather-protected outdoor areas (IP2x).
Installation orientation	Current collector insertion from below (recommended) or from the side (indoor area only)
Rail length	4000 mm (nominal size at 20° C/tolerance ± 3 mm)
Phase offset	50 mm (standard)/40 mm (reduced with offset current collector arrangement)
Suspension interval	≤ 1.5 m/typically 1.4 to 1.5 m
Maximum system length	Unlimited
Travel speed	maximum 600 m/min (straight line without interruption)
Permitted ambient temperature *	-15° C to +55° C (85° C in heat-resistant version/PPE + SB) [Lower temperatures on request. At lower temperatures, flexible lines should be used.]
Maximum temperature difference	Δ 40 K
Maximum conductor temperature	+ 85° C (115° C for heat-resistant version/PPE + SB, briefly t < 30 s) 125° C
Protection type	With current collector insertion from below: IP23 (DIN EN 60529, VDE 0470-1); with current collector insertion from the side: IP21
Storage temperature	-30° C to +40° C (store in a dry place, avoid condensation)
Minimum installation temperature	-10° C (recommended installation temperature: Above -5° C)
Local approvals	UL/CSA/EAC
Installation/mounting clearance	Min. 10 mm clear distance to surrounding metallic parts/structure
Max. air humidity at +40° C	85% rel. H/non-condensing
Altitude above sea level	≤ 2000 m
Travel direction	Forward and backward (reversing)

\* Note: At temperatures below -10° C, the mechanical load must be limited through physically limiting the breaking strength.

Conductor bar material	Stainless steel		Aluminum with stainless steel contact surface		CopperECO		Copper	
	081217	081213	081214	08121C	08121D	081215	081216	
Type								
Current load [A] at 100% DC and 35° C (rated value)	25	200	320	200	320	250	400	
at 60% DC	32	260	380	260	380	320	480	
Rated voltage [V]	690 (UL 600 V) – min. 24 V/1 A (minimum load)							
Ohmic resistance at +35° C [Ω/1000 m]	1.163	0.358	0.282	0.358	0.282	0.298	0.178	
+ 20° C [Ω/1000 m]	1.160	0.337	0.267	0.337	0.267	0.278	0.168	
Impedance at +20° C [Ω/1000 m]	1.163	0.377	0.306	0.377	0.306	0.321	0.217	
Impedance at +20° C [Ω/1000 m]	1.160	0.361	0.297	0.361	0.297	0.307	0.209	

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**NOTE!**

**Current collector capacity:**

The current collector capacity is defined by the connected cable as well as sliding contacts used and is typically lower (see KAT0812-0002)! Ambient temperatures and operating modes result in reduced current collector capacity (e.g., operating at a standstill, operating at elevated temperatures).

<b>Chemical resistance</b>	
Insulating material	PVC: Good general chemical resistance PPE: Average chemical resistance, critical when in direct contact with oils, not suitable for outdoor use in direct sunlight.
Installation material	PC, PA, PBT: Good general chemical resistance, partly limited
Conductor bar material	Stainless steel Aluminum with stainless steel contact surface CopperECO Copper

Information regarding resistances are general notes and depend on the temperature, exposure time, concentration and interactions and must be checked in individual cases. For applications in critical environmental conditions such as chemical operations, galvanizing plants, electroplating plants compost works, warehouses and locations for the processing of aromatic compounds, benzene and other substances from these material groups, we ask that you please contact us for the purpose of alternative installation positions and materials and possible necessary additional components.

<b>Insulation profile</b>	
Material	Stabilized rigid PVC (standard material) and PPE-SB (heat-resistant version for indoor applications)
Flammability	Compliant with requirements for insulating materials according to UL94 V-1; flame-retardant and self-extinguishing (IEC60695-11-10); halogen-free PPE-SB

Note: Under certain framework conditions, individual data is only valid to a limited extent.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

#### 3.1 Installation orientation



**WARNING!**

**Hazard due to increased wear or damage!**

- Align the current collector with its central axis exactly on the central axis of the conductor rail.
- The mean distance between the towing arm and the contact surface must be precisely complied with.



**WARNING!**

**Loss of contact or increased heating!**

Hazard due to loss of contact or increased heating if the current collector is operated outside the permissible installation position.

#### 3.2 Tolerances

The conductor rail must be installed within the following tolerances. Conductix-Wampfler does not accept any responsibility for the conductor rail's correct functioning if these tolerances are not observed. In such a case, Conductix-Wampfler does not accept any liability for problems that arise if the conductor rail system is not functioning correctly.

Conductor rails	X: +- 5 mm
Current collector*	X: ± 50 mm; Y: ± 50 mm
Pressure with which the current collector contacts the rail	20 N (with double current collector: 2x20 N)

\*Depending on the current collector type

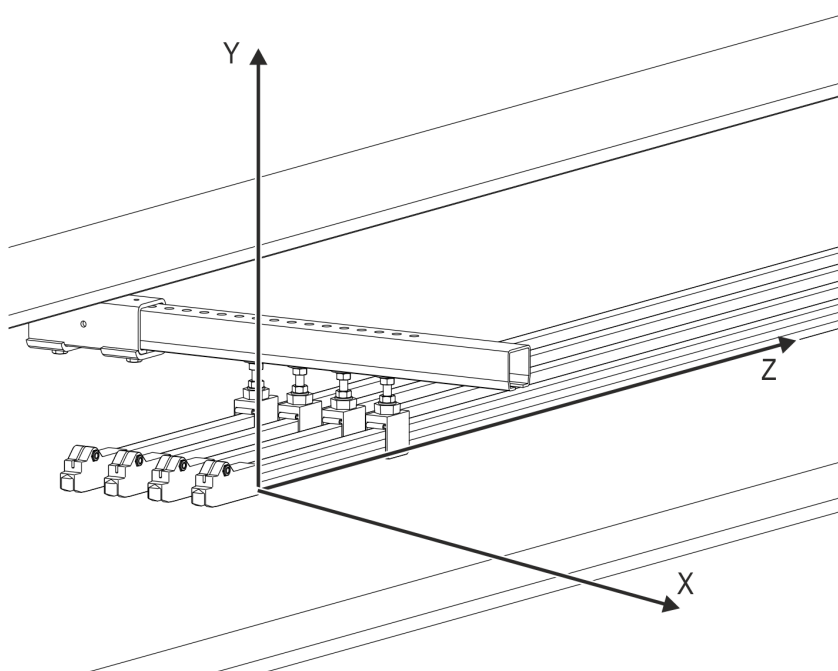


Fig. 1: Conductor bar 0812 coordinate system

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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#### 3.3 Unsuitable ambient conditions

The conductor rail must **not be installed** and **not be** operated under these environmental conditions (see also Section 2.5 , Section 2.8.4 and Section 3 ):

- Operation at excessively high or excessively low temperatures (Standard: < -10° C, > 55° C, different ambient temperatures on request).
- In environments containing chemical substances or gases that can potentially permanently damage the conductor rail's materials (corrosion) or drastically impact on the insulation.
- In ambient air that contains solvent vapors or aromatic compounds.
- In ambient air that contains flammable or explosive gases or dusts.
- Flammable or explosive materials in the vicinity, particularly below the conductor rail.
- In dusty environments.
- Outdoors with free weathering.
- In environments with relative humidity of more than 85%.
- In close proximity to splashing water.
- In environments that require a higher protection class than IP 2X.

#### Faults due to incorrect operating conditions!

If the operating conditions change or are no longer within the specified range, the conductor rails can malfunction due to short circuits, premature aging, and damage to electrical and mechanical components.



- The conductor rail must be switched off if the operating conditions are no longer within the permissible range described above.
- The conductor rail must be switched off if it gets wet or is soiled. Dry or clean according to regulations (observe WV0800-0001).
- Take the relevant measures to restore suitable operating conditions.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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## 4 Product Description and Functional Principles

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### 4.1 Brief description

Insulated conductor rails consist of single pole or multiple pole conductor rails firmly fixed on a guideway. One or more current collectors fastened to one or more mobile consumers engage with the conductor rails with their collector heads. The mobile consumers move along the guideway in a linear, track-guided manner. The current collector follows the movement of the mobile consumer and compensates for guideway deviations between the mobile consumer and the conductor rails (horizontally and vertically).

The electrical energy is transmitted into the conductor rail through line feeds and then fed to the current collector. The collector head of the current collector is pressed against the conductor rail with a permanently present contact force. The electrical energy is transferred to the current-collecting head through the contact point and to the mobile consumer through a connecting cable on the current collector.

The SinglePowerLine 0812 Conductor Rail System is a modular conductor rail system for customer installation of an electrical power supply for moving, rail-guided parts or ring arrangements. Any number of poles can be combined in conductor rail systems.

The conductor bar material is available as stainless steel, aluminum with a stainless steel contact surface, CopperECO and copper.

The connection to the power supply network is made via line feed connectors with a connection capability on the connector. Expansion units are available to compensate for temperature-related linear expansion. Air gaps can be used for the galvanic isolation of sections.

Examples of applications are:

- Crane systems
- Container stacking, steel mills or STS cranes
- People movers

**Insulated Conductor Rail System**

**SinglePowerLine Program 0812**

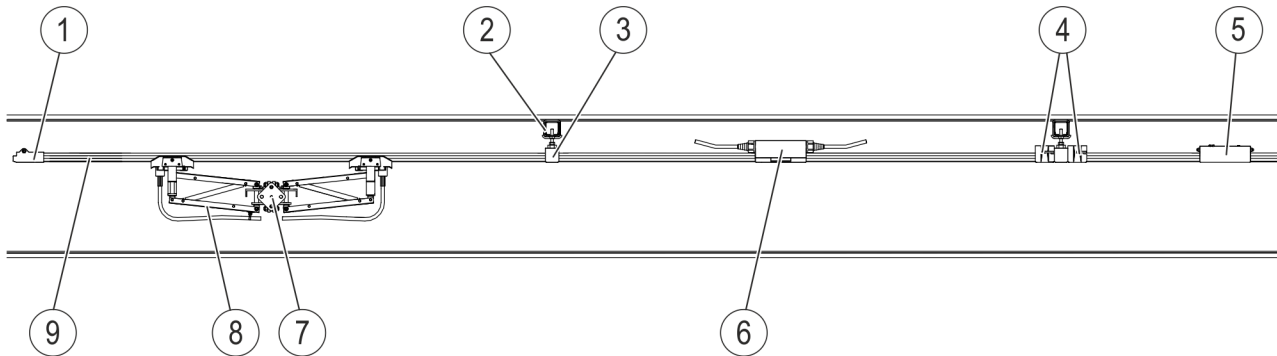


Fig. 2: System overview 0812

Position	Name
1	End cap
2	Cross Arm
3	Hanger clamp
4	Anchor clamps
5	Connector
6	Line feed
7	Towing arm
8	Double current collector
9	Conductor rail

**Examples of possible additional modules:**

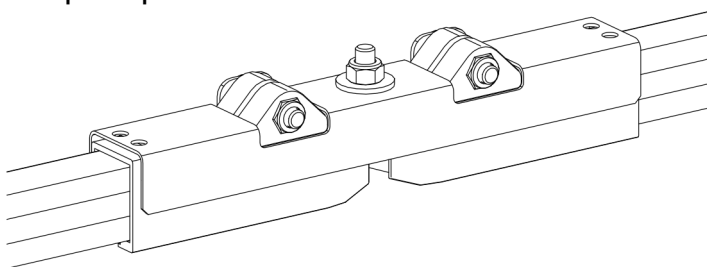


Fig. 3: Air gap 0812

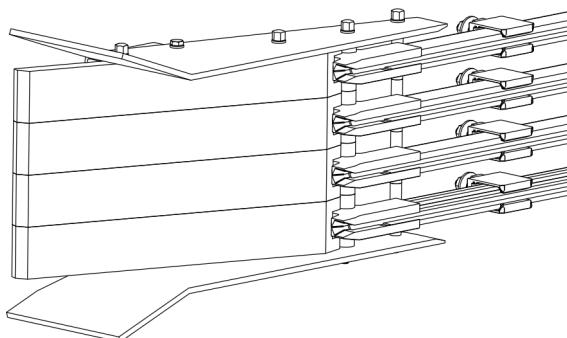


Fig. 4: Pickup guide 0812

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

The rails are straight or curved. A distinction is made between horizontal and vertical rail arrangements.

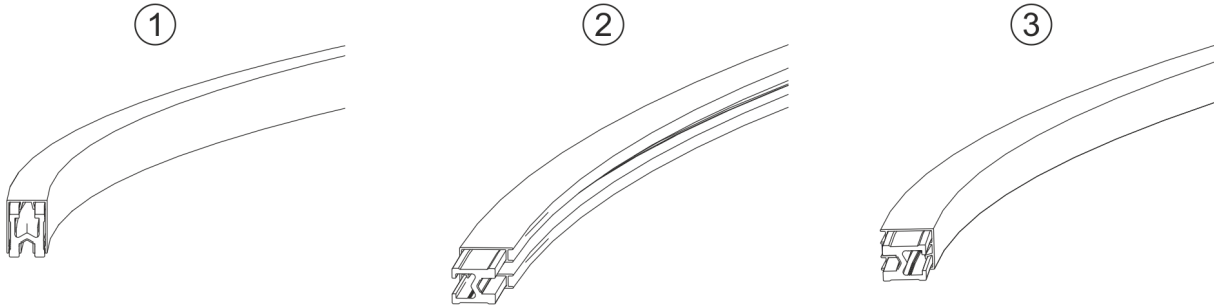


Fig. 5: Horizontal bend/inner and outer bend (horizontal arrangement)

Pos.	Name
1	Horizontal bend
2	Inner bend
3	Outer bend



Use the QR code ("click" or "scan") to see our animation: **System Overview 0812**.



## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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#### 4.2 Interfaces



All information can be found in KAT0812-0002 and, when applicable, in the system-specific layout.

##### **Mechanical interfaces:**

- The current collector must be fastened to the mobile consumer of the machine. The manufacturer/operator of the machine/system must comply with the required installation clearances and tolerances throughout the entire guideway. The fastenings are generally secured by screws.
- The hanger clamp must be attached to the cross arms or the support structure of the machine. The manufacturer/operator of the machine/system must take into account the required suspension intervals, the fastening positions and the loads. The fastenings are generally secured by screws.

##### **Electrical interfaces:**

- The current collector head is connected to the electrical system of the mobile consumer via a flexible connecting cable. The connecting cable can be supplied in the scope of delivery. The system manufacturer/operator of the machine/system must observe the required conductor cross sections and when applicable, the design of the cable and ensure that it is installed flexibly and free of directional forces. The electrical design and integration into the overall electrical network are the responsibility of the system manufacturer/operator. The connections are made using screw terminals.
- The conductor rail is fed with electrical energy from the network or from the machine/system via the line feed. A single-core cable is connected in the line feed. It is attached using cable lugs and screw connections. The connecting cables are not included in the scope of delivery. The electrical design and integration into the overall electrical network are the responsibility of the system manufacturer/operator.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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#### 4.3 Description of the components

The SinglePowerLine 0812 Conductor Rail System consists of:

- Conductor rails
- Hanger clamp (interface to the machine of the system manufacturer/operator)
- Connector
- Line feed connector (interface to the machine of the system manufacturer/operator)
- Anchor clamps
- End caps/overrun caps for conductor rails
- Air gaps
- Expansion units
- Pickup guides
- Current collectors (interface to the machine of the system manufacturer/operator)
- Accessories (clamp arms, cross arm brackets, clamping brackets, towing arms)

The conductor rails are fastened to a straight, smooth surface provided by the customer using hanger clamps. The conductor rails are electrically and mechanically coupled using connectors. The conductor rail is supplied with electrical energy through line feeds that mobile consumers can continuously tap using current collectors.

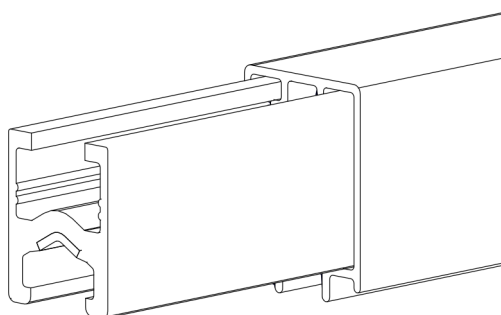


Fig. 6: Aluminum with a stainless steel strip

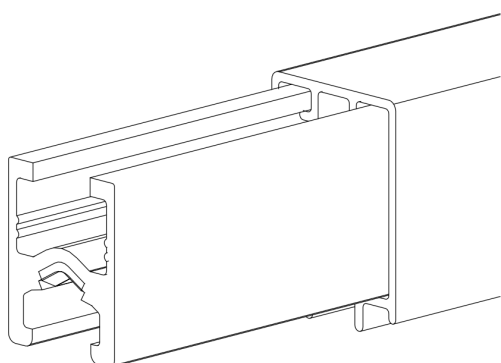


Fig. 7: CopperECO

#### ■ Conductor Rail 08121\*\*\*

Conductor rail with PVC insulation profile as PH and PE in nominal lengths of 4000 mm. The halogen-free PPE+SB is used for higher ambient temperatures.

PE rails are green/yellow. Phase rails are yellow. The conductor material of the conductor bars can be stainless steel, aluminum with a stainless steel strip, CopperECO or copper. There are different rated currents from 25 to 400 A.

PH = Phase conductor

PE = Protective conductor

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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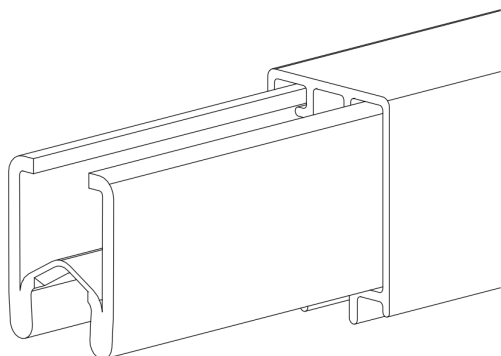


Fig. 8: Copper

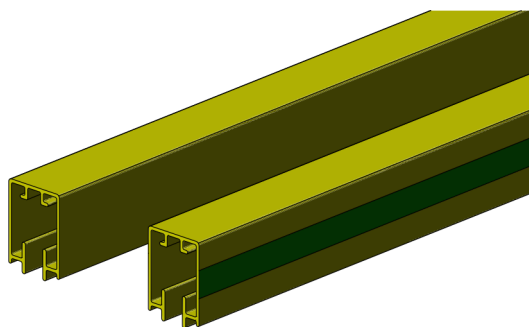


Fig. 9: PH insulation profile (yellow) and PE insulation profile (with green stripes)

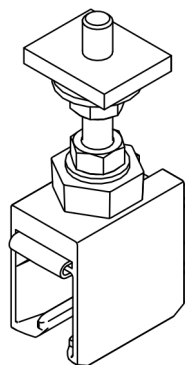


Fig. 10: Hanger clamp 0812 without insulator (square)

#### ■ Hanger clamp 08124\*\*\*

Hanger clamps for supporting the conductor rail. The hanger clamps are designed for mounting on a cross arm or C-rail. The hanger clamps are available with hexagon nuts or square nuts.

Hanger clamps with insulators are used for indoor applications with high levels of contamination and outdoor applications with a rated voltage of up to 1000 V. They may only be used with current collector insertion from below.

**ATTENTION!** These hanger clamps are not suitable for vertical/inclined applications.

See MV0812-0017 for hanger clamps for vertical/inclined applications.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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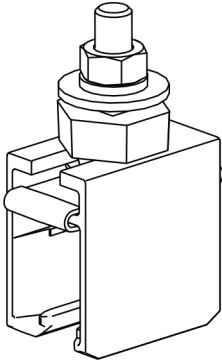


Fig. 11: Hanger clamp 0812 without insulator (hexagon)

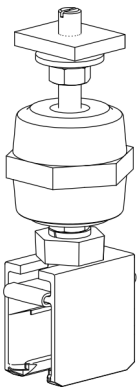


Fig. 12: Hanger clamp 0812 with insulator (square)

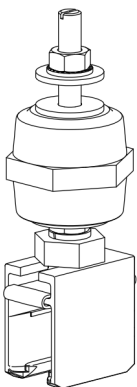


Fig. 13: Hanger clamp 0812 with insulator (hexagon)

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

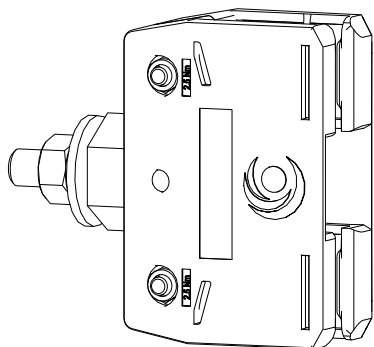


Fig. 14: Anchor clamp 0812 for vertical/inclined applications

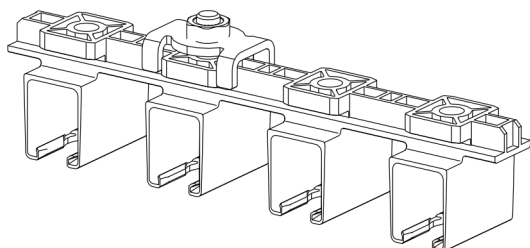


Fig. 15: Compact hanger clamp 0812 for cross arm / C-rail

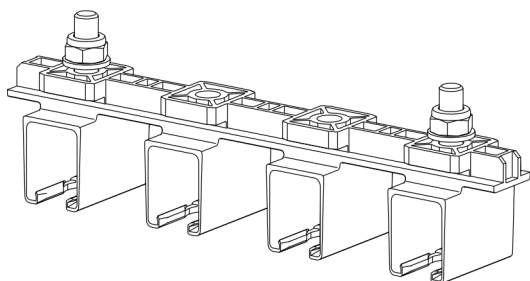


Fig. 16: Compact hanger clamp 0812 for retaining plate

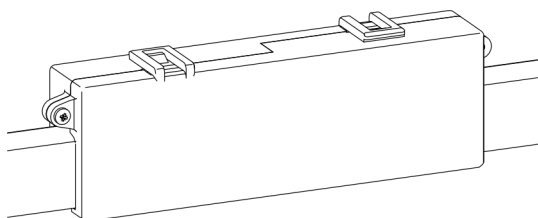


Fig. 17: Connector 0812

■ **Compact hanger clamp 081246-\*\*\***

Hanger clamps for quick assembly of 3 or 4 rails in indoor areas. Available for surface mounting or for insertion in C-rails in galvanized or stainless steel design with a nominal dimension of 30 mm.

■ **Connector 081221-\*\*\***

The conductor rail connections take place with compact screw connectors.

With aluminum-stainless steel/CopperECO conductor rails, the connector has a notch as a stopper to ensure a gap of approx. 2-3 mm. In the case of copper conductor rails, this gap must be set manually.

**Note/Tip:** Aluminum-stainless steel as well as CopperECO conductor rails use the identical connector. A mixed installation of these two types of conductor rail is permitted.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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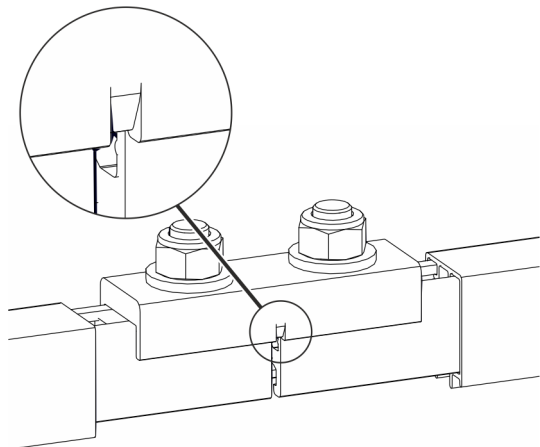


Fig. 18: Notch to mark the center of the connector (aluminum-stainless steel/CopperECO)

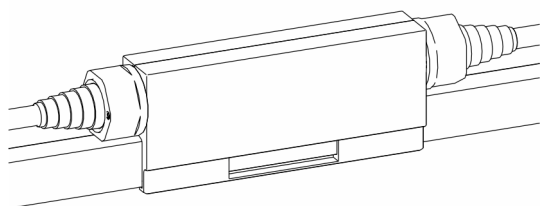


Fig. 19: Line feed 0812 (shown with insulating caps)

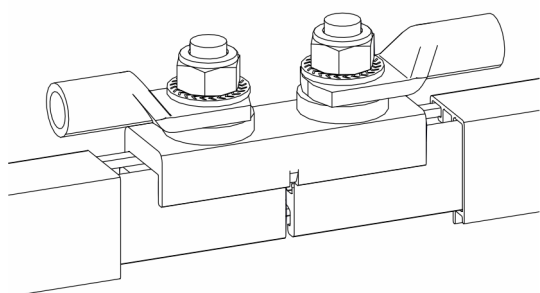


Fig. 20: Feed-in point with notch cable lug (shown without insulating caps)

#### ■ Line feed 081251-\*

The line feed takes place via line feed connectors. These are used instead of normal connectors. The electrical connection is made via spacer bolts and notch cable lugs.

The connecting cable and the notch cable lug are not included in the scope of delivery.

There are two insulating cap halves that are screwed with two nuts for protection against contact.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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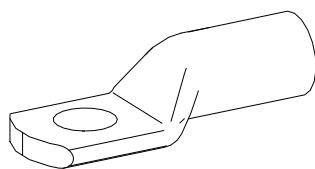


Fig. 21: Notch cable lug 0812

■ **Notch cable lug 080051-\*\***

The electrical connection to the line feed connector is made via the notch cable lug.

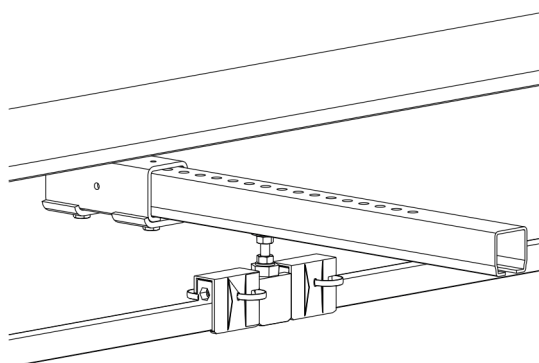


Fig. 22: Built-in anchor clamp

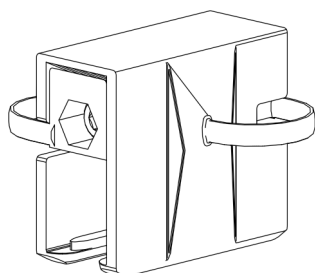


Fig. 23: Anchor clamp 0812

■ **Anchor clamp 081231-2\***

By using two anchor clamps that are mounted around a hanger clamp, the conductor rail is fixed at one point (anchor point) and can be freely expanded from this point. The anchor point is typically attached near the line feed. If several anchor points are projected, for example, with transfers or curves (natural anchor point), the route between the anchor points are to be decoupled using expansion units. Attachment of the anchor clamp occurs through a clamping cone on the insulation profile.

**ATTENTION!** This anchor point is not suitable for vertical/inclined applications.

See MV0812-0017 for anchor clamps for vertical/inclined applications.

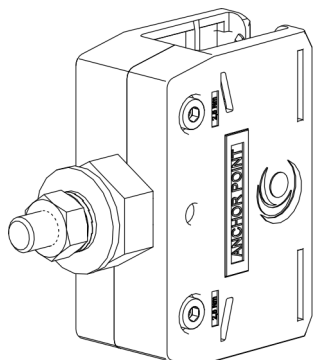


Fig. 24: Anchor clamp 0812 for vertical/inclined applications

## Insulated Conductor Rail System

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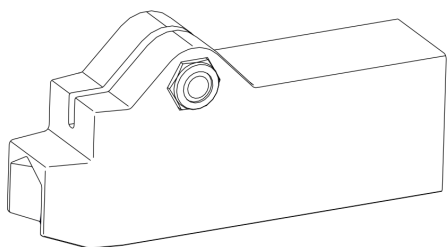


Fig. 25: End cap 0812

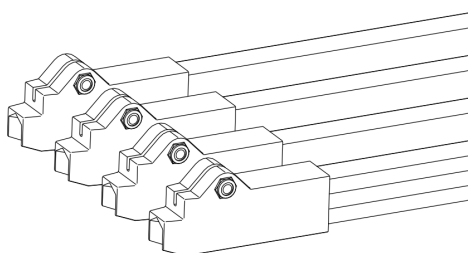


Fig. 26: End cap 0812 with conductor rails

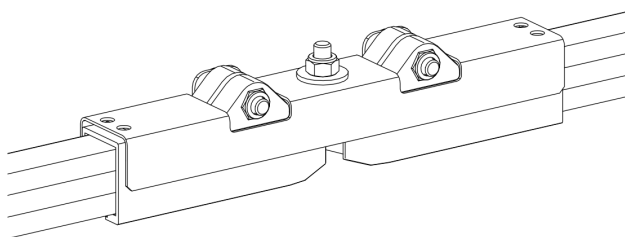


Fig. 27: Air gap 0812

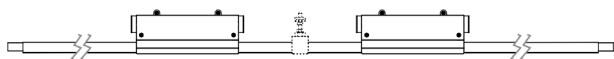


Fig. 28: Expansion unit 0812

#### ■ End cap 081271-\*\*

The end cap is used as a termination and as protection against contact with a free rail end. The caps are fixed to the conductor rail with a clamping screw.

#### ■ Air gap 081294-2

Air gaps are used for galvanic isolation of sections that can be fed in and disconnected from the power separately, e.g., for maintenance lines. For each isolation point, 2 air gaps are installed at a suitable distance in order to avoid voltage leak across the current collector.

#### ■ Expansion unit 081261-4X2\*\*\*

To compensate for temperature-related changes in length for systems > 100 m or sections of the route that are integrated between two anchor points, such as pickup guides at both ends of the section, expansion units are required to accommodate the change in length. The expansion unit has two expansion points, each of which can accommodate a maximum 25 mm expansion. The expansion units are delivered pre-assembled on a conductor rail (4000 mm). The middle section of the expansion unit must be supported with a hanger clamp (not included in the scope of delivery) on the customer's support structure/substructure.

The use of a double current collector is recommended when using expansion units.



## Insulated Conductor Rail System

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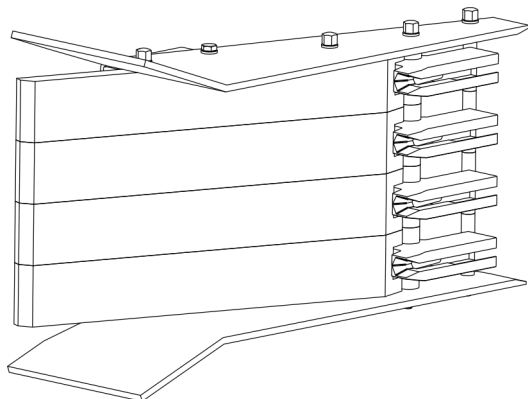


Fig. 29: Pickup guide 0812

#### ■ Pickup guide 081206\*\*\*/081208\*\*\*

For areas in which it is necessary to travel in or out of the conductor rail system, pickup guides are used in combination with the current collectors provided for this purpose. It should be noted that the maximum speed at pickup guides is 60 m/min, and pickup guides are classified as wear parts. The installation tolerances must be observed. Simultaneous offsets with the maximum tolerances in the x- and y-directions are not permitted.



**DANGER!**

#### **Hazard due to exposed current collectors!**

The user must ensure that the collectors are de-energized or protected against accidental contact while they are between pickup guides.

#### **Current collector**

A current collector is a sliding electrical connection between the conductor rail and the mobile consumer. It is recommended that a redundancy for the PE current collector is always included (min. 1 x double current collector).

When using inverters, there must also be redundancy for the phase current collectors (min. 1 x double current collector, protection against shutdown due to loss of phase voltage in the case of transient loss of contact).

The current collector central axis must be mounted exactly on the central axis of the conductor rail. The installation dimension between the towing arm and the contact surface must be strictly maintained.

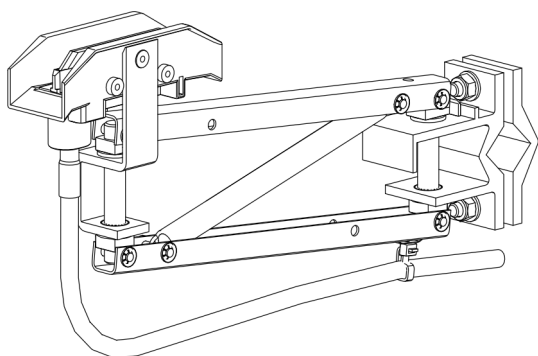


Fig. 30: Current collector

#### ■ Current collector 08120\*\*\*\*

Contact pressure: 20 N

Lateral deflection: Max.  $\pm$  50 mm

Working stroke in insertion direction: Max.  $\pm$  50 mm

Installation dimension between towing arm and contact surface: 115 mm.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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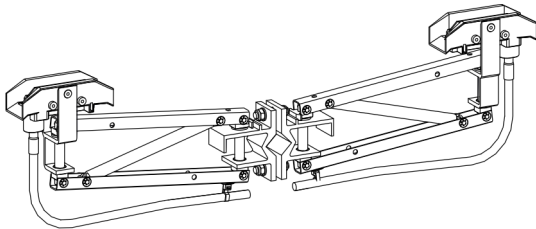


Fig. 31: Double current collector

■ **Double current collector 08120\*\*\***

Contact pressure: 2 x 20 N

Lateral deflection: Max.  $\pm$  50 mm

Working stroke in insertion direction: Max.  $\pm$  50 mm

Installation dimension between towing arm and contact surface: 115 mm.

Depending on application and function, different types of current collectors are used:

- Current collector 100 A
- Double current collector 200 A
- Current collectors for special requirements, e.g., higher speeds
- Suitable or unsuitable for guide travel
- Insertion from below or side insertion
- Current collector in plastic design 80 A (double current collector: 160 A)

## Insulated Conductor Rail System

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#### Sliding contact

- The sliding contact is protected by a plastic insulation, so that no part under voltage can be reached in the event of accidental contact with the operational current collector.
- When replacing the sliding contact, it is not necessary to disassemble the sliding contact insulation since it is designed as a plug contact (no screw connection). Sliding contact delivery includes plastic insulation. See Section 9.3 "Replace sliding contact"

## 4.4 Accessories

The following accessories are specific special components and can also be ordered from Conductix-Wampfler (see KAT0812-0002):

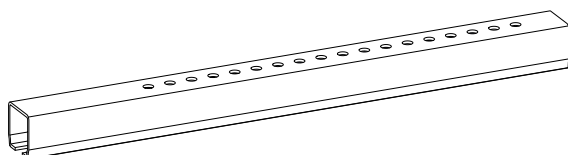


Fig. 32: Cross arm (Sendzimir (hot-dip) galvanized steel)

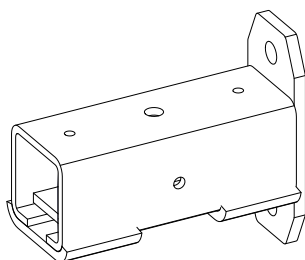


Fig. 33: Bracket for screwing on with 2-hole connection plate (steel, galvanized)

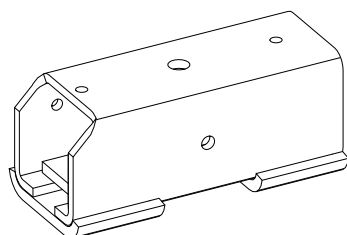


Fig. 34: Cross arm bracket (Bracket: Steel, blank; Small parts: Steel, galvanized)

#### ■ Cross arm (020185-0\*\*\*/020186-0\*\*\*) and cross arm bracket (020280/020282/020285/020286)

A cross arm can be used for attachment to the customer's support structure (substructure).

The cross arm is attached to the customer's support structure (substructure) using brackets. The brackets are available with and without a connection plate.

**Note:** Compact hanger clamps can only be used with 32x30 cross arms. Compact hanger clamps are not suitable for hot-dip galvanized cross arms.

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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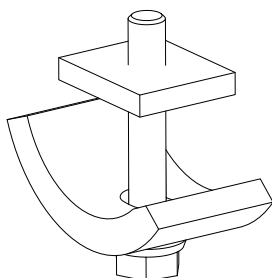


Fig. 35: Clamping brackets, clamping thickness 4-20 mm (galvanized steel or V4A)

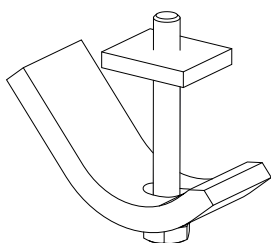


Fig. 36: Clamping brackets, clamping thickness 18-36 mm (galvanized steel or V4A)

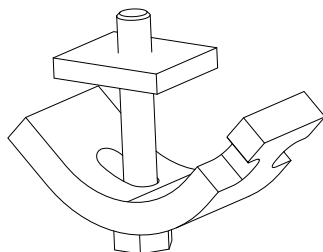


Fig. 37: Clamping brackets, anti-twist, clamping thickness 6-25 mm (galvanized steel)

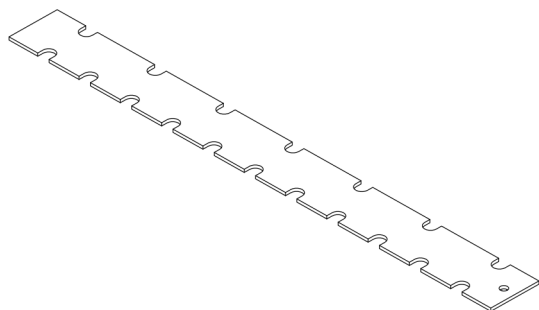


Fig. 38: Mounting comb

■ **Clamping bracket (020180\*\*\*\*/020181-08)**

Clamping brackets can also be used, for example, to attach a cross arm to the customer's support structure (substructure) without drilling or welding. There are different variants to cover clamping thicknesses from 6 mm to 36 mm.

■ **Mounting comb (081045\*) for hanger clamp**

The mounting comb can be used to make it easier to set up the hanger clamp spacing of 50 mm standard or 30 mm when mounting the cross arm (Attention: 30 mm is only possible with an offset current collector arrangement and offset line feeds).

## Insulated Conductor Rail System

### SinglePowerLine Program 0812

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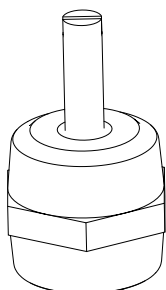


Fig. 39: Insulator

■ **Insulator (08040\*-\*\*\*)**

Insulators for indoor applications with high pollution and outdoor applications, up to 1000 V rated voltage. They are only used with current collector insertion from below.

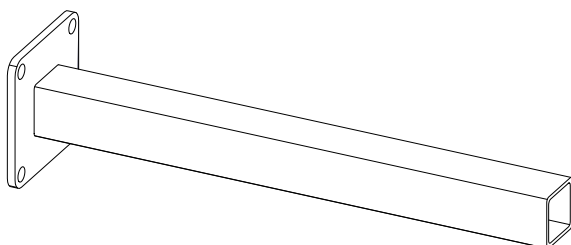


Fig. 40: Towing arm for current collector (steel, galvanized)

■ **Towing arm (02019-\*\*\*) for current collectors**

Used to tow the current collector. The towing arm is attached to mobile consumers.

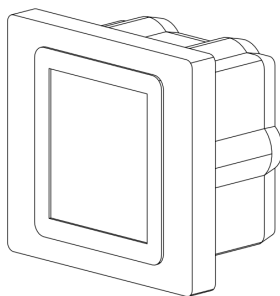


Fig. 41: End cap

■ **End cap for towing arm (020662-\*\*)**

The cap is used to close the towing arm.

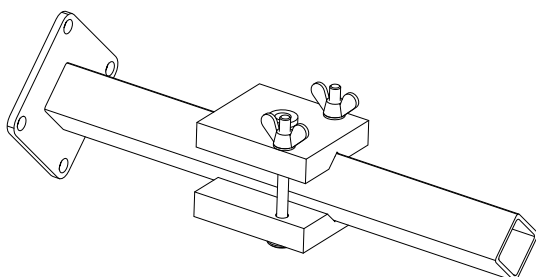


Fig. 42: Drilling jig

■ **Drilling jig for systems with a pickup guide (08-W100-0206)**

In order to meet the requirements of the VDE regulations, a hole must be drilled in the towing arm of systems with pickup guides with the drilling jig, which is used to accommodate the bolt on the protective conductor current collector (PE protection against interchanging)

## Insulated Conductor Rail System

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### 5 Transport, Packaging and Storage

---

#### 5.1 Safety

Recommended protective equipment:



**DANGER!**

#### **Risk of death due to suspended loads!**

Falling parts or uncontrolled swinging loads can lead to severe injury or even death.

- Never walk under suspended loads.
- Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or to eyelets on components.
- Ensure that lashing components are properly seated.
- Use only authorized lifting accessories and lashing elements with sufficient load capacity.
- Do not use torn or damaged ropes or straps; replace them with new ones.
- Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.
- Only move loads under supervision.
  - Set down the load before leaving the work area.
  - Cordon off the work area.
  - Use caution when working in the vicinity of, and particularly below, the conductor rail system.



**DANGER!**

#### **Risk of injury due to crushing of skin and limbs!**

Skin and limbs can be crushed:

- When packing components and handling long loads.
  - If transport crates are dropped.
  - With incorrect suspension points for transport crates.
  - With incorrect and unauthorized loading of transport crates.
- 
- Wear personal protective equipment!
  - Use suitable load suspension devices!

## Insulated Conductor Rail System

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**DANGER!**

#### **Risk of injury due to impacts and punctures/stabs from the conductor rails sliding out!**

Risk of injury due to impacts and punctures/stabs from sliding conductor rails due to holding packaging units at an angle, damaged packaging or carelessness with long goods/transport crates.

- Wear personal protective equipment!
- Cordon off the work area!
- Use caution when working in the vicinity, particularly below the conductor rail.
- Do not step under suspended loads!
- Before lifting, ensure that the packaging/transport crate is undamaged!



**WARNING!**

#### **Risk of injury due to cutting and amputation!**

Cuts and amputations can occur:

- On the packaging material (e.g.: cartons, bands, etc.).
- On sharp edges of the conductor rail.

- Wear personal protective equipment!



**WARNING!**

#### **Risk of injury due to punctures and stabs!**

The packaging material can contain points and sharp objects such as nails, struts, steel bands and wood splinters that can cause injury to limbs.

- Wear personal protective equipment!
- Cordon off the work area!



**NOTE!**

#### **Damage due to improper transport!**

Improper transport can result in substantial property damage.

- When unloading packaged parts upon delivery and during internal transport, proceed with caution and observe the symbols and information on the packaging.
- Only use the attachment points provided.
- Only remove packaging shortly before installation.

## 5.2 Transport

Immediately upon receipt, check the delivery for completeness and transport damage.

In case of externally visible damage, proceed as follows:

- Do not accept delivery or accept it only with reservations.
- Note the scope of damage on the transport documents, or on the transporter's delivery note.
- Initiate a complaint, with photos of the damage if possible.

## Insulated Conductor Rail System

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**NOTE!**

File a complaint on each defect as soon as it is detected. Damage compensation claims may only be made within the applicable claim periods.

### 5.3 Packaging

The individual packages are packed appropriately for the expected transportation conditions.

The packaging has the function of protecting the individual components against transport damage, corrosion and other damage until they are installed. Hence, do not destroy the packaging; remove it only shortly before installation.

#### Handling packaging materials:

Dispose of packaging material according to applicable legal regulations and local guidelines.



**CAUTION!**

#### Environmental damage due to improper disposal!

Packaging materials are valuable raw materials and can be reused in many cases or sensibly reconditioned and recycled.

- Dispose of packaging materials in an environmentally appropriate manner.
- Comply with locally applicable disposal guidelines; if necessary, engage a specialist to handle disposal.

### 5.4 Storage of packaged parts

Store packaged parts under the following conditions:

- Do not store outdoors.
- Store in a dry, dust-free place.
- Do not expose to aggressive media.
- Protect from direct sunlight.
- Avoid mechanical vibrations.
- Storage temperature: -30 to +40° C.
- Relative air humidity: Maximum 60% without condensation.
- In case of a storage time of more than 3 months, check the general condition of all parts at regular intervals. If necessary, refresh or replace the preservative.



**NOTE!**

In some cases, there may be instructions for storage on the packaged parts that go beyond the requirements listed here!

- Follow the instructions accordingly.



## Insulated Conductor Rail System

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### 6 Installation

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#### 6.1 Safety

- Installation and commissioning may only be carried out by specially trained technicians!

Recommended protective equipment:



#### **Risk of death due to suspended loads!**

Falling loads can cause serious injuries or even death.

- Never walk under suspended loads.
- Only move loads under supervision.
- Set down the load before leaving the work area.
- Wear personal protective equipment!



#### **Risk of injury from improper installation!**

Improper installation can result in serious injury to person and property.

- Before starting work, ensure there is sufficient space for the installation.
- Handle open, sharp-edged components carefully.
- Ensure the installation area is clean and tidy! Loosely stacked or scattered components and tools are a source of hazards.
- Install components properly. Comply with the prescribed screw tightening torques.



#### **Poisonous vapors/gases during fire!**

The standard insulation material contains PVC. Poisonous vapors/gases can be produced during a fire in the facility.

- System manufacturers/operators must take this into account when planning the entire system and provide appropriate protective measures against fire.
- Halogen-free materials can be used on request.
- The building must be evacuated immediately.
  - Notify the fire department.

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**DANGER!**

#### **Risk of injury due to crushing of skin and limbs!**

There is a risk of crushing of skin and limbs due to:

- Spring force/gravity (stored energy).
  - Current collector (spring force) during preassembly, installation, disassembly, and maintenance.
  - Falling conductor rail system components, if they have not been properly installed or if operated under inappropriate operating conditions (e.g., environment that contains solvents).
- Only allow installation to be conducted by trained technicians
  - When changing the sliding contact, follow the separate instructions for this task. See Section 12.1
  - Only install the conductor rail system where suitable operating conditions prevail. See Section 3.3
  - Wear personal protective equipment!



**DANGER!**

#### **Risk of injury due to crushing of skin and limbs!**

Skin and limbs can be crushed:

- When packing components and handling long loads.
  - If transport crates are dropped.
  - With incorrect suspension points for transport crates.
  - With incorrect and unauthorized loading of transport crates.
- Wear personal protective equipment!
  - Use suitable load suspension devices!



**DANGER!**

#### **Risk of injury due to ensnarement or impact!**

An ensnarement and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.

- Cordon off the work area.
- The main power supply (from the building) must be disconnected in the installation area and secured against switching on again.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices, etc.) have been removed or disabled.
- Use caution when working in the vicinity of the danger zone, particularly below the conductor rail.
- Wear personal protective equipment!

## Insulated Conductor Rail System

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**DANGER!**

#### **Risk of injury due to cutting and amputation!**

Cuts and amputations can occur:

- On sharp edges of the general components.
- On sharp edges of the conductor rails.
- On cut edges when trimming the conductor rails.
- On packaging materials (cartons, bands, etc.)

→ Wear personal protective equipment!



**WARNING!**

#### **Risk of injury due to punctures and stabs!**

The packaging material can contain points and sharp objects such as nails, struts, steel bands and wood splinters that can cause injury to limbs.

→ Wear personal protective equipment!

→ Cordon off the work area!



**DANGER!**

#### **Risk of injury due to impacts and punctures/stabs from the conductor rails sliding out!**

Risk of injury due to impacts and punctures/stabs from sliding conductor rails due to holding packaging units at an angle, damaged packaging or carelessness with long goods/transport crates.

→ Wear personal protective equipment!

→ Cordon off the work area!

→ Use caution when working in the vicinity, particularly below the conductor rail.

→ Do not step under suspended loads!

→ Before lifting, ensure that the packaging/transport crate is undamaged!



**DANGER!**

#### **Risk of death due to electrical shock!**

Contact with components carrying electrical power can lead to death or severe injury due to electrical shock. Danger of injury due to shock reactions, falling or being thrown across the room due to electrical shock.

→ The main power supply (from the building) and heater power supply must be disconnected in the installation area and secured against switching on again.

→ Disconnect all line feeds from the power supply.

→ Observe the 5 Safety Rules (see Section 2.7)!

→ Check whether a voltage is still present in the components and take measures where necessary.

→ Attach a sign stating "Risk of Death due to Electrical Shock" with the relevant hazard symbol in all areas with live components.

→ The customer must provide grounding for metallic components.

→ The customer must provide protective devices.

→ Ensure there is sufficient stability in the area.

## Insulated Conductor Rail System

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**WARNING!**

The system must be designed and operated according to the prevailing ambient conditions!



**WARNING!**

**Secure components against falling!**

Possible falling components must be determined in the customer analysis as part of the operator's risk and hazard analysis.

- The operator must take appropriate measures.
- With an installation height of 3 m or more in areas with pedestrian traffic, the conductor rails must be secured against falling.

## Insulated Conductor Rail System

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#### 6.2 Provide additional protection against contact at the conductor rail end.

An end cap is attached to the conductor rail end as protection against contact. In the case of double current collectors, a sliding contact that is **under voltage** can protrude from the end cap at the end of the conductor rail during operation. Touching this sliding contact may cause injury due to an electrical shock as well as by falling or being thrown across the room. The system operator must ensure that the current collector does not protrude or must ensure that the danger area is inaccessible (e.g., by providing protection against contact).



**DANGER!**

#### **Take constructive protective measures!**

- Use control technology to ensure that the current collector never travels beyond the end of the conductor rail or
- Install additional protection against contact that covers the sliding contact in a contact-proof manner when leaving the conductor rail.



**DANGER!**

#### **Alert personnel to the danger!**

- Attach a sign stating "Risk of Death due to Electrical Shock" with the relevant hazard symbol in all areas with components under voltage.

## Insulated Conductor Rail System

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### 6.3 System arrangement

The following illustration provides an overview of the arrangement of the components and distances in a conductor rail system.

#### Conductor Rail System 0812 with hanger clamps on cross arms

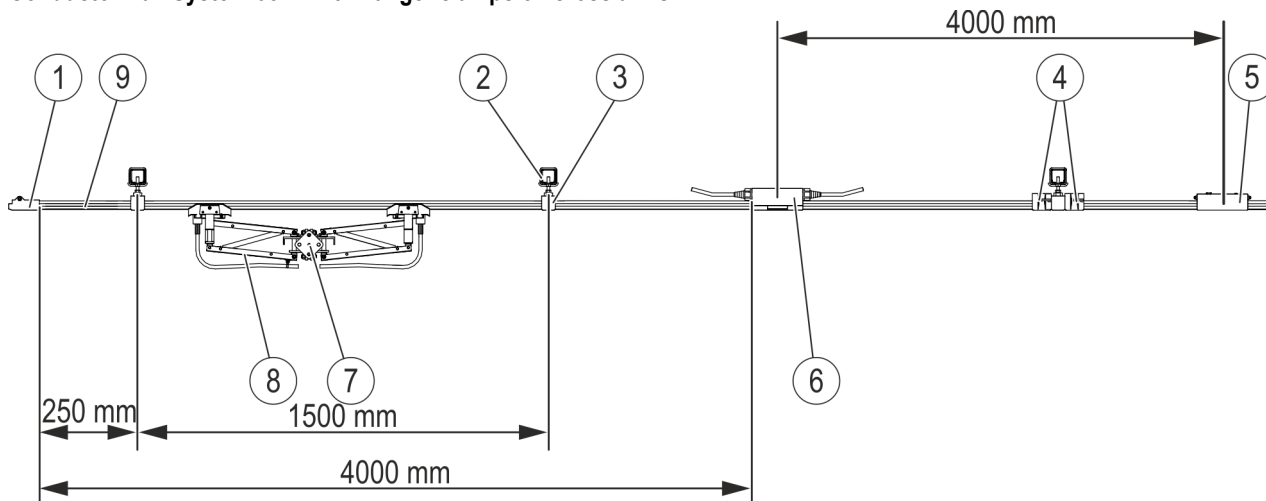


Fig. 43: Components in a conductor rail system

1	End cap
2	Cross arm with bracket
3	Hanger clamp
4	Anchor clamps
5	Connector
6	Line feed
7	Carrier for current collector
8	Current collector
9	Conductor rail



Use the QR code ("click" or "scan") to see our animation: **System Overview 0812.**

## Insulated Conductor Rail System

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#### 6.4 Installation of mechanical components

##### 6.4.1 Required tools

- Standard tools:
  - Measuring tape
  - Calipers
  - Scribe
  - Cutting tool (e.g., precision saw, angle grinder with fine cutting disk)
  - File for deburring cut edges after trimming
  - Cordless drill/drill
  - Screwdriver set
  - Hexagon screwdriver/ Hexagon bits SW 4, SW 5, SW 6
  - Open-end wrenches SW 10, SW 13, SW 17
  - Torque wrench up to 20 Nm
- Special tools:
  - Bending device (Order No.: 081010)
  - Mounting comb (Order No.: 081045\*)
  - Drilling jig for systems with a pickup guide (Order No.: 08-W100-0206)
  - Contact grease/conductive paste (Order No.: 080021\*)

##### Personnel:

- Installation only by technical personnel, at least 2 persons.

##### 6.4.2 Customizing components

The customization of components is limited to the trimming and bending of the conductor rail.



##### NOTE!

**The cutting of the conductor rail must be conducted away from the installation area!**

##### 6.4.2.1 Trim conductor rail

The customization of components is limited to the trimming of the conductor rail.



##### NOTE!

**Do not trim the conductor rail when it is installed, but rather conduct the work at a separate workstation!**

The conductor rails have a standard length of 4000 mm. Shorter lengths are available but are typically produced at the installation site.

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**Required tools:**

- Fine saw or angle grinder with a fine cutting insert
- File for deburring the ends, e.g., smooth file

**Work steps:**

- Pull the insulation profile off the conductor bar.

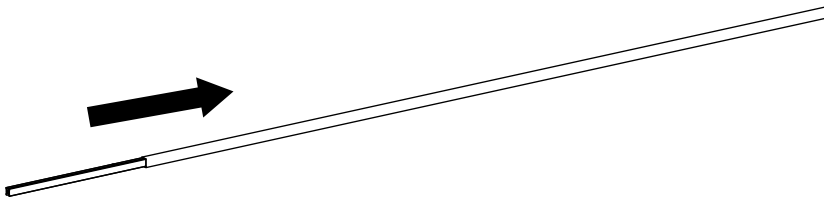


Fig. 44: Remove the insulation profile from the conductor bar

- If the conductor bar is sawed, the cutting direction must be kept from top to bottom (see Fig. 45).



**NOTE!**

**Maintain the cutting direction for the conductor bar!**

If the cutting direction from top to bottom is not maintained, the rolled-in stainless steel strip will loosen in the conductor bar.

- Always adhere to the cutting direction!

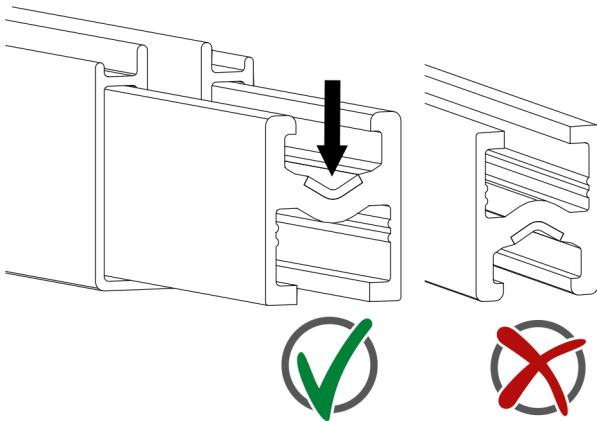


Fig. 45: Note the sawing direction for the conductor bar

- Saw the insulation profile accordingly. It must always be 2x40 mm shorter than the conductor bar.

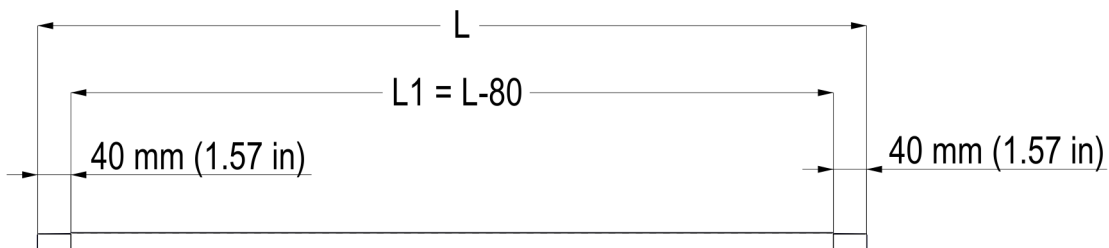


Fig. 46: The insulation profile is shorter than the conductor bar



## Insulated Conductor Rail System

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- Chamfer the conductor bar on the contact surface with approx. 1-2 mm 45° in order to ensure a perfect passage of the sliding contact over the rail joint.
- Deburr all edges of conductor bar and insulation profile with a small file. **There must be no sharp edges left.**

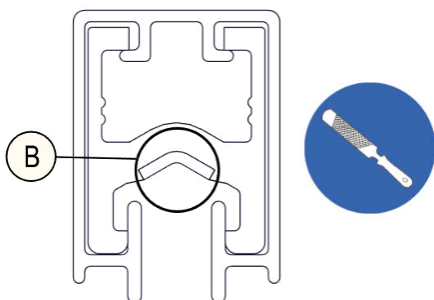


Fig. 47: Deburr conductor bar and insulation profile



**NOTE!**

**Sharp edges lead to increased wear of the sliding contacts or even to the failure of the system!**

- A sharp edge or burr can quickly wear away the sliding contacts. Therefore, deburring at the ends of the contact surface (B in Fig. 47) is necessary!



Use the QR code ("click" or "scan") to see our animation: **Cutting rails.**

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#### 6.4.2.2 Make a bend in the conductor rail



#### **Read and observe the additional operator instructions!**

Bending the conductor rails is described in detail in the separate installation instructions (MV0812-0002)!

Conductor rail bends can be fabricated in the factory or on the installation site. They are manufactured using the 081010 bending device. For large installations, electrically powered bending devices are available on request.

For extensive installations, request our technical advice!



Use the QR code ("click" or "scan") to see our animation: **Bending Rail (Bending Device)**.

## Insulated Conductor Rail System

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#### 6.4.3 Install conductor rail system

##### Procedure for the installation:

It is sensible to start the installation at one end cap and install the conductor rail along the route.

##### Work steps:

- Indicate the installation location for line feeds, customer-side anchor points, terminal boxes, expansion points, air gaps and the course of the conductor rail on the installation structure according to the layout and allocation plan on the substructure.
- Prepare the line feed and pickup guide (if present).
- Mount the hanger clamp (see Section 6.4.3.1 and Section 6.4.3.2).
- Install conductor rail sections.
- Check the mechanical installation.

##### Test steps to be performed during installation:

- Check the design against the layout and allocation plan.
- Maintain the hanger clamp distances; the rails must be audibly engaged in the hanger clamp.
- All transfers and conductor rail bends must be tested for functionality. Current collectors must not jam when passing through. Check for free passage with a single current collector.
- Cable routing (laying, marking, etc.) must be checked.
- Check horizontal and vertical deviation of the conductor rail system! The deviation from the ideal line may be max.  $\pm 5$  mm.

##### 6.4.3.1 Mount hanger clamps



##### NOTE!

**The maximum tightening torques must not be exceeded (14 Nm for a standard hanger clamp with steel nut). Too high tightening torques will damage the hanger clamp.**



##### NOTE!

**The hanger clamp fastening must be adapted to the respective application!**

The fastening elements are designed for standard fastening applications. For safety-critical fastenings, special on-site interfaces (e.g., deviating through-hole geometry or other restrictions affecting the fastening) and/or increased requirements (e.g., vibration), the fastening must be adapted to the respective application (e.g., by means of additional screw locking with Loctite 242). The system manufacturer is responsible for the evaluation.

##### Required tools:

- Mounting comb (Order No.: 081046\*)
- Torque wrench up to 20 Nm and socket from SW 13

The hanger clamps are available in designs with square nuts for mounting in cross arms/C-rails (see Fig. 48) or hexagon nuts (see Fig. 49) without an insulator as well as with an insulator (see Fig. 12 and Fig. 13). A design with a hexagon nut is recommended for current collector insertion from the side.

Insulators (see Fig. 12 und Fig. 13) are required for indoor applications with high levels of pollution and outdoor applications and allow a rated voltage of up to 1000 V with current collector insertion from below. They may only be used with current collector insertion from below.

## Insulated Conductor Rail System

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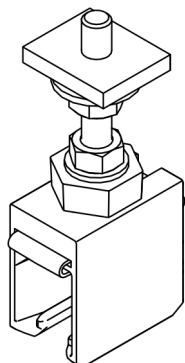


Fig. 48: Hanger clamp with square nut without insulator

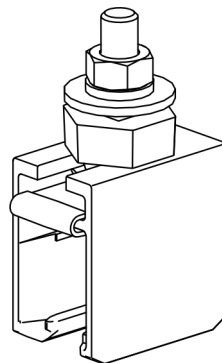


Fig. 49: Hanger clamp with hexagon nut without insulator

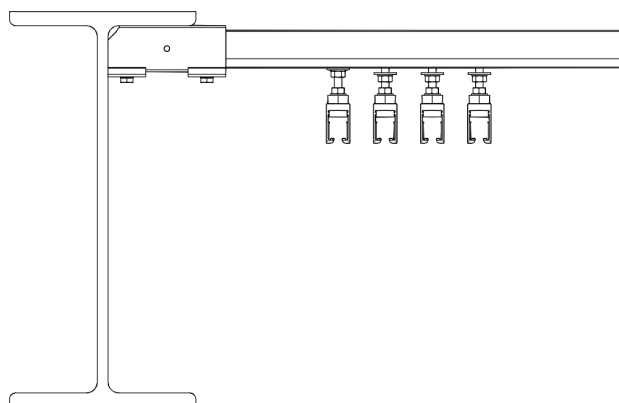


Fig. 50: Hanger clamp with square nut mounted in the cross arm/C-rail

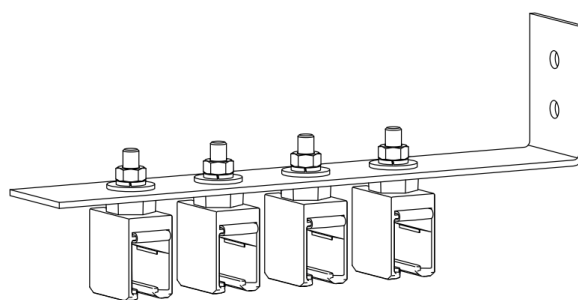


Fig. 51: Hanger clamp with hexagon nut mounted with retaining plate

#### Requirements:

The support structure (e.g., cross arm or retaining plate) is mounted at the appropriate distance (see project-specific documents).

#### Distance between hanger clamps:

Hanger clamp to hanger clamp:  $\leq 1500$  mm

Hanger clamp center to end cap:  $\geq 250$  mm (up to max. 350 mm)

Center distance between hanger clamp and rail connector:  $\geq 250$  mm

#### Work steps (mounting with cross arm/C-rail):

- Slide the first hanger clamp onto the cross arm/C-rail (see Fig. 52). Please refer to the project-specific documents for the exact dimensions.
- Tighten the first hanger clamp with the prescribed torque (SW 13, torque wrench: **7 Nm**) (see Fig. 53).
- Slide the next hanger clamp into the cross arm/C-rail (see Fig. 54).

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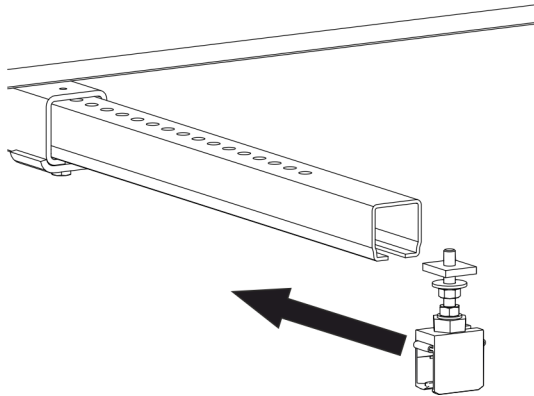


Fig. 52: Slide the first hanger clamp onto the cross arm

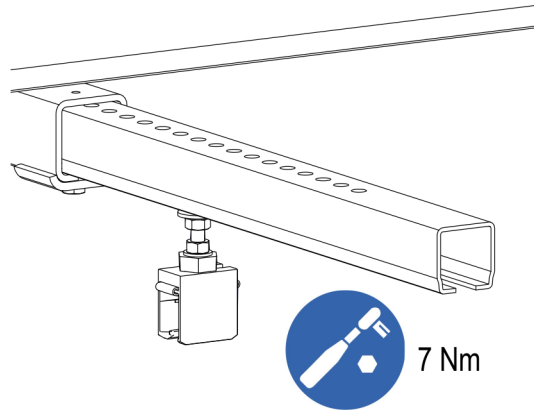


Fig. 53: First hanger clamp slid onto the cross arm and tightened

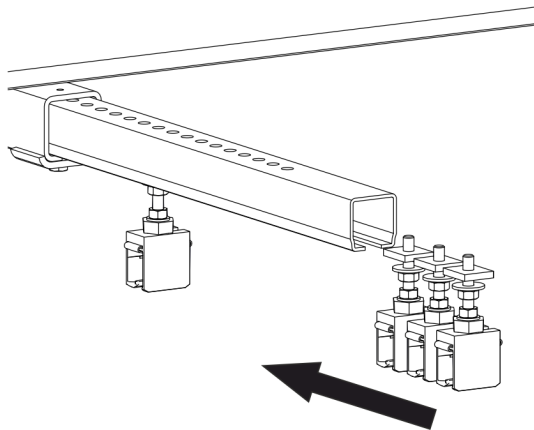


Fig. 54: Slide the next hanger clamp onto the cross arm

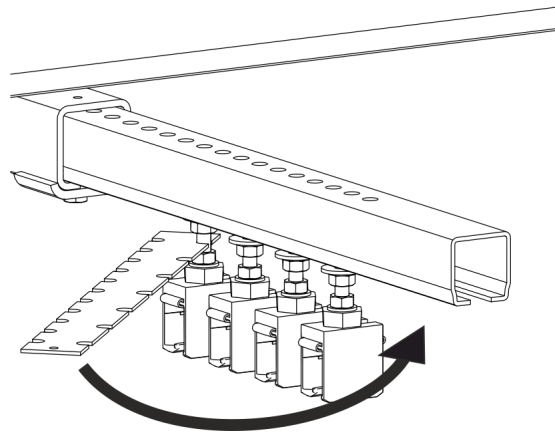


Fig. 55: Align the hanger clamps using the mounting comb

→ In order to achieve an even phase offset, the next hanger clamps must be aligned with the mounting comb (see Fig. 55). With the mounting comb, the phase spacing of either 50 mm (standard) or 30 mm can be set (Attention: 30 mm is only possible with an offset current collector arrangement and offset line feeds). The corresponding side (10x30 mm or 6x50 mm) of the mounting comb must be used depending on which phase offset is to be implemented (see Fig. 56).

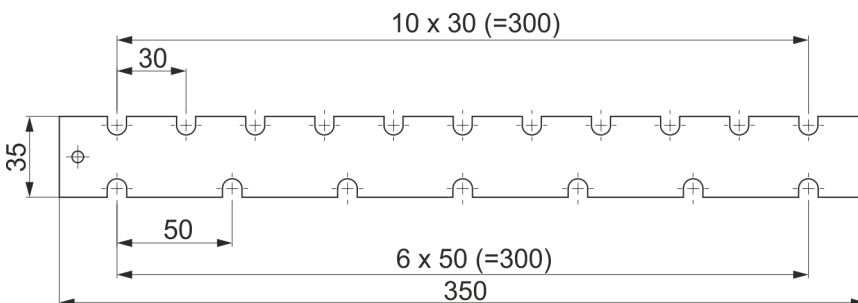


Fig. 56: Dimensions on the mounting comb

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- After the hanger clamps have been aligned, tighten the next hanger clamps with the prescribed torque (SW 13, torque wrench: **7 Nm**) and remove the mounting comb. The retaining clamp of the hanger clamp must be rotatable. A subsequent alignment is not necessary.
- Mount the other hanger clamps in the same way.

#### Work steps (mounting with retaining plate with through holes):

- Loosen the screw connection with the hexagon nut and washers from the hanger clamp (see Fig. 57).

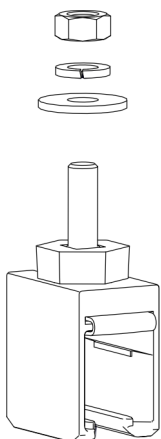


Fig. 57: Loosen the screw connection from the hanger clamp

- Insert the hanger clamp into the hole in the retaining plate and tighten the screw connections from above with the prescribed torque (SW 13, torque wrench: **7 Nm**) (see Fig. 58 to Fig. 60). The retaining clamp of the hanger clamp must be rotatable. A subsequent alignment is not necessary.
- Mount the other hanger clamps in the same way.

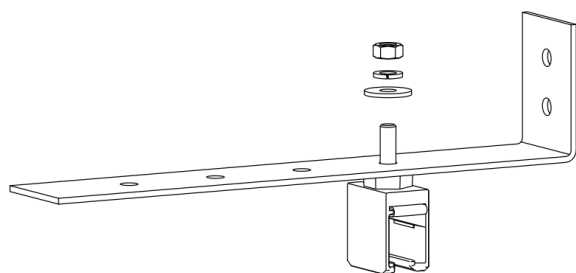


Fig. 58: Insert the hanger clamp into the first hole in the retaining plate

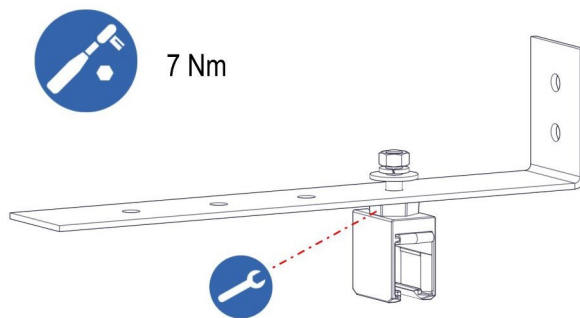


Fig. 59: The hanger clamp is screwed on from above

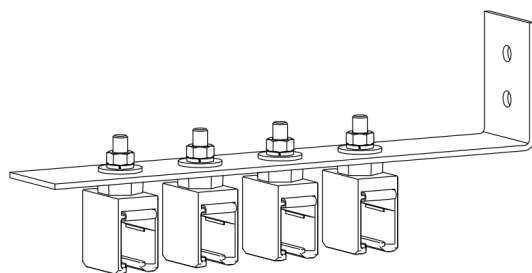


Fig. 60: All hanger clamps are mounted

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Use the QR code ("click" or "scan") to see our animation: **Mounting hanger clamps.**



These hanger clamps are not suitable for vertical/inclined applications.  
See the separate installation instructions for hanger clamps for vertical/inclined applications (MV0812-0017).

#### 6.4.3.2 Mount compact hanger clamp



The maximum tightening torques must not be exceeded (2 Nm for the compact hanger clamp for cross arm/C-rail, 2 Nm for the compact hanger clamp for retaining plate). Too high tightening torques will damage the compact hanger clamp.



In contrast to the self-aligning, rotatable single hanger clamps, compact hanger clamps must be aligned with their substructure exactly 90° to the conductor rail in order to ensure that the conductor rail can slide freely when expanded.

Not suitable for coated (e.g. hot-dip galvanized and powder-coated) rail brackets.

Not suitable for outdoor use under aggressive environmental conditions.

#### Required tools:

- Torque wrench up to 20 Nm with a socket size from 13 mm (outer) and a hexagon bit size 6 mm (inner)

The compact hanger clamps are available in the designs for cross arm/C-rail (see Fig. 61) or for retaining plates (see Fig. 62).

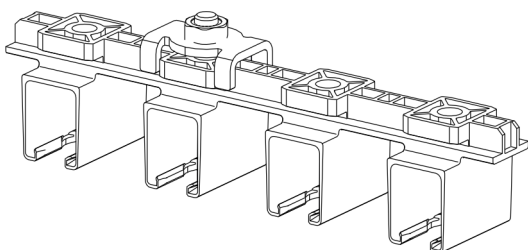


Fig. 61: Compact hanger clamps 0812 for cross arm /C-rail

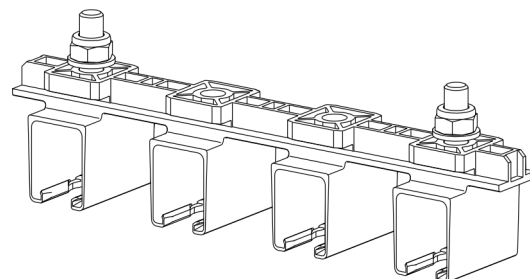


Fig. 62: Compact hanger clamps 0812 for retaining plate

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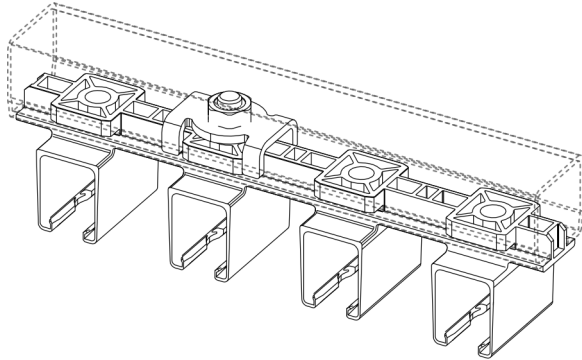


Fig. 63: Compact hanger clamps mounted on the cross arm/C-rail

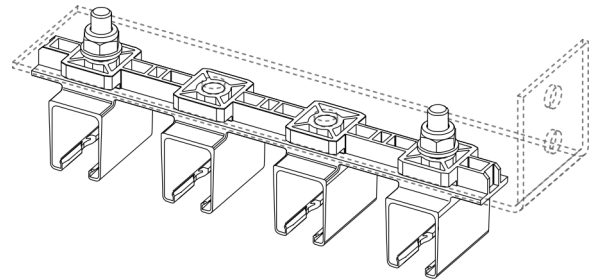


Fig. 64: Compact hanger clamps mounted on the retaining plate

#### Requirements:

The support structure (e.g., retaining plate or cross arm/C-rail) is mounted at the appropriate distance (see project-specific documents).

#### Distance between hanger clamps:

Hanger clamp to hanger clamp:  $\leq 1500$  mm

Hanger clamp center to end cap:  $\geq 250$  mm (up to max. 400 mm)

Center distance between hanger clamp and rail connector:  $\geq 250$  mm

#### Work steps (mounting with cross arm/C-rail):

- Slide the compact hanger clamp onto the cross arm/C-rail (see Fig. 65). Please refer to the project-specific documents for the exact dimensions.
- Tighten the compact hanger clamp with the prescribed torque (SW 6, torque wrench **2 Nm**) (see Fig. 66).

#### ATTENTION!

The retaining clamp of the compact hanger clamp must be mounted with the cross arm/C-rail on one of the center poles (see Fig. 67 and Fig. 68).



#### NOTE!

The cylinder screws must be recessed in the compact hanger clamp so the rail can later be inserted into the compact hanger clamp (see Fig. 69).

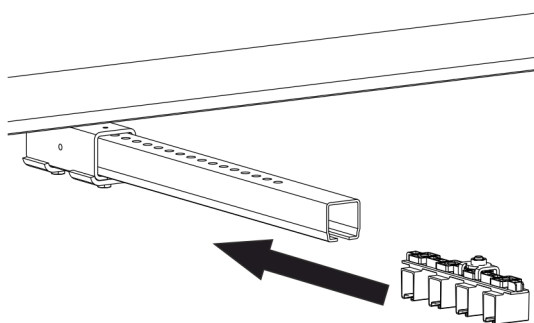


Fig. 65: Slide the compact hanger clamps onto the cross arm/C-rail

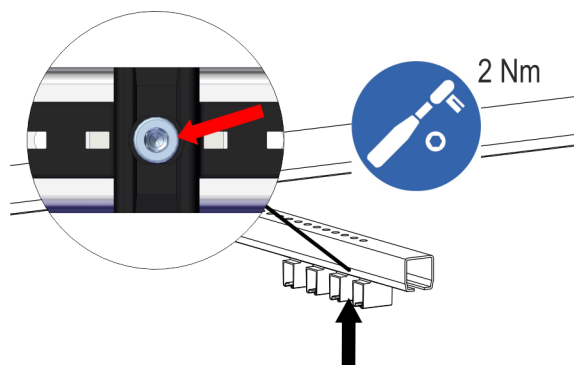


Fig. 66: Tighten the compact hanger clamps



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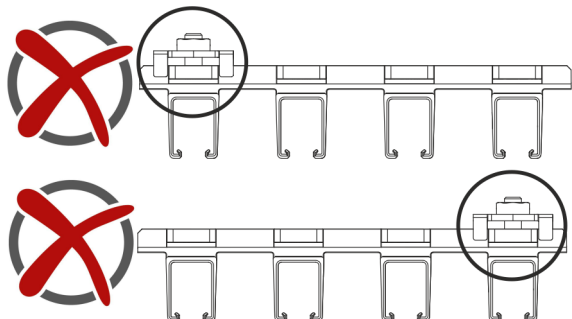


Fig. 67: Position of the retaining clamp outside (incorrect)

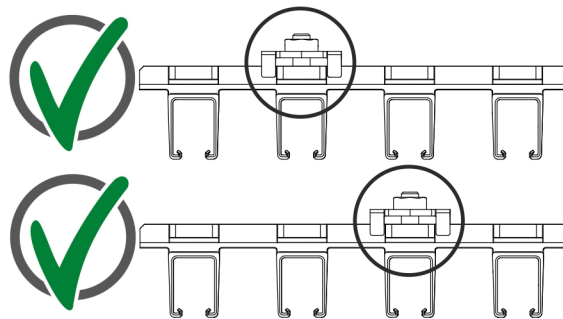


Fig. 68: Position of the retaining clamp in the center (correct)

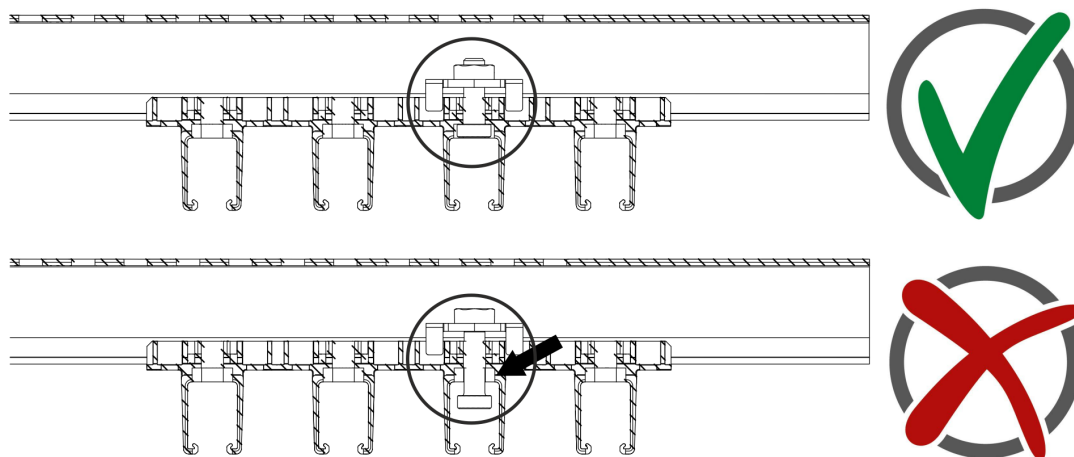


Fig. 69: Tighten recessed cylinder screw (above = correct, below = incorrect)

→ Mount the other compact hanger clamps in the same way.

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#### Work steps (mounting on the retaining plate):

- Loosen the screw connection with lock nuts DIN 985 M8-8.8 and washers DIN 125 8.4 from the compact hanger clamp.
- Insert the compact hanger clamp into the holes in the retaining plate.
- Tighten the screw connections with the prescribed torque (SW 17 (outer), torque wrench: **2 Nm**) and a hexagon screwdriver SW 6 (inner) (see Fig. 70 and Fig. 71).



#### NOTE!

The cylinder screws must be recessed in the compact hanger clamp so the rail can later be inserted into the compact hanger clamp (see Fig. 72).

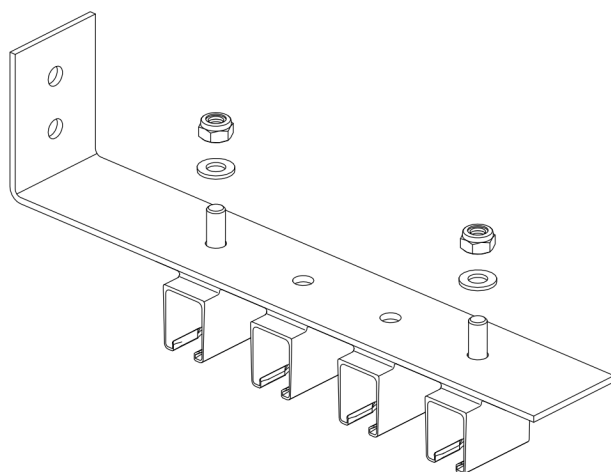


Fig. 70: Insert the compact hanger clamp into the holes in the C-rail

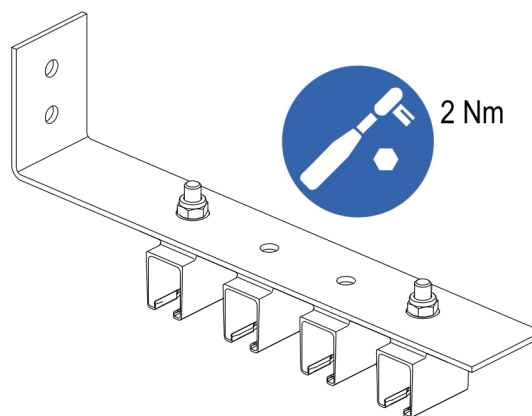


Fig. 71: Screw on the compact hanger clamp

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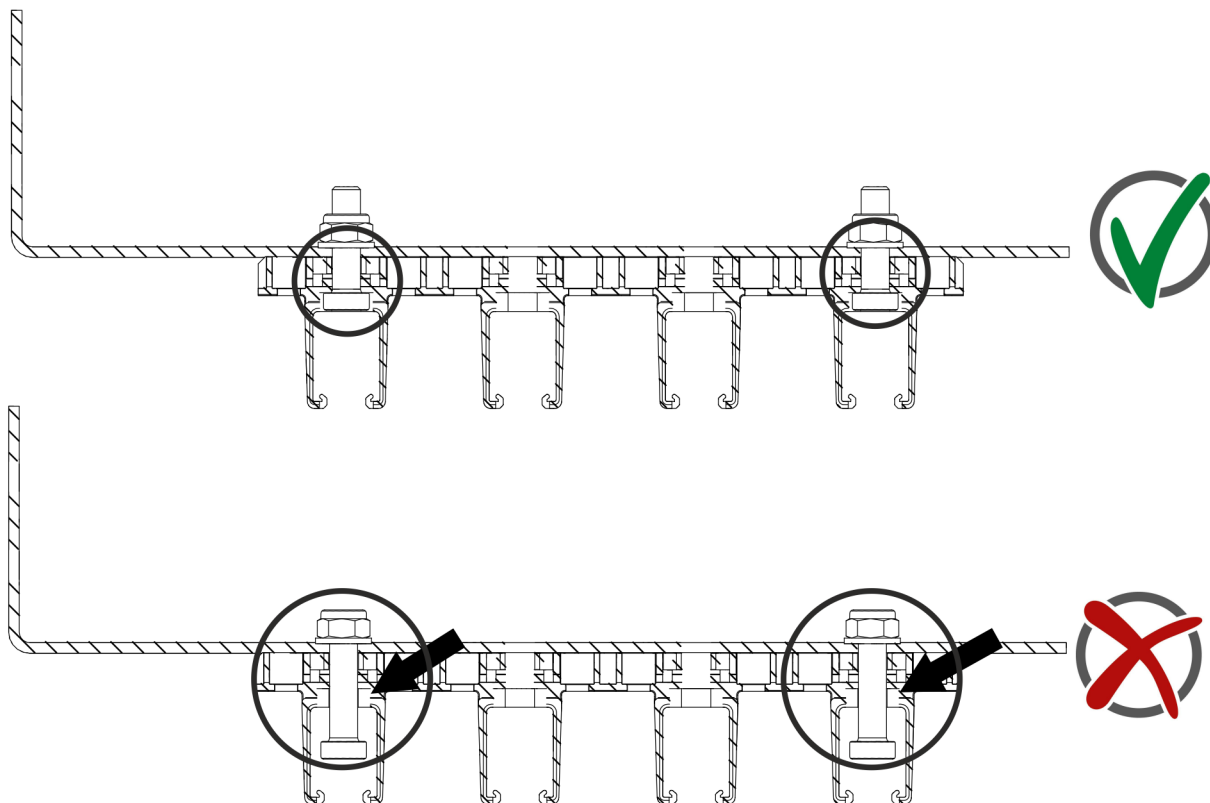


Fig. 72: Tighten recessed cylinder screw (above = correct, below = incorrect)

→ Mount the other compact hanger clamps in the same way.



Use the QR code ("click" or "scan") to see our animation: **Mounting hanger clamps.**

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#### 6.4.3.3 Mount the conductor rail



#### WARNING!

#### Secure components against falling!

Possible falling components must be determined in the customer analysis as part of the operator's risk and hazard analysis.

→ The operator must take appropriate measures.

#### Requirements:

The hanger clamps are correctly mounted on the support structure (substructure) (see Sections 6.4.3.1 and 6.4.3.2).

#### Work steps:

- Mount the conductor rails according to the project-specific documents (note the position of the phase rail and PE rail).
- Insert the first conductor rail into the hanger clamp at approx. 45° and clip it in (see Fig. 73). Ensure that the conductor rails engage correctly, and the hanger clamp covers the insulation above and below (see Fig. 74).

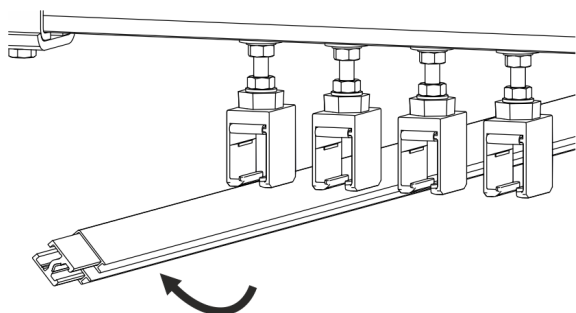


Fig. 73: Clip the rail into the hanger clamp

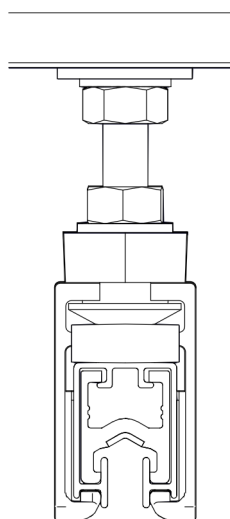


Fig. 74: The rail is clipped into the hanger clamp

- Mount all conductor rails in the same way.

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#### 6.4.3.4 Connect rails

The mechanical and electrical connection of the conductor rail is done by means of a connector. To allow expansion, the distance between hanger clamp and connector must be  $\geq 250$  mm!

#### Requirements:

The conductor rails are mounted into the hanger clamp (see Section 6.4.3.3).



**NOTE!**

#### With anchor point mounting:

Before the conductor rails are connected to each other, the anchor clamps must first be slid onto the conductor rails (see Section 6.4.3.6).

Anchor clamps are positioned to the right and left of a hanger clamp. Please refer to the project-specific documents for the exact position of the anchor clamps.



**NOTE!**

Aluminum-stainless steel and CopperECO conductor rails use the identical connector. A mixed installation of these two types of conductor rail is permitted.

#### Required tools:

- Crosshead screwdriver
- Torque wrench up to 20 Nm with a socket size from 13 mm
- Contact grease/conductive paste (Order No.: 080021)
- Steel brush

#### Work steps:

- The connection points must have exposed metal (on contact surfaces) and be thinly coated with contact grease/contact paste (Order No.: 080021).
- Slide the rail ends into the connector (Pos. 1) (see Fig. 75).

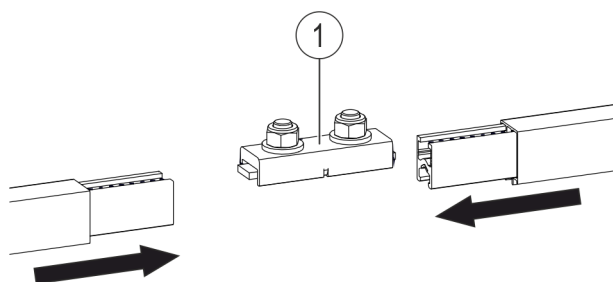


Fig. 75: Slide the conductor bar ends into the connector

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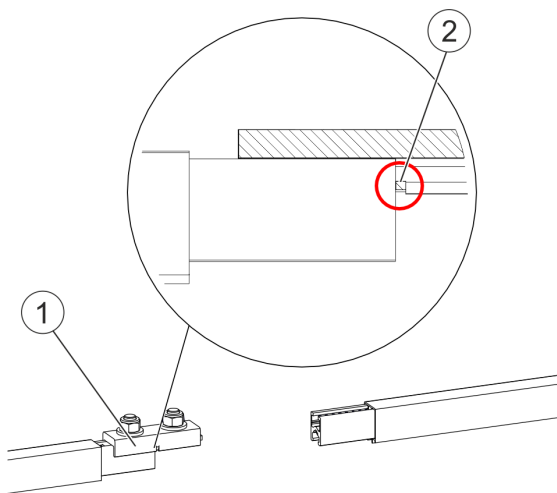


Fig. 76: Slide the connector onto the first end of the conductor bar up to the notch

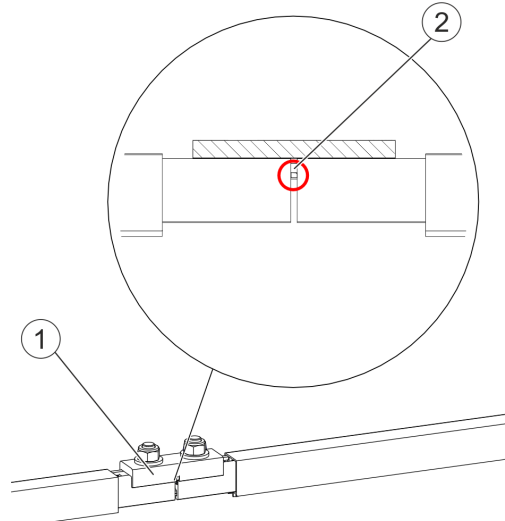


Fig. 77: Connector with notch (Pos. 2) – slid onto both conductor bar ends

- Mount the connector (Pos. 1) up to the notch (Pos. 2) on the first end of the conductor bar (see Fig. 76). Depending on the function, a gap of 2 to max. 3 mm between the rail ends is necessary. The clamping plate (Pos. 6, see Fig. 82) must lie in the hollow profile of the conductor bar.



#### NOTE!

**In the case of aluminum-stainless steel conductor rails as well as CopperECO, there is a stopper that ensures the functionally necessary gap of 2 to 3 mm between the rail ends. In the case of copper conductor rails, this gap must be set manually.**

- Slide the conductor bar of the second end of the rail up to the notch (Pos. 2) of the connector (see Fig. 77).
- Tighten the M8 nuts of the connector (Pos. 3) with the prescribed torque (SW 13, torque wrench: **10 Nm** for stainless steel nuts, **12 Nm** for galvanized nuts).

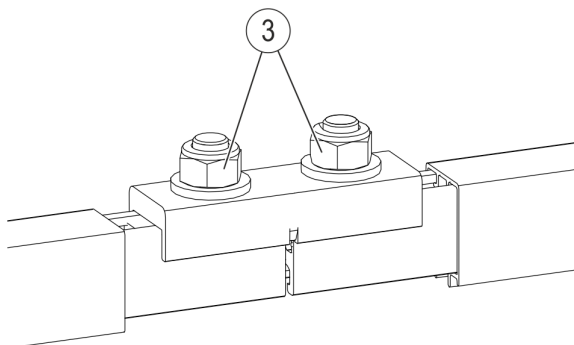


Fig. 78: Tighten nuts M10/M12

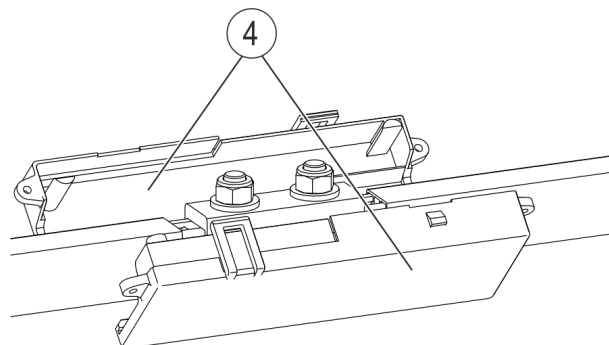


Fig. 79: Close the connector cap halves over the connector

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→ Hook the connector cap halves (Pos. 4) below the rail and close them above the rail joint (see Fig. 80). Screw the connector cap halves to the side plastic tabs (see Fig. 81) with the two self-tapping screws (Pos. 5).

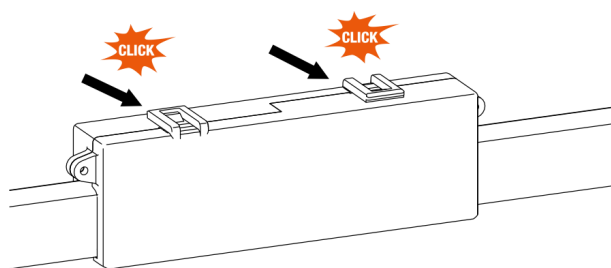


Fig. 80: Click the connector cap halves into place

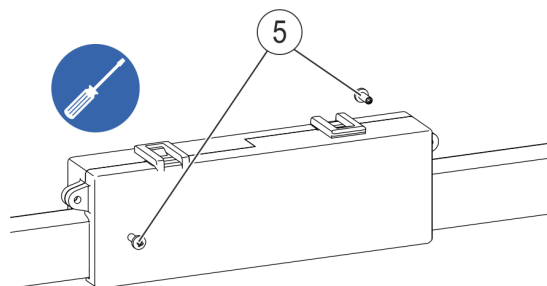


Fig. 81: Screw the connector cap halves together

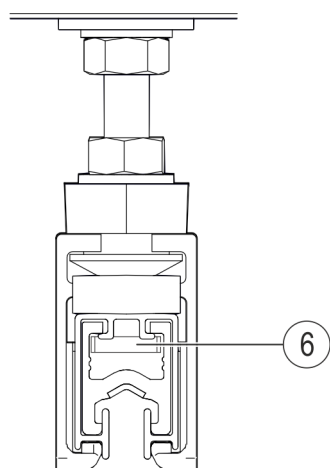


Fig. 82: Clamping plate (Pos. 6) of the connector lies in the hollow profile of the rail

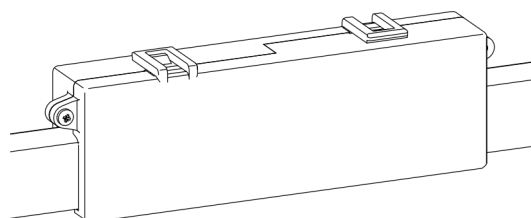


Fig. 83: Connector 0812 with insulating cap halves

→ Mount each connection point in the same way.



#### Avoid destroying the conductor rail!

- Do not slide the conductor rails together with force.
- Do not strike them with a hammer.
- Observe the tightening torques and use a torque wrench.
- Contact grease/conductive paste (Order No.: 080021).

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Use the QR code ("click" or "scan") to see our animation: **Connecting rails and mounting line feed.**

#### 6.4.3.5 Mount line feed

The electrical line feeds that are used instead of the rail connectors must be mounted as close as possible to the feed cable of the permanent installation (see Section 6.4.3.4). If the line feed is provided within a section of rail that has been cut to length, the insulation profile must be separated there and shortened by 40 mm on both sides (see Section 6.4.2).

#### Required tools:

- Contact grease/conductive paste (Order No.: 080021)
- Steel brush
- Crosshead screwdriver
- Torque wrench up to 20 Nm and socket from SW 13
- Crimping tool
- Hot air dryer

#### Distances:

Distance between line feed and hanger clamp: min. 250 mm (due to temperature shift of the conductor rails)



Please refer to the project-specific documents for the exact position of a line feed.

#### Requirements:

The ends of the conductor rail are deburred (see Fig. 47). The line end of the connecting cable is stripped.

#### Work Steps

- To ensure a good current transfer over the long term, the conductor rail ends must be cleaned and thinly coated with contact grease/conductive paste.
- Slide the each of rail ends of the conductor rail into the line feed connector (Pos. 1) (see Fig. 84).

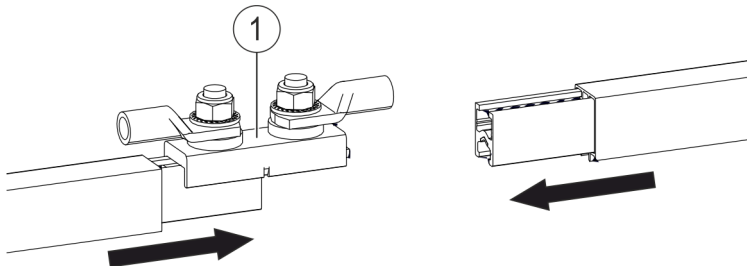


Fig. 84: Slide the conductor bar ends into the line feed connector



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- Place the nuts (Pos. 4) over the ends of the connecting cable (Pos. 2) (see Fig. 85).
- Cut rubber grommets (Pos. 3) according to the cable diameter and slide the stripped ends of the connecting cable (Pos.2) through the grommets (one-sided or two-sided connection possible) (see Fig. 85).



For better sealing, Conductix-Wampfler recommends pulling a shrink tube over the cable beforehand and connecting it to the grommet with a hot air blower after installation.

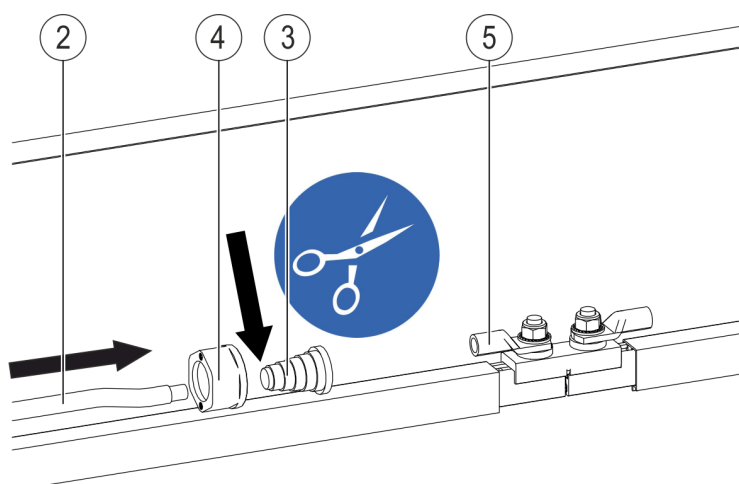


Fig. 85: Slide the cable ends through the grommet

- Mount the connector (Pos.1) with notch cable lugs (Pos. 5), as described in Section 6.4.3.4, with the prescribed torque (SW 13, torque wrench **10 Nm** for stainless steel nuts, **12 Nm** for galvanized nuts) (see Fig. 78).

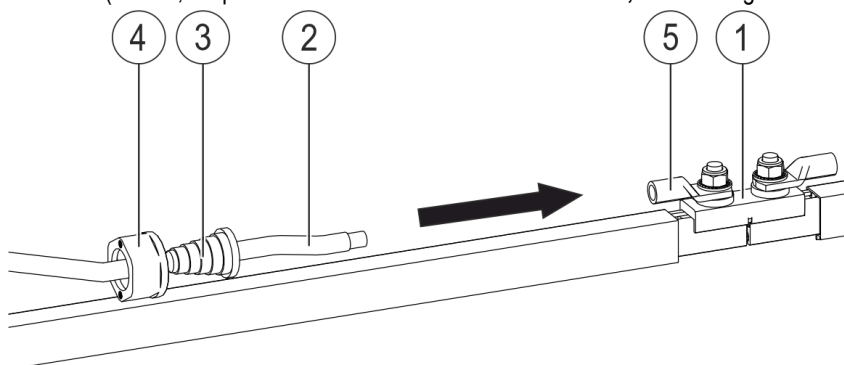


Fig. 86: Insert cable end into the notch cable lug

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→ Crimp the stripped end of the connecting cable (Pos. 2) with the notch cable lug (Pos. 5) crimp (see Fig. 87).

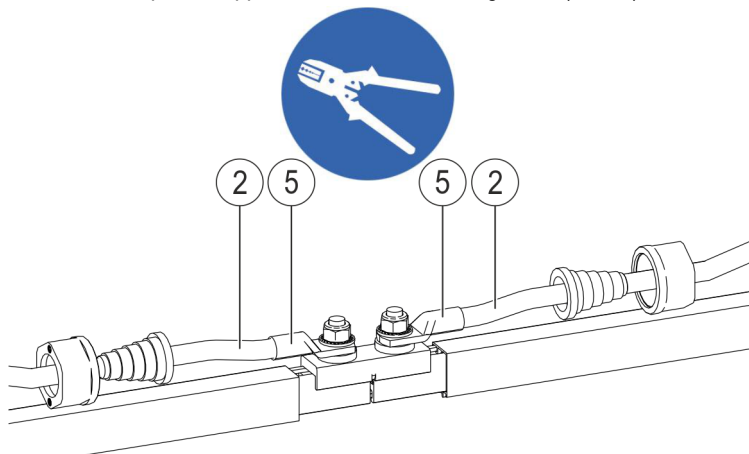


Fig. 87: Crimp cable end (Pos. 2) with notch cable lug

→ Hook both halves of the line feed cap (Pos. 6) under the rail. The inner snap lock of the line feed cap must be between the two line feed clamps. Clip the two halves together and screw together with the already fitted cable grommets (Pos. 3) and nuts (Pos. 4) (see Fig. 88 and Fig. 89).

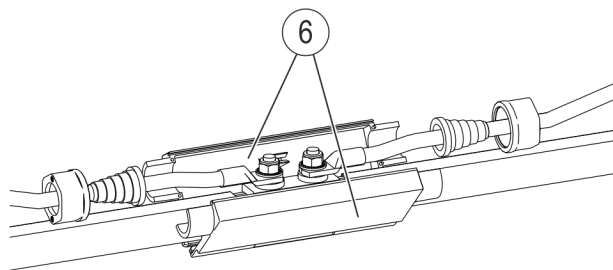


Fig. 88: Close the line feed cap halves over the line feed

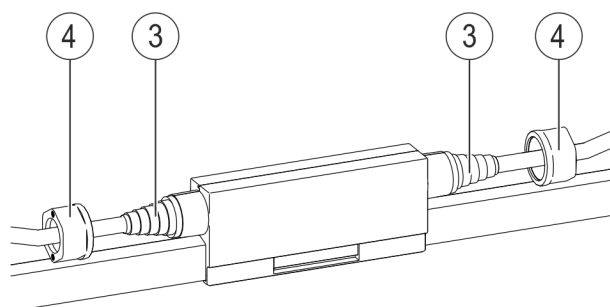


Fig. 89: Screw the line feed cap halves together with the cable grommets and nuts

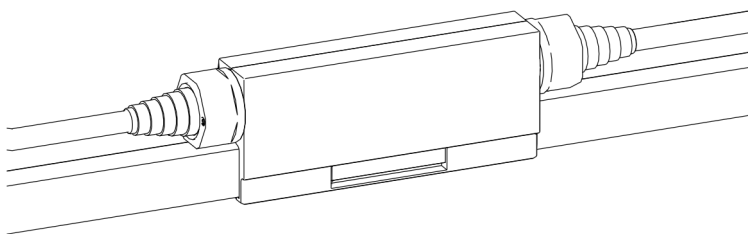


Fig. 90: Line feed fully mounted

→ Mount each line feed in the same way.

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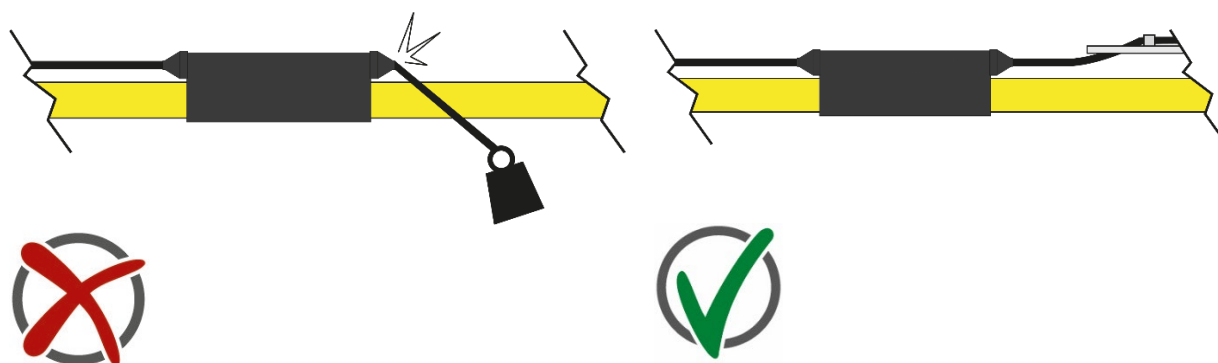
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**NOTE!**

**Do not allow any tensile stress on the connecting cable!**

→ Provide the connecting cable with a strain relief at a suitable distance.



**WARNING!**

**Avoid destroying the conductor rail!**

- Do not slide the conductor rails together with force.
- Do not strike them with a hammer.
- Observe the tightening torques and use a torque wrench.
- Contact grease/conductive paste (Order No.: 080021)



Use the QR code ("click" or "scan") to see our animation: **Connecting rails and mounting line feed.**

#### 6.4.3.6 Mount anchor clamp

The conductor rail is fixed at one point by means of anchor clamps and can expand freely from this point. The anchor point is typically attached near the line feed. If several anchor points are projected, for example, with transfers or curves (natural anchor point), decouple the route between the anchor points using expansion units. Attachment of the anchor clamp occurs through a clamping cone on the insulation profile.



The conductor rail can normally slide in the hanger clamp. The conductor rail is mechanically fixed within the support structure/substructure using anchor points. It makes sense to always position anchor points of the conductor rail at anchor point positions of the supporting structure.

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Please refer to the project-specific documents for the exact position of the anchor points.



#### NOTE!

**Before the conductor rails are connected to each other, the anchor clamps must first be slid onto the conductor rails.**

**Anchor clamps are positioned to the right and left of a hanger clamp.**

#### Required tools:

- Torque wrench up to 20 Nm with hexagon bit SW 5

#### Work steps:

- Slide the anchor clamps (Pos. 1) onto the conductor rail section to the right and left of the hanger clamp (see Fig. 91). When sliding on the anchor clamps, ensure that the screw on the side of the anchor clamps is on the outside.
- Slide the anchor point clamps up to the hanger clamp (see Fig. 92).
- Tighten the side screw (Pos. 2) (see Fig. 93) on the anchor point clamps with the prescribed torque (SW 5, torque wrench: **5.5-6 Nm**). Only tighten the screws after the setting of the system and the setting of the expansion units (see Section 6.4.3.7) have been completed.

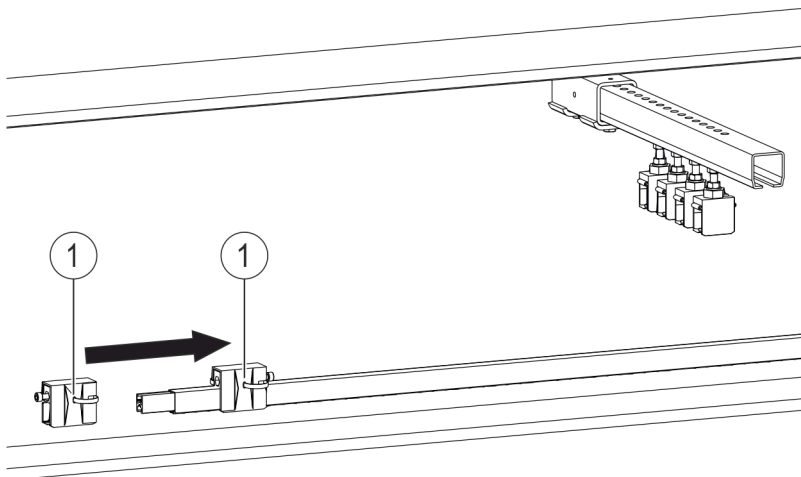


Fig. 91: Slide the anchor point clamps 0812 onto the conductor rail

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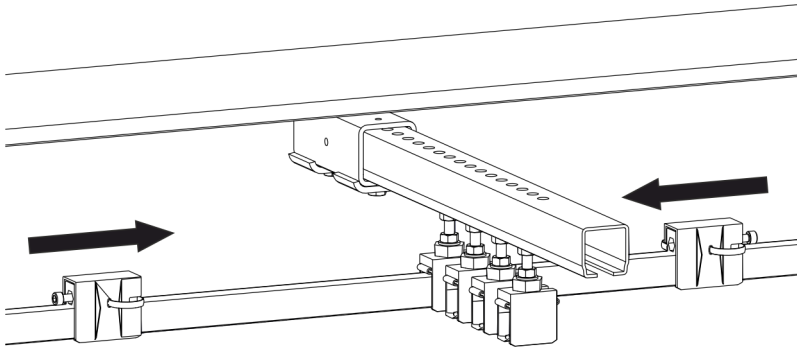


Fig. 92: Slide the anchor point clamps 0812 onto the hanger clamp

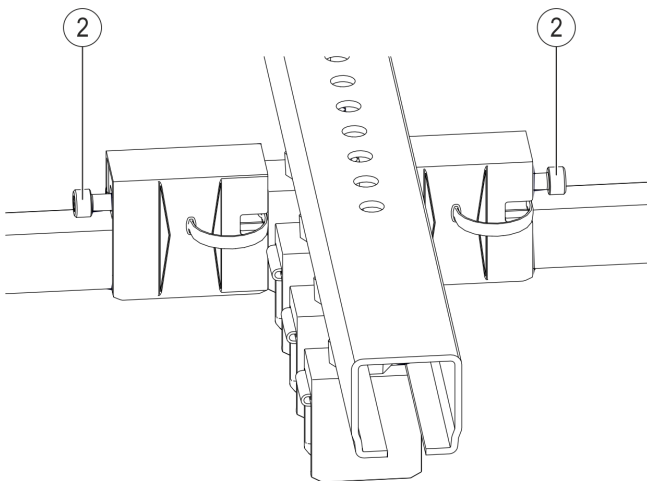


Fig. 93: Screw on the anchor clamps 0812

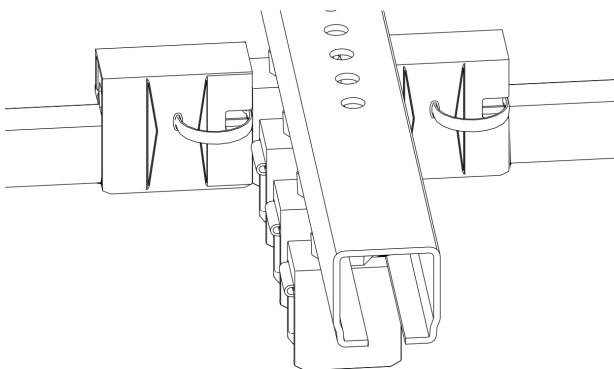


Fig. 94: Anchor clamp is mounted to the right and left of the hanger clamp

→ Mount each anchor clamp in the same way.

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Use the QR code ("click" or "scan") to see our animation: **Mounting anchor point.**



**This anchor point is not suitable for vertical/inclined applications.**

**See the separate installation instructions for hanger clamps for vertical/inclined applications (MV0812-0017).**

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#### 6.4.3.7 Mount heating conductor (optional)

In order to increase the system availability during winter operations, conductor rail systems in outdoor systems or similar environmental conditions are additionally provided with a heating system. Conductix-Wampfler GmbH's Conductor Rail Program 0812 is suitable for (protected) outdoor use. Therefore, heating should prevent the formation of frost on the conductor rail and the resulting loss of contact with the current collector. The heating system is not designed for defrosting, but rather for the prevention of condensation and frost. The conductor rail is heated using an electrical heating conductor that is fed into the insulation profile. It lies in the hollow cavity of the insulation profile. Each pole of a conductor rail system is heated. Terminal boxes for the electrical connection of the heating conductors are used in each case at the line feed and outfeed of a heating conductor circuit.

Among other things, the following must be observed:

- The heating conductor is supplied on a coil. An on-site suspension must be provided for the heating conductor coil.
- A cut-out must be made in the insulation profile for the entry and exit points of the heating conductor.
- A rail section (142 mm long) must be prepared for each of the expansion loops of the heating conductor.
- All sharp edges must be very well deburred. Burrs damage the insulation of the heating conductor.
- After connecting the heating conductor, an insulation measurement (see MV0800-0018) must be conducted.



**DANGER!**

#### **Risk of death due to electrical shock!**

Before work on the conductor rail system can begin, the heating must also be disconnected from the power supply! The heating can be designed as a separate electrical circuit and may need to be disconnected from the power separately from the conductor rail.

- Disconnect the power supply of each heating conductor circuit.



**NOTE!**

In all cases, heating requires extensive planning, otherwise neither the function nor the system safety can be guaranteed.

For a detailed description of the installation of the heating system, please read MV0812-0015 and observe the project-specific documents!

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#### 6.4.3.8 Mount expansion unit

To compensate for temperature-related changes in length for systems > 100 m or sections of the route that are integrated between two anchor points, e.g., with pickup guides at both ends of the section or with bends (natural anchor points), expansion units are required to accommodate the change in length. The expansion unit has two expansion points, each of which can accommodate a maximum 25 mm expansion. The expansion units are delivered pre-assembled as a conductor rail piece (4 m). The middle section of the expansion unit between the two expansion segments must be supported with a hanger clamp (not included in the scope of delivery) on the customer's support structure/substructure.

The use of a double current collector is recommended when using expansion units.

#### Required tools:

- Torque wrench up to 20 Nm and socket from SW 13

#### Work steps:

- Mount the hanger clamp (not included in the scope of delivery) for the center piece of the expansion unit (see Section 6.4.3.1).
- Clip the 4 m piece into the hanger clamp (see Section 6.4.3.1).
- Connect the two rail ends with a connector (see Section 6.4.3.4).
- The size of the air gap depends on the ambient temperature during installation. Determine the air gap dimension, consisting of the expansion point dimensions  $x_1$  and  $x_2$  (see Fig. 95), using the diagram (see Fig. 96 or the template diagram in Section 12.2). Set the determined dimension from below. The dimension does not need to be set symmetrically at the expansion points.

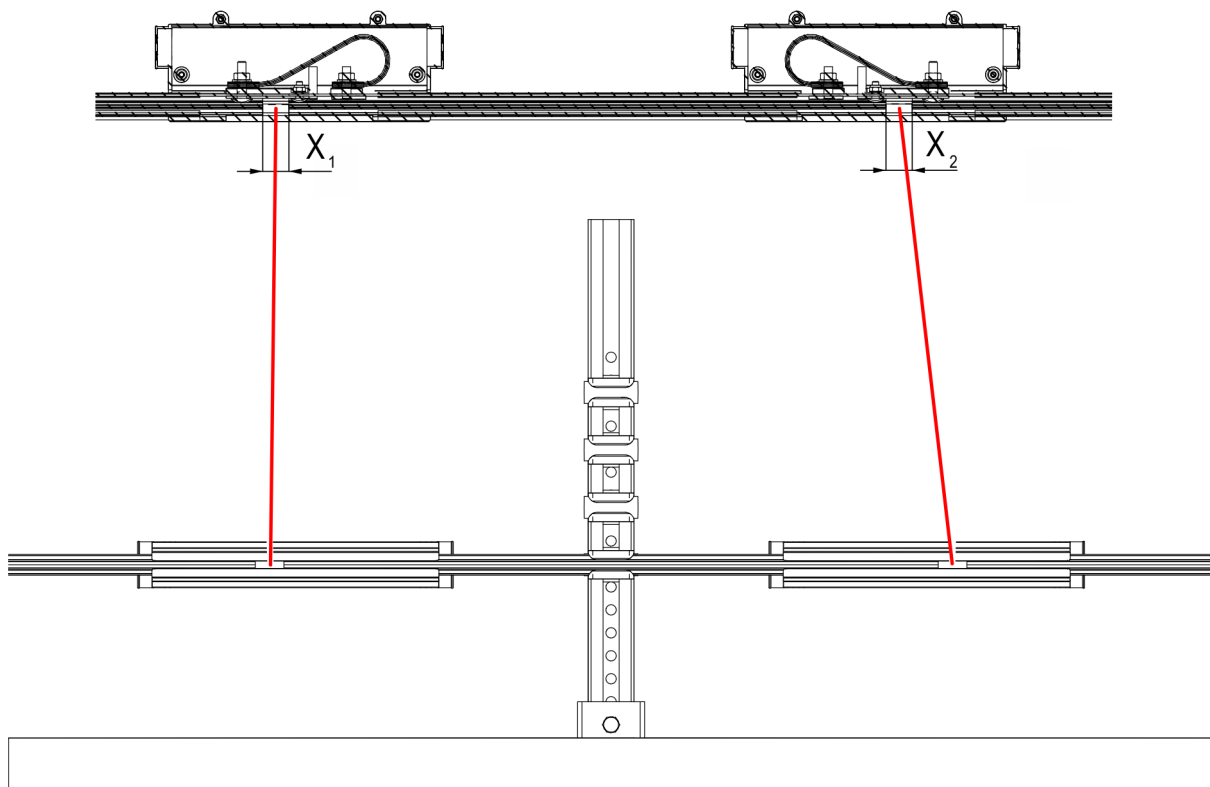


Fig. 95: Air gap in the expansion unit



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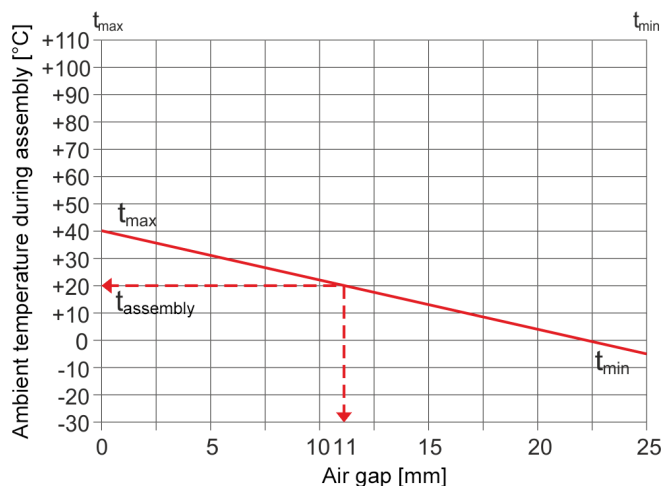


Fig. 96: Determine the size of the air gap

#### Instructions:

t<sub>min</sub> = lowest temperature occurring in the respective application

t<sub>max</sub> = highest possible ambient temperature + current heating

1. Enter the connecting line from t<sub>min</sub> to t<sub>max</sub>.
2. Enter a horizontal line at the ambient temperature during installation.
3. Drop a line down from the intersection of the two lines and read off the air gap to adjust.

#### Example

Temperature range: From -5° C to +40° C

Ambient temperature during assembly: + 20° C

Air gap: 11 mm per expansion point = 2 x 11 mm for the expansion unit.

#### \* Note

Guide values for current heating:

10° C up to 40% DC (duty cycle)

20° C up to 65% DC

30° C up to 100% DC



The diagram template in Section 12.2 can be used to help determine the air gap on the construction site!

→ After the closest anchor point on the route has been tightened, the set size of the air gap must be checked again.



Use the QR code ("click" or "scan") to see our animation: **Mounting and adjusting expansion unit.**

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#### 6.4.3.9 Mount air gap insulation section

Air gap insulation sections are used for galvanic isolation and segmentation of system sections and subdivide a conductor rail system into sections (e.g., maintenance lines that can be fed in and switched on separately). An air gap insulation section consists of two opposing end caps. For each isolation point, two air gap insulation sections are mounted at a suitable distance in order to avoid voltage leak across the double current collector.

#### Requirements:

The ends of the conductor rail ends are deburred (see Fig. 47) and not connected with a connector.



Please refer to the project-specific documents for the exact position of an air gap insulation section.

#### Required tools:

- Open-end wrench SW10
- Hexagon screwdriver SW5
- Rubber mallet

#### Work steps:

→ Slide the end caps (Pos. 1) onto the end of the rail (see Fig. 97) and mount (see Section 6.4.3.10).

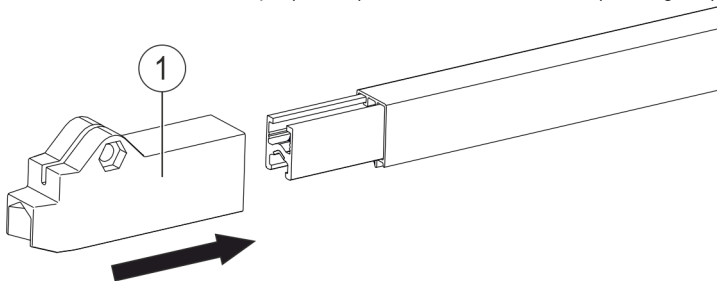


Fig. 97: Slide the end cap onto the end of the rail

→ Place the plate for the air gap insulation section (Pos. 2) on the end caps (Pos. 1) (see Fig. 98).

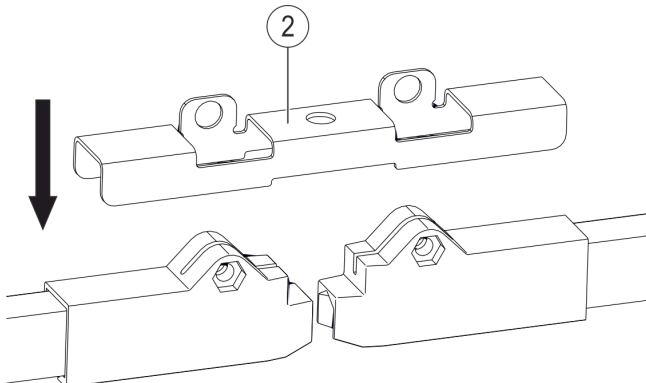


Fig. 98: Place plate on end caps

→ Place the cover (Pos. 3) on the plate (Pos. 2) (see Fig. 99).

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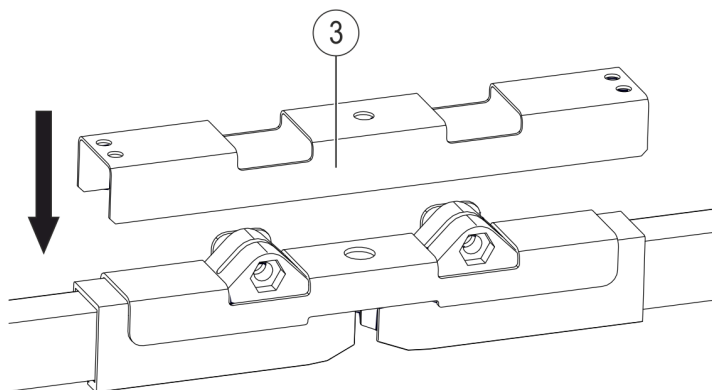


Fig. 99: Place the cover

- Tighten plate for air gap insulation section (Pos. 2) using countersunk screws DIN 7991 M6x30-A2 (Pos. 4) with an open-end wrench SW 10 and mount the locking nuts DIN 985 M6-A4 (Pos. 5) on the end caps (see Fig. 100).

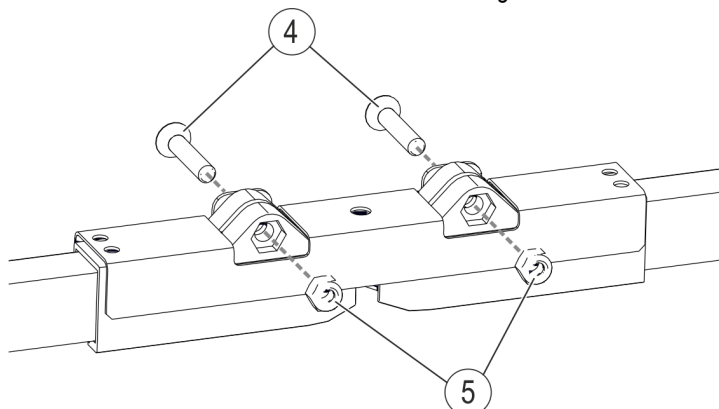


Fig. 100: Mount the plate for the air gap insulation section

- Tighten the countersunk screw DIN 7991 M6x16-A2 (Pos. 6) with a hexagon screwdriver SW5 and washer DIN 9021-A6,4-A2 (Pos. 8) as well as the hexagon nut DIN 985-M6-A4 (Pos. 7) using an SW10 open-end wrench so that the cover (Pos. 3) on the plate (Pos. 2) is mounted (see Fig. 101).

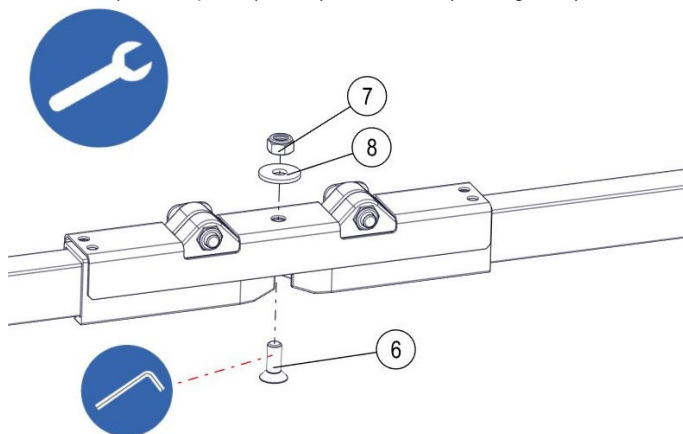


Fig. 101: Mount the cover

## Insulated Conductor Rail System

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→ Mount all air gap insulation sections in the same way.

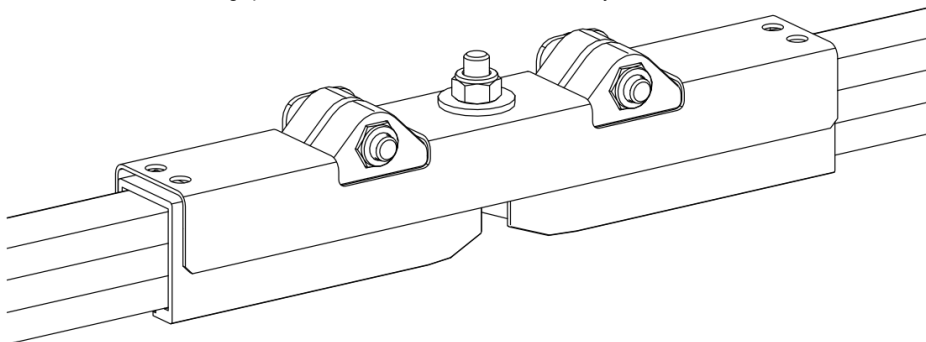


Fig. 102: Mounted air gap insulation section 0812



#### NOTE!

A potential difference in the two conductor rails in the air gap insulation section can lead to spark formation and electrical erosion in the rail during a current collector transfer. Therefore, avoid potential constructive differences!



Use the QR code ("click" or "scan") to see our animation: **Mounting air gap insulation section.**

#### 6.4.3.10 Mount end caps

##### Required tools:

- Hexagon screwdriver SW 4
- Rubber mallet

End caps are used to close rail end points and for protection against contact with the rails.

##### Requirements:

The outer edges of the conductor rail must be deburred (see Fig. 47).

##### Distances:

End cap end to hanger clamp center: Max. 250 mm

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#### Work steps:

- Tap the end cap (Pos. 1) onto the end of the conductor rail with careful and light mallet taps (see Fig. 103, Fig. 104 and Fig. 105).

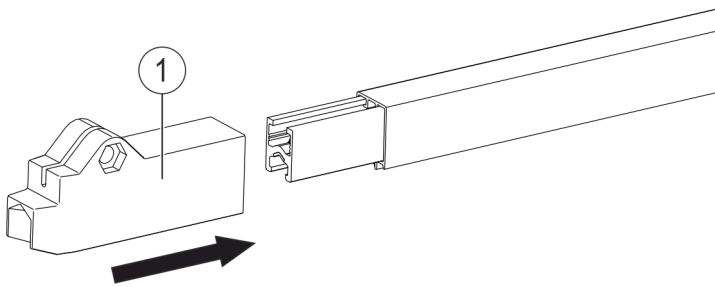


Fig. 103: Slide the end cap onto the end of the conductor rail

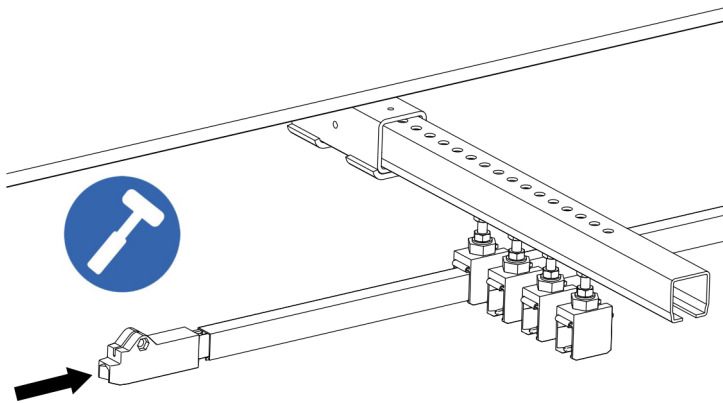


Fig. 104: Tap the end cap onto the end of the conductor rail

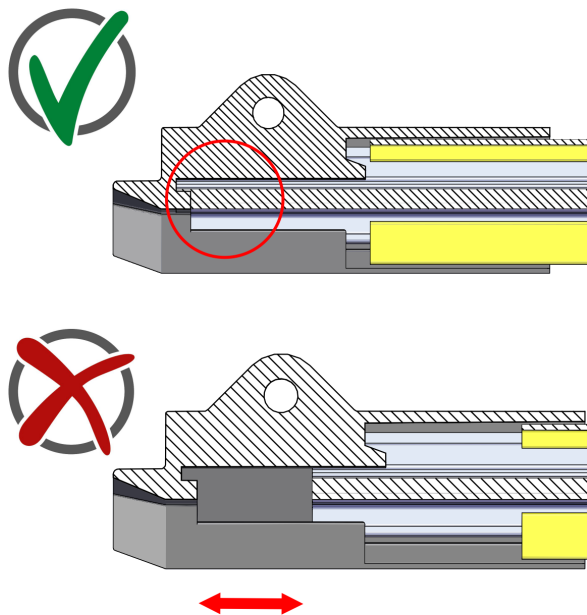


Fig. 105: The end cap is mounted correctly (above) and incorrectly (below)

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→ Tighten the cylinder screw DIN 6912-M6x20 (Pos. 2) and lock nut DIN 985-M6 (Pos. 3) with a hexagon screwdriver SW4 (see Fig. 106).

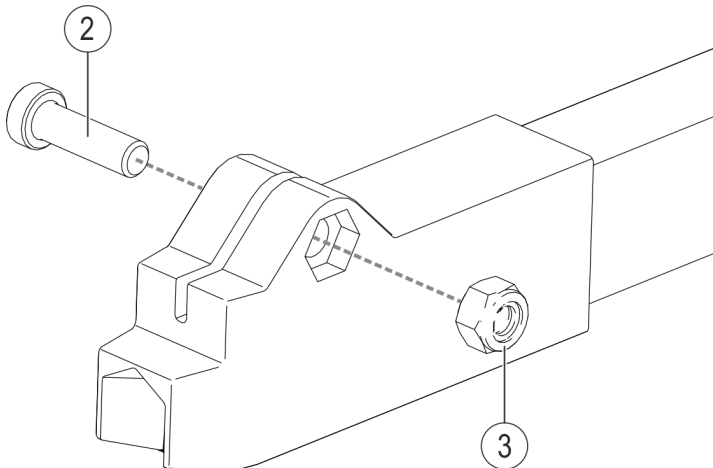


Fig. 106: Tighten cylinder screw

→ Mount each end cap in the same way (see Fig. 107).

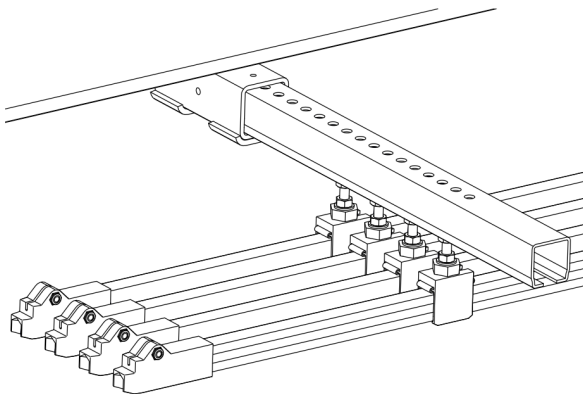


Fig. 107: All end caps are mounted



Use the QR code ("click" or "scan") to see our animation: **Mounting end cap.**

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#### 6.4.3.11 Mount pickup guide

When it is necessary to travel in and out of the conductor rail system, pickup guides are used in combination with the current collectors provided for this purpose. It should be noted that the maximum speed for pickup guides is 60 m/min and pickup guides are classified as wearing parts. The installation tolerances must be observed. Simultaneous offsets with the maximum tolerances in the x- and y-directions are not permitted.

The pickup guide centers the current collector with a maximum lateral and vertical offset of  $\pm 25$  mm (settings of less than  $\pm 10$  mm are recommended).



**NOTE!**

For systems with pickup guides, there must be an appropriate number of current collectors installed at an interval that ensures that the minimum number of current collectors required for the current demand is always engaged (see Fig. 109).



**WARNING!**

**De-energize current collectors or protect them against contact!**

The user must ensure that current collectors located between the pickup guides are de-energized or protected against accidental contact.

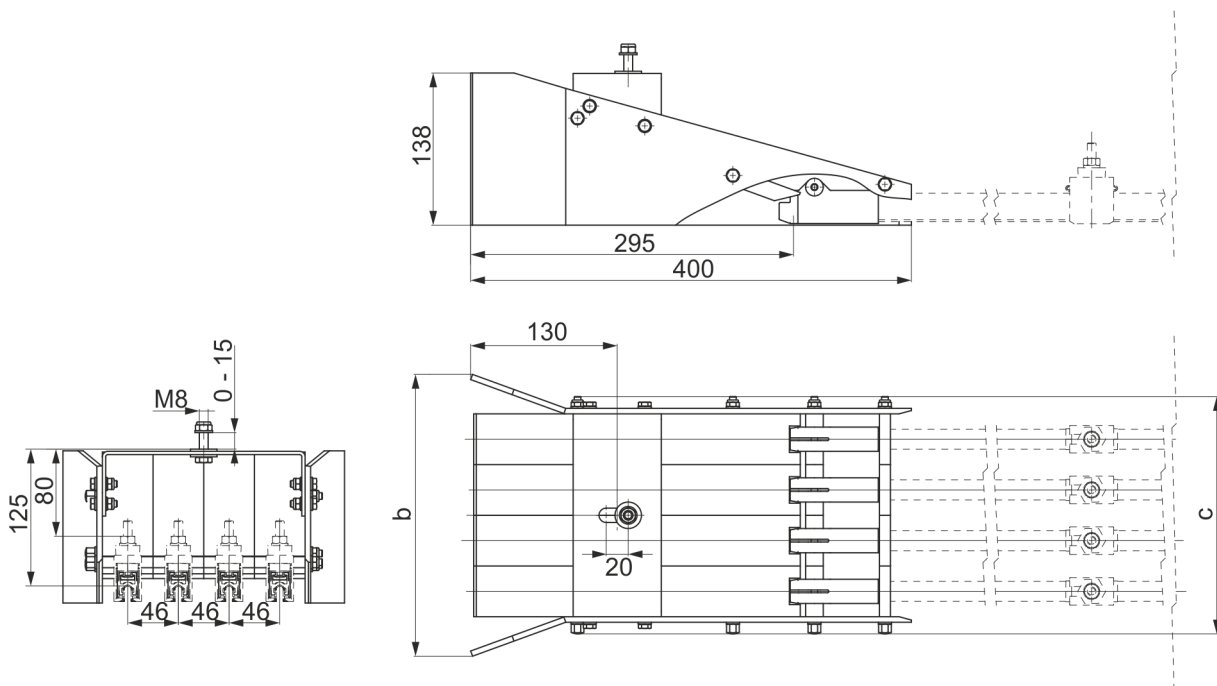


Fig. 108: Installation dimensions of the pickup guide

Dimension [mm]	Number of Poles					
	1	2	3	4	5	6
<b>b</b>	120	166	212	258	304	350
<b>c</b>	78	124	170	216	262	308

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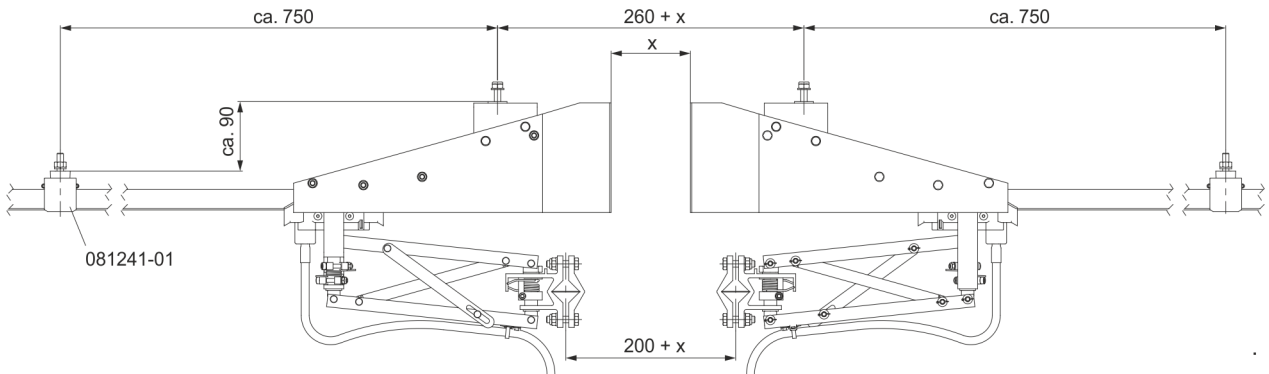


Fig. 109: Important dimensions for systems with pickup guides



**NOTE!**

Please also note the information on installing the PE current collector for systems with a pickup guide (see Section 6.4.4).

#### Hangar clamp distance for systems with pickup guides:

When using multiple pole pickup guides, the distance between phases must be reduced from 50 mm (Standard) to 46 mm on the section shortly before the pickup guide. For this purpose, 2 to 3 hanger clamps are mounted in front of the pickup guide with a distance of 46 mm (see Fig. 110).

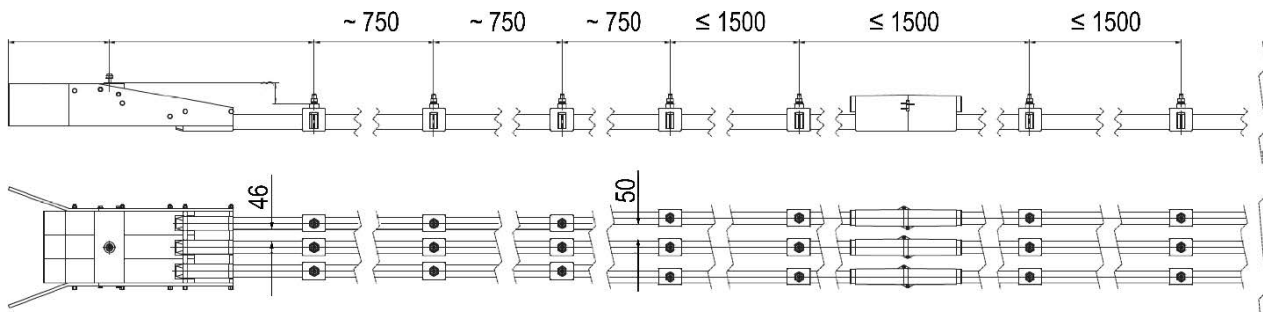


Fig. 110: System layout for systems with pickup guides

#### Requirements:

The phase offset of the hanger clamps in front of the pickup guide was reduced from 50 mm to 46 mm.

#### Distances:

Pickup guide to the first hanger clamp: 750 mm

#### Required tools:

- Rubber mallet
- Torque wrench up to 20 Nm with socket SW 10



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#### Work steps:

- The pickup guide is delivered complete with end caps. In order to slide the end caps onto the conductor rail, the continuous threaded rod on the side lock nuts M6 must be loosened. With more than four poles, if necessary, the end caps may need to be disassembled and individually pushed onto the conductor rail ends (see Section 6.4.3.10).



#### NOTE!

- Observe the reduced gap between phases near the guide area.
- Use double current collectors with stroke limitation and centering for the guide paths.
- Remove PE deflector for guide applications (use drilling template for PE protection against interchanging).
- Disconnect the current collector near the transfer or take on-site measures for shock protection, such as the installation height, covers, etc.

#### 6.4.4 Mount current collector

There are two types of current collector mounting:

- Single current collector 100 A.
- Double current collector 200 A

In addition, there are variants for insertion from below, from the side (see Section 6.4.4.1), variants for higher speeds and current collectors suitable for guide travel.

In order to mount the current collector onto the mobile consumer, it is mounted on a towing arm by means of a square support on the current collector.



#### NOTE!

The specified distance between the central axis of the towing arm and the contact surface must be maintained and it must be ensured that the central axis of the current collector is mounted exactly on the central axis of the conductor rail (see Fig. 113).

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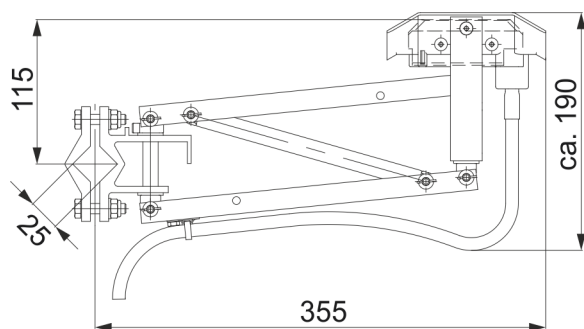


Fig. 111: Installation dimensions of the 100 A single current collector

#### Single current collector (100 A)

**Maximum current load:**

100A

**Max. travel speed:**

600 m/min; higher travel speeds on request

**Contact pressure:**

20 N

**Lateral deflection:**

Max.  $\pm$  50 mm

**Working stroke in insertion direction:**

Max.  $\pm$  50 mm

**Connecting cable:**

16 mm<sup>2</sup>, highly flexible, 1.5 m long (longer connecting cable on request)

**Distance between the axis of the towing arm and the contact surface of the rail (nominal installation dimensions):**

115 mm (see Fig. 113)

**Temperature range cables:**

-15 °C to +55 °C (ambient)

#### Double current collector 200 A

**Maximum current load:**

200 A

**Max. travel speed:**

600 m/min; higher travel speeds on request

**Contact pressure:**

2 x 20 N

**Lateral deflection:**

Max.  $\pm$  50 mm

**Working stroke in insertion direction:**

Max.  $\pm$  50 mm

**Connecting cable:**

16 mm<sup>2</sup>, 1.5m long, highly flexible; longer connecting cable on request

**Distance between the axis of the towing arm and the contact surface of the rail (nominal installation dimensions):**

115 mm (see Fig. 113)

**Temperature range cables:**

-15 °C to +55 °C (ambient), different temperature requirements on request

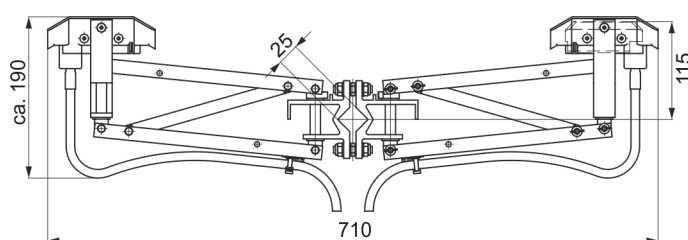


Fig. 112: Installation dimensions of the 500 A double current collector

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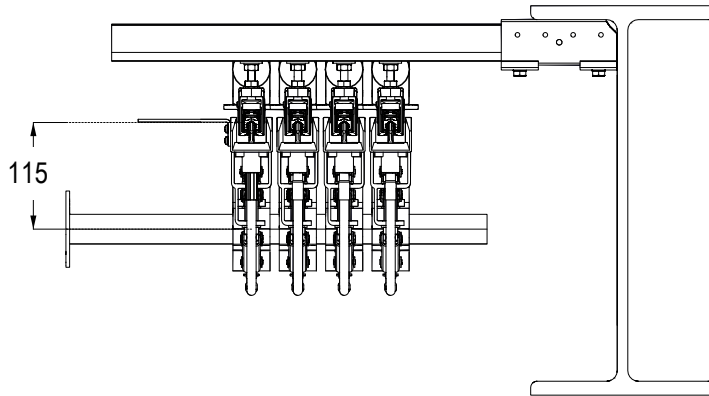


Fig. 113: Nominal mounting dimension 115 mm

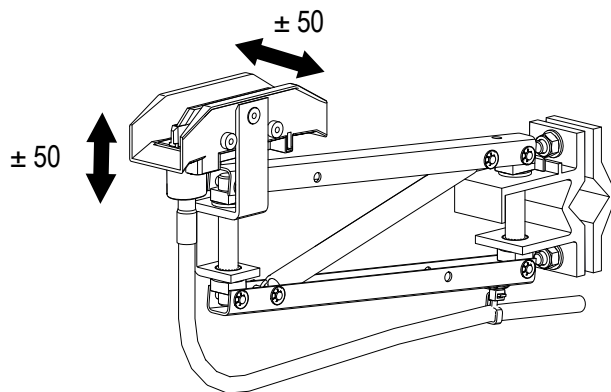


Fig. 114: Deviation of the current collector in mounted position with nominal mounting dimension 115 mm

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#### Instructions for mounting the current collector

- Make connecting cable straight and highly flexible in order to avoid deflection, pulling or pressing on the sliding contacts or movement restrictions of the current collector (see Fig. 115 to Fig. 121).
- Use only highly flexible and double-insulated (for voltages > 48 V) Conductix-Wampfler connecting cables! In the event of repairs, use notch cable lugs with shrink tubing for the flexible connecting cables (see Connection repair set, Order No.: 08-K154-0397).
- Do not bundle, fix or attach identification signs to the current collector connecting cable!
- Do not allow foreign objects to protrude into the moving range of the current collector and connecting cables!
- Select foreign objects such as fastening screws so that the movement of cables and current collectors is not affected.
- In systems with curves, the ideal mounting position for the current collector is directly at the height of the wheel contact point (in the pivot point or in the steering axis) of the guideways. When the positions and internal and external curves deviate too far, the distances to the rail and thus the contact pressure change. In the worst case, the sliding contacts and conductor rail can cause increased wear and tear to the point of damage to the system. Tolerances must be strictly maintained at the narrowest points.

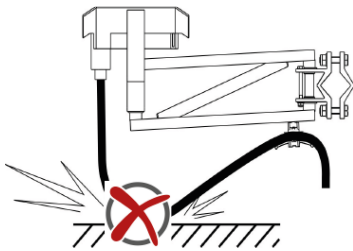


Fig. 115: The connecting cable must not be laying downward

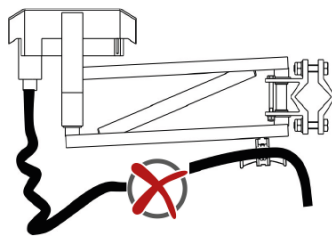


Fig. 116: Do not compress or kink the connecting cable

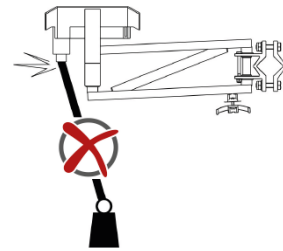


Fig. 117: Do not load the connecting cable

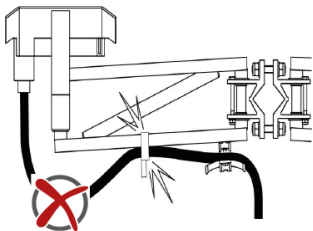


Fig. 118: Do not fix the connecting cable to the joint of the current collector with a cable tie

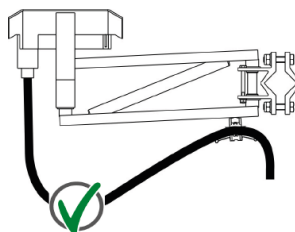


Fig. 119 Connecting cable laid correctly

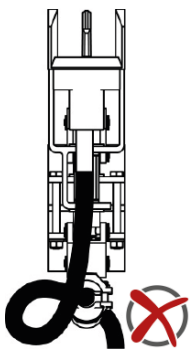


Fig. 120: Do not twist the connecting cable

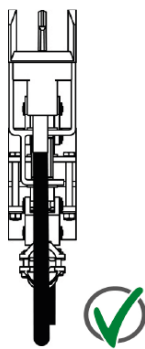


Fig. 121: Connecting cable is not twisted

## Insulated Conductor Rail System

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#### Requirements for mounting the current collectors

- Conductor rail is installed (see Section 6.4.3)
- Mobile unit (s) used in the guideway
- Towing arm (see Order No.: 020195-630 and 020495-630) mounted on the mobile unit and aligned parallel to the poles of the conductor rail. If there are bends in the conductor rail, the towing arm should be installed in the pivot point or in the steering axis. Observe the current collector tolerances (installation dimensions, check at the narrowest point in the case of curves). The towing arm must not have any play or bend.

#### Required tools:

- Open-end wrench SW 13 (2 pieces)

#### Work steps:

- The towing arm is mounted with four screws on the connecting flange to a suitable point of the vehicle. Observe the installation dimensions provided above.
- Tension the towing arm (Pos. 1) in the middle support (square) (Pos. 3) of the current collector. The outer nuts M8 (Pos. 2) at the same time, gradually tighten alternately with an open-end wrench (see Fig. 122). Observe the tolerances and instructions provided above.

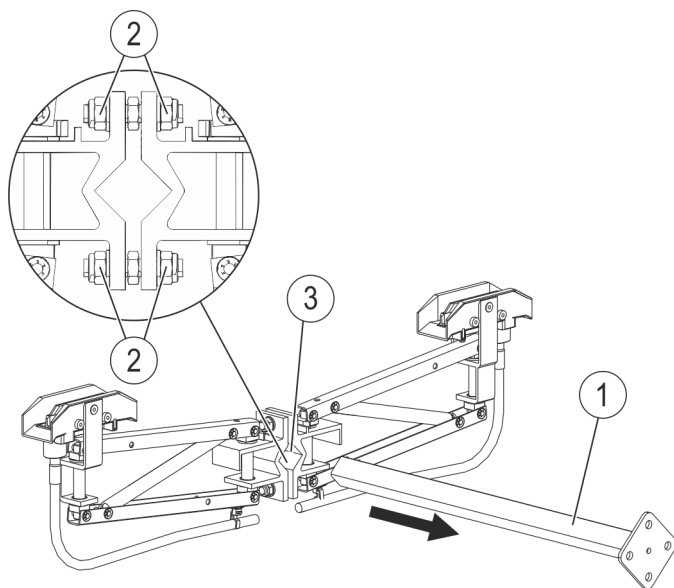


Fig. 122: Mount the towing arm



Use the QR code ("click" or "scan") to see our animation: **Current collector tolerances.**

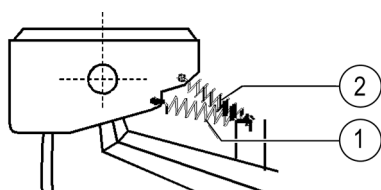
## Insulated Conductor Rail System

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#### Towing and reversing operation

For circuit systems in which one direction of travel prevails, the 081209 current collector can be used in the towing design. By applying the spring, which holds the sliding contact in the direction of travel, this incline sequence is counteracted as much as possible. Towing current collectors are used in systems where motion in one direction of travel prevails. Travel in the opposite direction is possible.

Current collectors in reversing mode are used for systems with uniform distribution of the direction of movement, e.g., cranes, etc. The Standard 0812 articulated current collectors are only available for the reversing operation that prevails in typical applications.



- 1 - Position spring in reversing mode
- 2 - Position spring in towing mode

Fig. 123: Stabilizing spring for towing and reversing operation

#### 6.4.4.1 Current collector insertion from the side

For current collectors with insertion from the side, the spring (Pos. 1) counteracts the weight on the bearing.

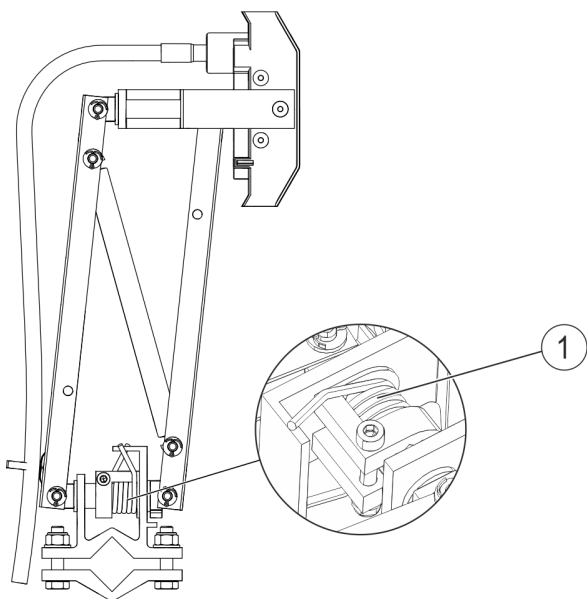


Fig. 124: Spring (Pos. 1) on the current collector for side insertion

#### 6.4.4.2 Typical mounting errors

- Rail joints and transfers have not been deburred.
- Distance within connectors was not maintained (gap size > 3 mm for aluminum-stainless steel/CopperECO).
- Pickup guides are not set correctly (end positions, dimensional tolerances).
- Incorrect current collector connecting cables were used.
- Connecting cables are not used according to the specifications (not free of directional and tensile forces).
- Installation positions are not within specification. Permissible tolerances exceeded in bends and curves.

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## 6.5 Electrical installation

### 6.5.1 Conductor rail

Pay attention to the selection of the connecting cable and to a tension-free laying.

- Select cables with suitable cross section.
- For phases, doubly insulated connecting cables must be provided for voltages > 48 V.
- At feed-in points that change their position when the system is subjected to a thermal expansion (not recommended!), the connecting cable must be laid with a flexible loop.
- Connecting cable is provided with on-site strain relief.

### 6.5.2 Current collector

- Pay attention to the selection of the connecting cable and to a correct and tension-free laying of the connecting cables (see Fig. 115 to Fig. 121).
- Only use highly flexible Conductix-Wampfler cables! In principle, connecting cables with copper wires are to be used.
- Use ferrules with insulation collars for the flexible connecting cables.
- For phases, doubly insulated connecting cables must be provided for voltages > 48 V.
- Do not bundle or fix the connecting cable of the current collector or provide it with identification labels!
- Do not allow foreign objects to protrude into the moving range of the current collector and connecting cables!

## 6.6 Further documents



### Read and observe the additional operator instructions!

You can find further information on the installation of conductor rail systems in the following instructions:

- WV0800-0001 Cleaning of conductor rails
- WV0800-0002 Conductor rail maintenance plan
- MV0800-0018 Heating cable insulation measurement
- MV0800-0019 Conductor rail insulation measurement
- MV0812-0002 Bending device
- MV0812-0015 Heating conductor program 0812
- MV0812-0016 Brief instructions for Conductor Rail System 0812)
- MV0812-0017 Hanger clamp\_Anchor point\_Fall arrest device in vertical applications
- IBC0812-0001 Commissioning Checklist 0812

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### 7 Commissioning

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#### 7.1 Safety

##### Personnel:

- The conductor rail system must only be commissioned and operated for the first time after a repair by qualified electricians!
- The qualified electricians must meet the requirements described in Section 2.2.1.

##### Recommended protective equipment:



##### **Risk of injury due to improper commissioning!**

Improperly performed commissioning can lead to dangerous situations for personnel (see Section 7.2.1).



**WARNING!**

- Before commissioning, carry out the inspections on the inspection list of the manufacturer.
- Measure the insulation resistance (see MV0800-0018 and MV0800-0019) each time before commissioning. Follow the locally applicable technical standards, guidelines, and laws.
- Always make sure that all of the assembly and installation work has been fully completed before commissioning the system.
- Always ensure that all of the components have been properly installed before commissioning the system.



**CAUTION!**

##### **Ensure a free travel path before beginning the commissioning!**



**CAUTION!**

##### **Contact problems or increased heating!**

- Clean the sliding contact before commissioning and remove soiling, oxidation, pitting corrosion and other impurities by means of a brass brush or abrasive paper (320 grit).
- Avoid standstill operation with high currents during commissioning as far as possible. The sliding contacts are not yet grounded and can therefore heat up more.



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#### **Risk of injury by crushing of skin and limbs!**

There is a risk of crushing of skin and limbs due to:



**DANGER!**

- Do not stand directly below the conductor rail system
- Do not enter the danger zones of the system during operation. The operator/system manufacturer must ensure the technical protective measures are taken (covers, protection by distance, control technology, etc.).
- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.

#### **Fire hazard due to overload or sparking!**

Fire hazards occur due to overloaded cables, electrical arcs, short circuits or sparking. Sparking can occur with poorly serviced, soiled conductor rails or if installation does not comply with the required tolerances.

Take the following measures:



**DANGER!**

- Before commissioning, ensure that all installation work has been completed and all the components have been properly installed.
- Conduct prescribed electrical testing
- Permissible current values must be observed.
- Maintain tolerances during operation.
- Carry out dimensioning according to permissible system load capacity and provide for appropriate electrical protective devices.
- Do not remove the prescribed electrical safety devices and protective devices.
- Do not store easily ignited materials near conductor rails.
  - Check, service and clean conductor rails regularly and as prescribed. See Section 12

#### **Risk of injury due to ensnarement or impact!**

An ensnarement and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.



**DANGER!**

- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices, etc.) have been removed or disabled.
- Use caution when working in the vicinity of the danger zone, particularly below the conductor rail.
- Beware of falling parts of the conductor rail system in the event of improper assembly or in unsuitable operating conditions (e.g., in an environment containing solvents)
- Wear personal protective equipment!

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**DANGER!**

#### **Risk of injury due to impacts and punctures/stabs!**

Risk of injury due to impacts and punctures/stabs from sliding conductor rails due to holding packaging units at an angle, damaged packaging, or carelessness with long goods/transport crates.

Risk of injury due to impacts and punctures/stabs from falling conductor rails in areas with pedestrian traffic.

- Wear personal protective equipment!
- Cordon off the work area!
- Use caution when working in the vicinity, particularly below the conductor rail.
- Do not step under suspended loads!
- Before lifting, ensure that the packaging/transport crate is undamaged!



**WARNING!**

#### **Risk of injury due to punctures and stabs!**

The packaging material can contain points and sharp objects such as nails, struts, steel bands and wood splinters that can cause injury to limbs.

- Wear personal protective equipment!
- Cordon off the work area!



**WARNING!**

#### **Risk of burns from hot surfaces!**

Components can get hot during operation.

- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.
- Protective devices are to be provided by the customer.
- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices) have been removed or are not activated.
- Wear personal protective equipment!



**CAUTION!**

#### **Before switching the system on!**

- Ensure that all installation work has been completed and all the components have been properly installed.
- Before each startup of the product or system, measure the insulation resistance (see MV0800-0019) according to locally applicable technical standards, directives and legal regulations.
- Conduct locally required electrical tests.
- Ensure adequate stability on the product/system for the commissioning engineer.

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**DANGER!**

#### **Risk of death due to electrical shock!**

Contact with components carrying electrical power can lead to death or severe injury due to electrical shock. Danger of injury due to shock reactions, falling or being thrown across the room due to electrical shock.

- Customer-side grounding of metallic components must be present.
- Customer-side protective devices must be present.
- Ensure secure footing.
- Use personal protective equipment.

## 7.2 Testing and initial commissioning

### 7.2.1 Test list



#### **Read and observe the further documents!**

Further information on testing and commissioning the conductor rail system can be found in the following document:

- Commissioning Checklist 0812 (IBC0812-0001)

### 7.2.2 Initial commissioning of the conductor rail system

- Conduct a complete run along the conductor rail (walking pace).



**NOTE!**

#### **The current collectors must not become caught, stick, or scrape!**

Where necessary, repair any faults and conduct settings work.

After initial commissioning, a further review must be conducted to detect any damage or problems in the system.

#### **Visual inspection of the product/system after initial commissioning:**

- Current collector undamaged and without signs of heavy wear.
- Conductor rail components undamaged and in the proper location. No displacements or distortions. Check hanger clamps, end caps and anchor points in particular!
- Check that there are no visible signs of heavy wear (chips, plastic parts, etc.). Signs of heavy wear indicate that installation clearances and their tolerances are not complied with. This can sometimes also be the case for individual sections of the route.

## Insulated Conductor Rail System

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## 8 Operation

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The only operations required to operate the conductor rail system are switching the power supply on and off to stop/activate the system as in Section 8.3.

The safety information in Section 8.1 must be observed to ensure safety during operation.

### 8.1 Safety



**DANGER!**

#### **Risk of death due to electrical shock!**

Contact with components carrying electrical power can lead to death or severe injury due to electrical shock. Danger of injury due to shock reactions, falling or being thrown across the room due to electrical shock.

The conductor rail must not be operated under the following circumstances:

- If the conductor rail is heavily soiled.
- If the conductor rail is wet.
- If parts under voltage are exposed (insulation profile or the insulation of the connecting cable are damaged).
- If the hanger clamp or insulation profile fail.
- If the conductor bar falls down and contacts a conductive material.

Take the following measures:

- Install the conductor rail in an area that is not accessible to the public outside and out of manual reach.
- Ensure proper electrical protection at all times.
- The danger zone must be enclosed by the customer or protection ensured by distance.
- Ensure customer grounding of metallic components at all times.
- Ensure the function of the customer's protective devices at all times.
- Regularly check, maintain and clean the conductor rail, repair if necessary.



**DANGER!**

#### **Risk of injury due to cutting and amputation!**

Cutting on sharp edges must be avoided.

- Wear personal protective equipment!
- The operator/system manufacturer must ensure the technical protective measures are taken (covers, protection by distance, control technology, etc.)
- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.

## Insulated Conductor Rail System

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#### **Risk of injury due to ensnarement, punctures/stabs and/or impacts!**

An ensnarement and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.

- Cordon off the work area.
- Do not enter the danger zones of the system during operation. The operator/system manufacturer must ensure the technical protective measures are taken (covers, protection by distance, control technology, etc.).
- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices, etc.) have been removed or disabled.
- Use caution when working in the vicinity of the danger zone, particularly below the conductor rail.
- With an installation height of 3 m or more in areas with pedestrian traffic, the conductor rails must be secured against falling.
- Beware of falling parts of the conductor rail system in the event of improper assembly or in unsuitable operating conditions (e.g., in an environment containing solvents).
- Wear personal protective equipment!



**DANGER!**

#### **Unauthorized personnel are at risk!**

Unauthorized personnel are not familiar with the hazards in the working area.

- The system must only be operated by trained personnel!
- Keep unauthorized personnel away from the working area.
- In case of doubt, address such persons and direct them away from the working area.
- Stop working as long as unauthorized personnel are in the working area.



**WARNING!**

In order to comply with the **most important measures** for protection against hazards, the measures specified in Sections 2 and 3 must be observed. For information on foreseeable incorrect applications or unsuitable ambient conditions particularly see Sections 2.5 and 3.3.

#### **Risk of injury from falling conductor rails!**

The hanger clamps of the conductor rail can fail, and the conductor rail can fall down. Components can be damaged if the following or similar materials are stored in the vicinity of the conductor rail:

- Foodstuffs that contain aromatic compounds that can evaporate
- Coating products and paints
- Separating agents or coolants and lubricants
- See Section 3.3 and 2.8.4
  - Do not store any of the above or similar substances near the conductor rails



**DANGER!**

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#### Fire hazard due to overload or sparking!

Fire hazards occur due to overloaded cables, electrical arcs, short circuits or sparking. Sparking can occur with poorly serviced, soiled conductor rails or if installation does not comply with the required tolerances.

Take the following measures:



**DANGER!**

- Conduct prescribed electrical testing before commissioning.
- Before operation, ensure that the system has been properly commissioned.
- Permissible current values must be observed.
- Maintain tolerances during operation.
- Carry out dimensioning according to permissible system load capacity and provide for appropriate electrical protective devices.
- Do not remove the prescribed electrical safety devices and protective devices.
- Do not store easily ignited materials near conductor rails.
  - Check, service, and clean conductor rails regularly and as prescribed. See Section 12

#### Danger of injury due to dust and abrasion!

Breathing difficulties and eye irritation can occur due to dust thrown up and abrasion of the carbon brushes, sliding contacts, copper conductor bars and plastic. There is a health hazard due to airborne respirable dust. **Cancer, mucous membrane irritation and respiratory diseases** can be a consequence of frequent and prolonged stays in a heavily used facility without protective equipment.



**DANGER!**

#### Observe the following measures:

- Clean regularly! As needed and before starting the work, clean the conductor rail according to regulations (observe WV0800-0001). See Section 12.1
- Prevent inhalation of dust from the conductor rail.
- Do not store or consume open food in the immediate vicinity of the conductor rail.
- See Section 2.8.3 for further information.

#### Risk of burns from hot surfaces!

Components can get hot during operation.



**WARNING!**

- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.
- Protective devices are to be provided by the customer.
- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices) have been removed or are not activated.
- Wear personal protective equipment!

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#### 8.2 Normal operation

The conductor rail system 0812 is protected against accidental contact and is suitable for use in non-publicly accessible areas, out of hands' reach in indoor and weather-protected outdoor areas, e.g., for ceiling cranes, process cranes or automatic passenger transport.

#### 8.3 Stopping the system



**DANGER!**

**Risk of injury due to electric shock!**

→ Disconnect the **conductor rail system** from the power supply and secure it against switching on again according to the 5 Safety Rules. 5 Safety Rules see Section 2.7



#### 8.4 Continuing operation



**WARNING!**

**Risk of injury due to disabled safety equipment and protective devices!**

→ Before switching the system back on, ensure that all covers, safety systems and protective devices are installed and working properly.

**Before switching the system back on, ensure that:**

- The current collector heads are in contact with the conductor rail over their full length and the prescribed contact pressure is available.
- There is no coarse soiling or objects in the conductor rails.
  - Perform a visual inspection.
- The insulation resistance corresponds to the locally applicable technical directives:
  - As needed, before the device or system is started, measure the insulation resistance according to locally applicable technical standards, directives, and legal regulations.
- Visual inspection of the product/system:
  - Current collector undamaged and without signs of heavy wear.
  - Conductor rail components undamaged and in the proper location. No displacements or distortions. Check hanger clamps, end caps and anchor points in particular!
  - Check that there are no visible signs of heavy wear (chips, plastic parts, etc.). Signs of heavy wear indicate that installation clearances and their tolerances are not complied with. This can sometimes also be the case for individual sections of the route.

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### 9 Service and Maintenance

#### 9.1 Safety

Recommended protective equipment:



**DANGER!**

#### Risk of injury due to electric shock!

- Disconnect the **conductor rail system** from the power supply and secure it against switching on again according to the 5 Safety Rules. 5 Safety Rules see Section 2.7



#### Risk of death due to electrical shock!

Contact with components carrying electrical power can lead to death or severe injury due to electrical shock. Danger of injury due to shock reactions, falling or being thrown across the room due to electrical shock.



**DANGER!**

- Disconnect all line feeds from the power supply.  
The main power supply and heater voltage supply must be disconnected and secured against switching on again.
- Check whether a voltage is still present in the components and take measures where necessary.
- The customer must provide grounding for metallic components.
- The customer must provide protective devices.
- Conduct prescribed electrical testing.
- Observe the 5 Safety Rules (see Section 2.7)!
- Ensure secure footing.



**WARNING!**

#### Risk of injury due to improperly executed maintenance and/or servicing tasks!

Improper or omitted maintenance or servicing work can result in serious injury to persons and/or material damage. Loosely stacked or components and tools that are left lying around are a source of danger. They are a trip hazards and improperly stored components can fall over or fall to the ground.

- The system must only be serviced and maintained by specialist personnel!
- Before starting work, ensure there is sufficient space for the installation.
- Ensure the installation area is clean and tidy!
- If components have been removed, be careful to reinstall them properly, replace all fastening elements and comply with screw tightening torques.



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**CAUTION!**

#### **Risk of damage when cleaning the conductor rail!**

When cleaning, only loose or lightly adhering dust or foreign substances may be removed.

- **Do not use contact spray** (formation of silicon carbide/abrasive and/or damage of plastic parts).
- Use abrasives or brushes as a tool only partially to remove strong adhesion from the light burn points. This work should only be conducted by qualified personnel.
- The lubricant layer on the guideway must not be removed, this will damage the rail (see also WV0800-0001 and WV0800-0004).

#### **Danger of injury due to dust and abrasion!**

Breathing difficulties and eye irritation can occur due to dust thrown up and abrasion of the carbon brushes, sliding contacts, copper conductor bars and plastic. There is a health hazard due to airborne respirable dust. Sensitization may occur if handling the conductor rail frequently and/or carelessly handling dust accumulation. **Cancer, mucous membrane irritation and respiratory diseases** can be a consequence of frequent and prolonged stays in a heavily used facility without protective equipment.

#### **Observe the following measures:**

- Clean regularly! Before starting work, clean the conductor rail according to regulations (observe WV0800-0001). See Section 12.1
- Wear personal protective equipment:
  - Protective eyewear
  - Dust mask Class FFP3 (observe local regulations)
  - Protective gloves
  - Disposable coveralls
- Prevent contamination of the environment (e.g., people, goods, production facilities, etc.) while cleaning by taking appropriate measures (use covers, barriers, filter systems).
- Do not **blow out dust with compressed air**, but rather vacuum it away. The vacuum must be equipped with a HEPA Class H fine filter.
- Do not eat or drink in the work area! Do not store or consume open food in the immediate vicinity.
- Do not smoke during the work!
- See Section 2.8.3 for further information.



**DANGER!**

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#### **Risk of injury due to ensnarement, punctures/stabs and/or impacts!**

An ensnarement, punctures, and stabs and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.

Risk of injury from impacts and punctures/stabs from the conductor rail sliding out when holding the rails at an angle, from carelessness with long goods or from falling conductor rails in areas with pedestrian traffic.



**DANGER!**

- Cordon off the work area!
- The main power supply (from the building) must be disconnected in the installation area and secured against switching on again.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices, etc.) have been removed or disabled.
- Wear personal protective equipment!

#### **Risk of injury due to impacts, punctures and stabs!**

Hazard due to moving or falling parts during maintenance/servicing.



**WARNING!**

- Wear personal protective equipment!
- Cordon off the work area!
- Use caution when working in the vicinity, particularly below the conductor rail.

#### **Fire hazard due to overload or sparking!**

A fire hazard can occur due to overloads of the cable, electrical arcing or short-circuits.



**WARNING!**

- Before recommissioning, ensure that all work has been completed and all components have been properly installed.
- Conduct prescribed electrical testing.
- Permissible current values must be observed.
- Electrical fuses must be installed according to regulations.
- Warn against misuse.
- Do not store easily ignited materials near conductor rails.
- Carry out dimensioning according to permissible system load capacity and provide for appropriate electrical protective devices.

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**WARNING!**

#### **Risk of burns from hot surfaces!**

Components can get hot during operation.

- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.
- Protective devices are to be provided by the customer.
- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices) have been removed or are not activated.
- Wear personal protective equipment!
- Allow components to cool before servicing.



**CAUTION!**

#### **The functioning and availability of the conductor rail system are dependent on the quality of the contact surface!**

Copper conductor rails are dependent on a lubricant-patina guideway that builds up during operation and should not be removed (no sanding or brushing off). Observe the Maintenance Instructions WV0800-0004!



**DANGER!**

#### **Risk of explosion!**

Airborne dust, open flames or other sources of ignition can result in explosion.

### Conducting maintenance work on the current collectors



**DANGER!**

#### **Risk of injury due to crushing of skin and limbs!**

There is a risk of crushing of skin and limbs due to:

- Current collector (spring force) during preassembly, installation, disassembly, and maintenance.
- Only permit trained technicians to conduct the work.
- Wear personal protective equipment!
- When changing the sliding contacts, follow the separate instructions for this task. See Section 12.1

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#### Replacing conductor rails



**DANGER!**

#### **Risk of injury due to cutting and amputation!**

The ends of the conductor bars can have sharp edges, particularly if they were cut to size at the installation site and have not been deburred.

- Wear protective gloves and protective shoes.
- For mounting: Carefully deburr the insulation profile and conductor bars after sawing.
- Sawed through, disassembled conductor rails must be handled carefully and properly stored (container or transport crate).
- Be mindful of sharp edges in the surroundings of the installation area and avoid contact.

## 9.2 Tools and materials

The maintenance work on the conductor rail must be conducted using commercially available metric tools.

Maintenance work	Tool
Measure the height of the sliding contacts	Calipers
Determine the contact pressure of the sliding contacts	Spring scale with a measuring range of 0 N to 30 N

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#### 9.3 Replace sliding contact



**NOTE!**

Sliding contacts must be replaced in a timely manner before the minimum wear height is reached. The minimum wear height ( $h_{min}$ ) can be found in the maintenance schedule for conductor rails (see Section 12.1).

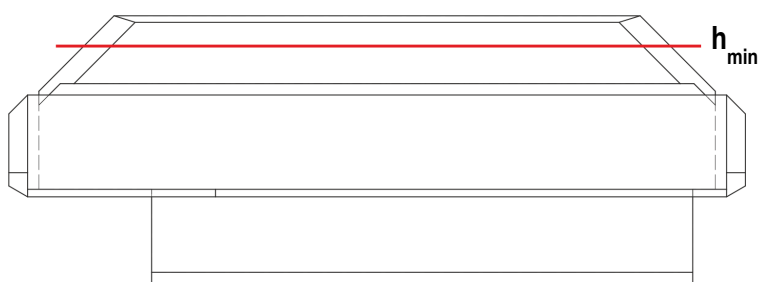


Fig. 125: Minimum wear height ( $h_{min}$ )

In order to replace the sliding contact (Pos. 1) (see Fig. 127), the following work steps must be conducted:

- Disconnect the entire system from the power supply. Also observe the notes for this in Section 2.7.
- Pull the current collector down in the spring-loaded state and unscrew it from the side in order to be able to remove the current collector from the conductor rail (see Fig. 126). If there are more than three poles, the current collector may need to be removed from the carrier.

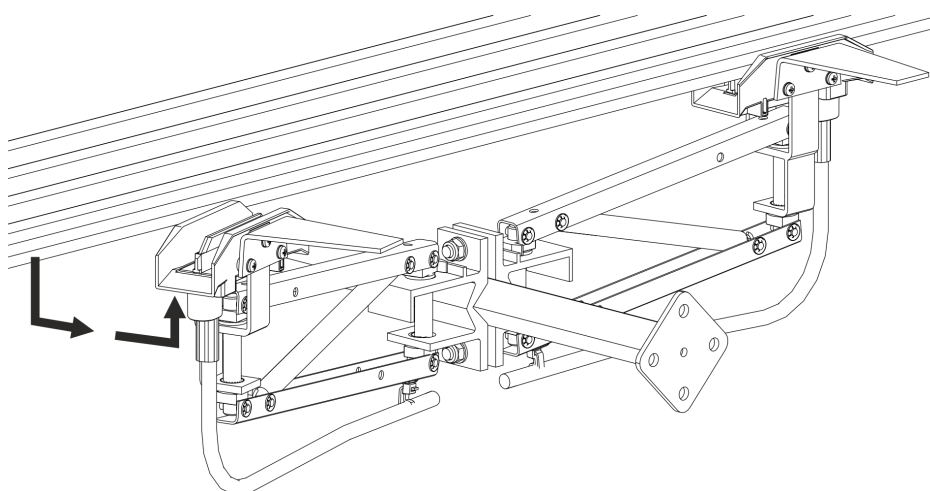


Fig. 126: Remove the current collector from the conductor rail

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- It is best to clean the current collector head with oil-free compressed air (while wearing a mask). If oil-free compressed air is not available, a cloth and a suitable cleaning agent that does not corrode the plastic must be used for cleaning.
- Hold the current collector head firmly and use water pump pliers to adjust the sliding contact (Pos. 1) with its plastic insulation (Pos. 2) pulled out. Start pulling out on the more open side (= side A in Fig. 128) of the contact plate (Pos. 3) (see Fig. 127 and Fig. 128).

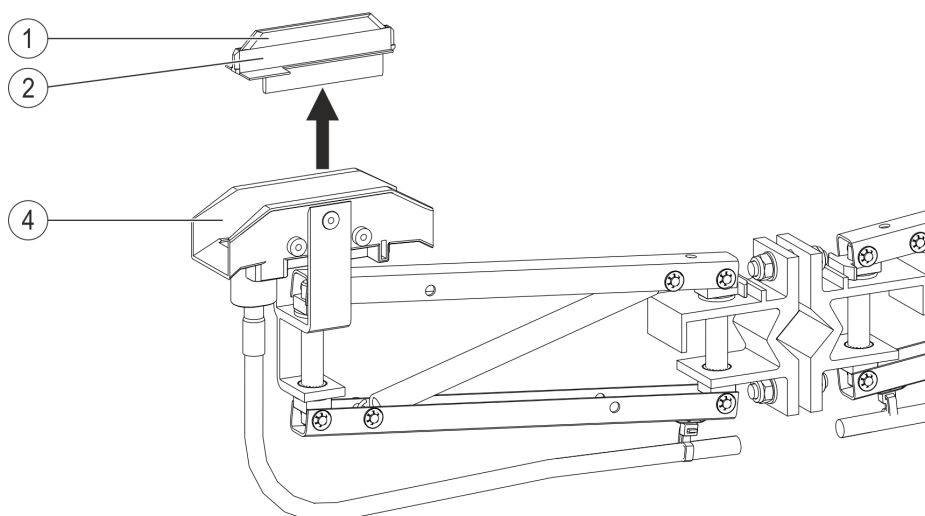


Fig. 127: Remove sliding contact (Pos. 1) and plastic insulation (Pos. 2)

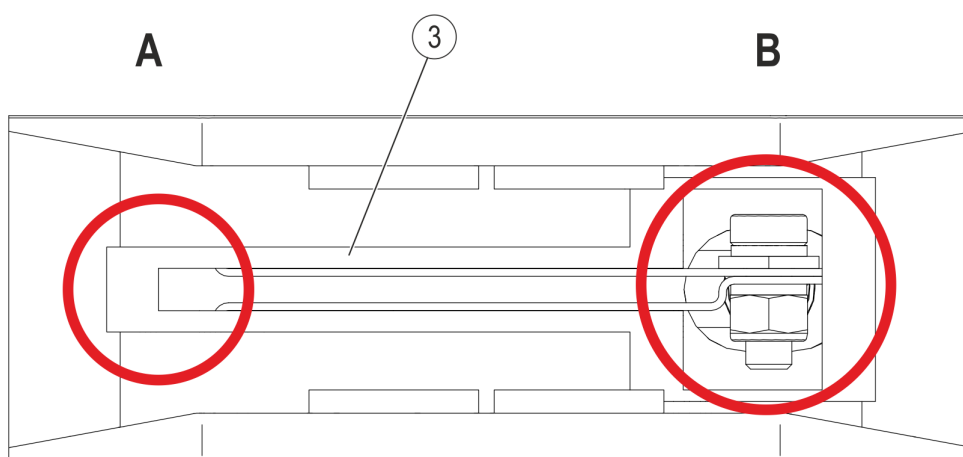


Fig. 128: Farthest side (A) and narrowest side (B) of the contact plate (Pos. 3)

- Clean the area under the plastic insulation (Pos. 2), particularly the contact surface of the contact plate (Pos. 3) (see Fig. 128).

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→ Press the new sliding contact with its plastic insulation by hand into the sliding contact insulation (Pos. 4) (see Fig. 129). Start at the more open side of the contact plate (side A in Fig. 128) and then fully insert the sliding contact while turning. No tools (such as a hammer) may be used when pressing in, as this can damage the contact surfaces of the sliding contact. Please note the following when inserting:

- The sliding contact cut-out (Pos. 1) must sit on the side of the rail (Side B) (see Fig. 129).
- The sliding contact (Pos. 1) must be between the contact plate (Pos. 3) and must not sit next to the contact plate (see Fig. 130).

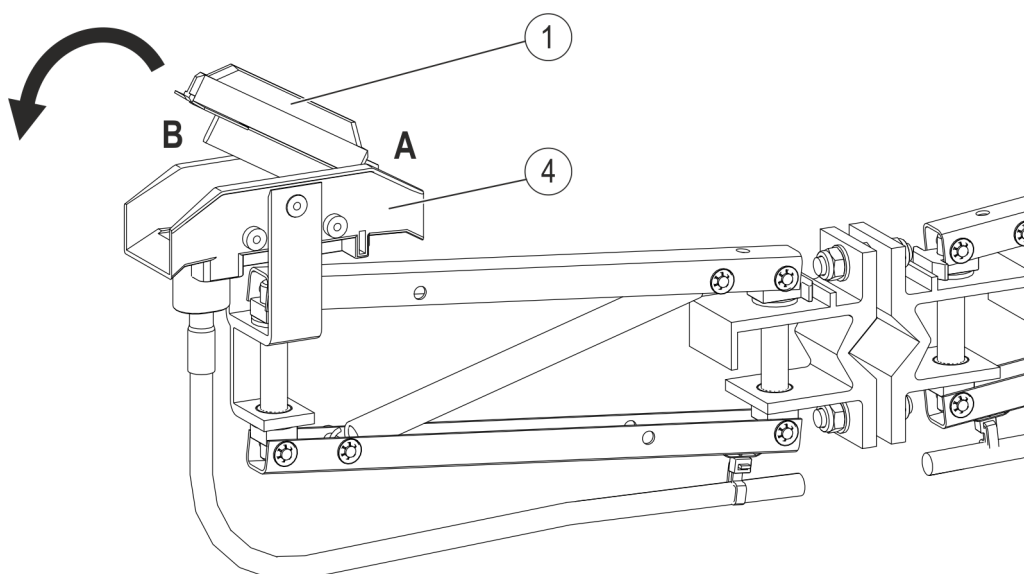


Fig. 129: Sliding contact cut-out on the side of the rail

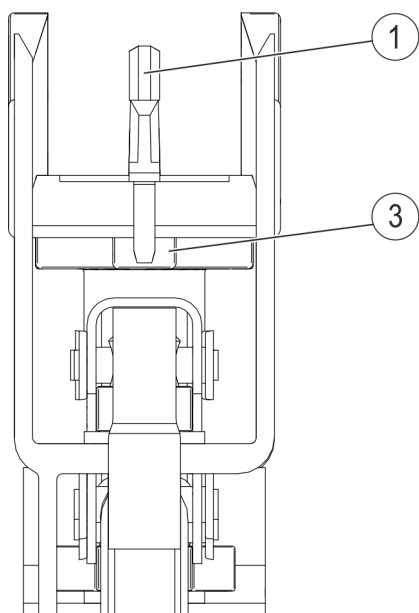


Fig. 130: Sliding contact (Pos. 1) sits in the contact plate (Pos. 3)

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→ Place the current collector back onto the conductor rail (see Fig. 131).

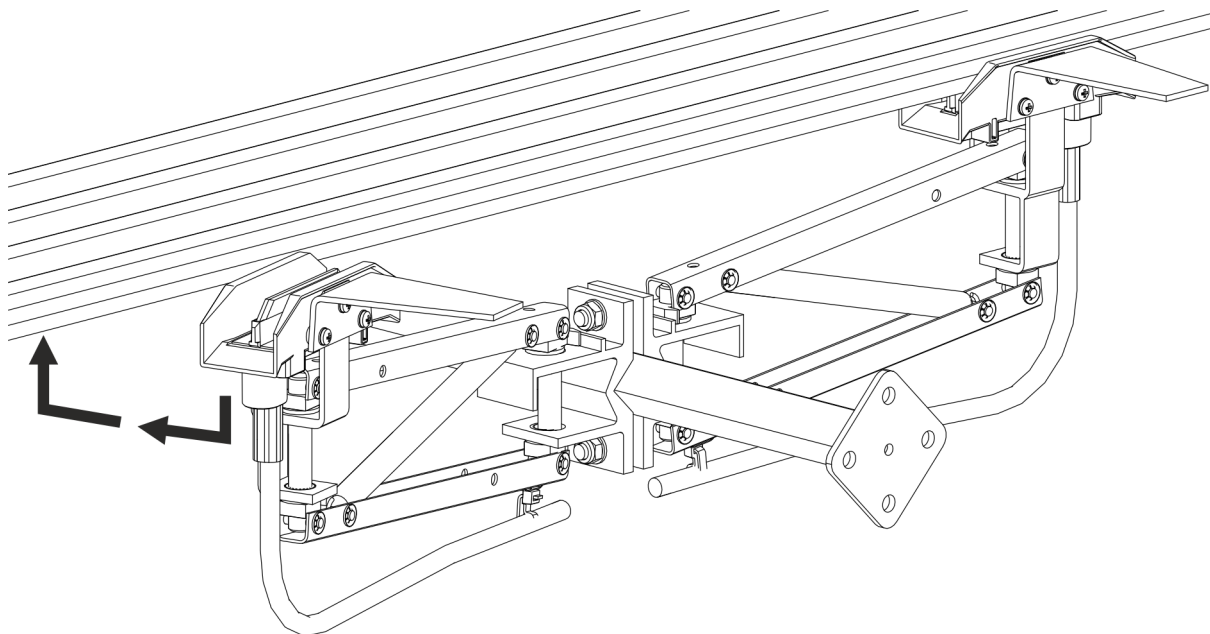


Fig. 131: Insert the current collector onto the conductor rail



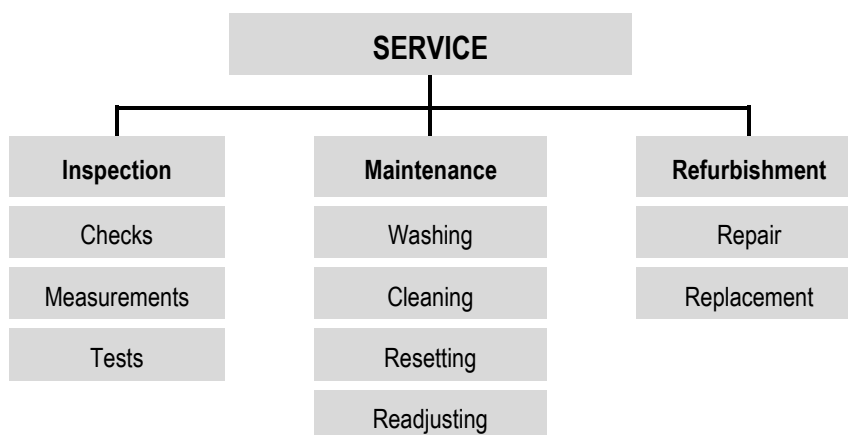
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#### 9.4 Maintenance schedule

The following tasks fall under the category "Service":



The separate Maintenance Instructions WV0800-0002 contains the measures required for optimal and trouble-free operation. It also contains the required maintenance intervals.

The tasks specified and performed as per the maintenance plan must be logged.

If regular checks reveal increased wear, the required maintenance intervals should be shortened in accordance with the actual signs of wear.

Contact the manufacturer in case of any questions regarding maintenance tasks and intervals; see the service address on the last page. The operator must take responsibility for organizing the following maintenance measures in order to comply with warranty requirements and for general prevention of damage.

- Inspection, maintenance, and repair work must only be conducted by trained, qualified technicians!
- Inspection, maintenance, and repair measures must always be documented!
- It is essential to observe the safety instructions in Section 9.1 !

#### Performance of the maintenance work

- All maintenance work must be conducted in accordance with the separate Maintenance Instructions WV0800-0002!
- Maintenance intervals must be observed.
- The maintenance work must be documented.

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### 10 Troubleshooting

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#### 10.1 Safety

Wear recommended protective equipment:



**WARNING!**

#### **Danger of injury due to improper troubleshooting!**

Improper troubleshooting can result in serious injury to person and property.

- Contact the manufacturer in case of malfunction.
- Allow troubleshooting to be conducted only by personnel from or authorized by the manufacturer.

The faults that, to Conductix-Wampfler's best knowledge, tend to arise are listed in the following table (see Section 10.2) together with their corresponding corrective measures.



**CAUTION!**

#### **Before working on these components!**

- **Disconnect the conductor rail system from the power supply and secure it against switching on again** according to the 5 Safety Rules. 5 Safety Rules see Section 2.7



#### **Risk of death due to electrical shock!**

Contact with components carrying electrical power can lead to death or severe injury due to electrical shock. Danger of injury due to shock reactions, falling or being thrown across the room due to electrical shock.



**DANGER!**

- Disconnect all line feeds from the power supply.
- When decommissioning, check whether a voltage is still present in the components and take measures where necessary.
- The danger zone must be enclosed by the customer or protection ensured by distance.
- The customer must provide grounding for metallic components.
- The customer must provide protective devices.
- Ensure there is sufficient stability in the area.
- If a conductor rail heating is available, this must also be disconnected from the power supply. Care must be taken to ensure that each individual heating circuit is voltage-free.
- Use personal protective equipment.

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**DANGER!**

#### Risk of injury due to crushing of skin and limbs!

There is a risk of crushing of skin and limbs due to:

- Current collector (spring force) during preassembly, installation, disassembly and maintenance.
- Falling conductor rail system components, if they have not been properly installed or if operated under inappropriate operating conditions (e.g., environment that contains solvents).

#### Danger of injury due to dust and abrasion!

Breathing difficulties and eye irritation can occur due to dust thrown up and abrasion of the carbon brushes, sliding contacts, copper conductor bars and plastic. There is a health hazard due to airborne respirable dust. Sensitization may occur if handling the conductor rail frequently and/or carelessly handling dust accumulation. **Cancer, mucous membrane irritation and respiratory diseases** can be a consequence of frequent and prolonged stays in a heavily used facility without protective equipment.

#### Observe the following measures:

- Clean regularly! Before starting work, clean the conductor rail according to the instructions (observe WV0800-0001). See Section 12.1
- Wear personal protective equipment:
  - Protective eyewear
  - Dust mask Class FFP3 (observe local regulations)
  - Protective gloves
  - Disposable coveralls
- Prevent contamination of the environment (e.g., people, goods, production facilities, etc.) while cleaning by taking appropriate measures (use covers, barriers, filter systems).
- Do not **blow out dust** with compressed air, but rather vacuum it away. The vacuum must be equipped with a HEPA Class H fine filter.
- Do not eat or drink in the work area! Do not store or consume open food in the immediate vicinity.
- See Section 2.8.3 for further information.



**DANGER!**

#### Risk of injury due to cutting and amputation!

Cuts and amputations can occur on:

- Sharp edges of the general components.
- Sharp edges of the conductor rails.
- Cut edges when trimming the conductor rails.
- Packaging materials (cartons, bands, etc.).

- Wear personal protective equipment!



**DANGER!**

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#### **Risk of injury due to ensnarement, punctures/stabs and/or impacts!**

An ensnarement and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.

Risk of injury from impacts and punctures/stabs from the conductor rail sliding out when holding the rails at an angle, from carelessness with long goods or from falling conductor rails in areas with pedestrian traffic.



**DANGER!**

- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices, etc.) have been removed or disabled.
- Wear personal protective equipment!

#### **Fire hazard due to overload or sparking!**

Fire hazards due to overloaded cables, electrical arcs, short circuits or sparking.

- Before recommissioning, ensure that all work has been completed and all components have been properly installed.
- Conduct prescribed electrical testing.
- Permissible current values must be observed.
- Electrical fuses must be installed according to regulations.
- Warn against misuse.
- Do not store easily ignited materials near conductor rails.
- Carry out dimensioning according to permissible system load capacity and provide for appropriate electrical protective devices.



**WARNING!**

#### **Before switching the system on!**

→ Each time before the product or system is started, measure the insulation resistance according to locally applicable technical standards, directives and legal regulations.

- Conduct locally required electrical tests.



**CAUTION!**

#### **Risk of burns from hot surfaces!**

Components can get hot during operation.

- Operation is only permitted in areas inaccessible to the public and out of manual reach. The danger zone must be enclosed by the customer or protection ensured by distance.
- Protective devices are to be provided by the customer.
- Cordon off the work area.
- Use caution when working in the vicinity of the danger zone, particularly if protective devices (covers, enclosures, control devices) have been removed or are not activated.
- Wear personal protective equipment!
- Allow hot surfaces to cool before removing the fault.



**WARNING!**

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**DANGER!**

**Hazard due to improperly completed maintenance work!**

- Before recommissioning, ensure that all work has been completed and all components have been properly installed.
- Conduct prescribed electrical testing.
- Electrical fuses must be installed according to regulations.

## 10.2 Fault correction table

Fault	Cause	Corrective Measures
Sliding contacts are unevenly worn.	Range of movement of the current collector head is restricted	Use original current collector heads from Conductix-Wampfler (ensure freedom of movement). Mount current collector according to Section 6.4.4. Check the installation position at various points in the system.
	Contact pressure is too high or low.	Mount current collector according to 6.4.4. Use original connection cables from Conductix-Wampfler (superfine-stranded Class 6 connecting cables (according to IEC 60228)).
Sliding contact insulation is abraded on the side down to the sliding contacts.	Current collector is not centered on the central axis of the conductor rail.	Replace current collector heads; correctly adjust the height of the current collector.
Sliding contacts wear out too fast.	Sharp edges on the feed terminal, conductor rails, connections between the conductor rails.	Smooth out sharp edges with a file, compressed-air grinder or sanding paper.
	Conductor rails soiled or scorched in places.	Check current values; clean rails as specified in Maintenance Instructions WV0800-0002; if necessary, replace conductor rails.
	Contact pressure too high.	Install current collector as specified in Section 6.4.4. Check the installation position at various points in the system.
	Contact pressure too low.	Only use original Conductix-Wampfler current collectors, check cable routing (ensure freedom of movement). Install current collector as specified in Section 6.4.4. Correct connecting cable, replace if necessary. Check the installation position at various points in the system.

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Fault	Cause	Corrective Measures
	Collision with system components.	Consolidate project-specific documents, fasten affected components without collision, replace damaged components.
	Abrasive dust has collected at one of the more frequently used transfer points (where the direction of travel is reversed).	Adjust the consumer's movement profile. Move over the end position to slide the collected abrasive dust out of the conductor bar. Clean the conductor bar.
The power supply is not continuous, contact is disrupted.	Line feed connector and feed terminal not properly connected.	Tighten all screws with torque, see 6.4.2. If necessary, recrimp and reinstall the notch cable lug.
	Current collector not properly connected.	Install current collector as specified in Section 6.4.4. Correct connecting cable, replace if necessary.
Insulation profile is not engaged in the hanger clamp.	Conductor rail has not been properly installed.	Snap in the insulation profile, check components, replace if necessary. Install the conductor rail as described in Section 6.4.3.3.
	Use of damaged components.	Replace damaged components.

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### 11 Disassembly and Disposal

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#### 11.1 Safety

##### Personnel:

- May only be performed by trained technicians. Recommendation: Min. 2 people

##### Recommended protective equipment:



##### Requirements:



**DANGER!**

##### Prior to starting the disassembly:

- Completely disconnect the conductor rail system from the power supply and secure it against switching on again.



##### Risk of death due to electrical shock!

Contact with components carrying electrical power can lead to death or severe injury due to electrical shock. Danger of injury due to shock reactions, falling or being thrown across the room due to electrical shock.



**DANGER!**

- The main power supply (from the building) and the heater voltage supply must be disconnected in the disassembly area and secured against switching on again.
- Disconnect all line feeds from the power supply.
- Observe the 5 Safety Rules (see Section 2.7)!
- When decommissioning, check whether a voltage is still present in the components and take measures where necessary.
- If a conductor rail heating is available, this must also be disconnected from the power supply. Care must be taken to ensure that each individual heating circuit is voltage-free.
- Ensure secure footing.

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#### **Danger of injury due to improper disassembly!**

Stored residual energy, sharp components, and points and edges on and in the product or the required tools can cause injuries.



**WARNING!**

- Ensure that there is sufficient space before starting work.
- Handle open, sharp-edged components carefully.
- Ensure that the work area is tidy and clean! Loosely stacked or scattered components and tools are a source of hazards.
- Disassemble components properly. Be aware of the dead weights of the components. If necessary, use lifting gear.
- Secure components so they cannot fall or topple.

#### **Risk of injury due to cutting and amputation!**

Cuts and amputations can occur:

- Sharp edges of the conductor rails.
- Cut edges when trimming rails.



**DANGER!**

- Wear personal protective equipment!
- Cordon off the work area!
- Use caution when working in the vicinity, particularly below the conductor rail.

#### **Risk of injury due to crushing of skin and limbs!**

There is a risk of crushing of skin and limbs due to:

- Current collector (spring force) during preassembly, installation, disassembly, and maintenance.
- Falling parts of the conductor rail system in the case of improper disassembly.



**DANGER!**

#### **Risk of injury due to impacts and punctures/stabs from the conductor rails sliding out!**

Risk of injury due to impacts and punctures/stabs from conductor rails sliding out when holding the rails at an angle or carelessness with long goods.

- Wear personal protective equipment!
- Cordon off the work area!
- Use caution when working in the vicinity, particularly below the conductor rail.



**DANGER!**



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#### **Danger of injury due to dust and abrasion!**

Breathing difficulties and eye irritation can occur due to dust thrown up and abrasion of the carbon brushes, sliding contacts, copper conductor bars and plastic. There is a health hazard due to airborne respirable dust. One result may be cancer.

- Clean regularly! If necessary, clean the system according to the instructions before starting work. See Section 12.1
- Wear personal protective equipment:
  - Protective eyewear
  - Dust mask Class FFP3 (observe local regulations)
  - Protective gloves
  - Disposable coveralls
- Prevent contamination of the environment (e.g., people, goods, production facilities, etc.) while cleaning by taking appropriate measures (use covers, barriers, filter systems).
- Do not **blow out dust** with compressed air, but rather vacuum it away. The vacuum must be equipped with a HEPA Class H fine filter.
- See Section 2.8.3 for further information.



**DANGER!**

#### **Risk of injury when removing the connectors!**

The connector is very large compared to the insulation profile and the conductor bar and e.g., a saw blade could easily become trapped in it. The saw could also spring out and injure the installer.

- When separating the 4 m rail segments, keep at a distance of at least 100 mm from the end of the insulation profile.



**WARNING!**

#### **Hazard due to reuse of disposable components!**

For example, reusing a connector can lead to the following hazards:

- The connection is not perfect and reliable.
- High-resistance connection, heating, fire hazard, reduced performance.

- Dispose of disassembled connectors and replace with new ones. Do not reuse!



**CAUTION!**

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#### 11.2 Disassembly

After the end of its service life, the product must be disassembled and disposed of in an environmentally friendly manner.

- Remove operating and auxiliary materials, as well as residual processing materials, and dispose of them in an environmentally appropriate manner.
- Clean the subassemblies and components properly and dismantle and dispose of them in compliance with locally applicable occupational safety and environmental protection regulations.

#### Required tools

- Hexagon screwdriver/ Hexagon bits      SW 4, SW 5, SW 6
- Open-end wrenches                              SW 10, SW 13, SW 17
- Screwdriver set
- Cutting tool (e.g., jigsaw/angle grinder)
- Tools for securing

#### 11.3 Disposal

In the absence of a return or disposal agreement, disassembled components must be recycled as follows:

- Metal components must be recycled.
- Plastic components must be sent for recycling.
- The other components are to be disposed of according to their material composition.



**CAUTION!**

#### **Environmental damage due to improper disposal!**

Electrical waste, electronic components, lubricants, and other auxiliary materials are subject to hazardous waste disposal regulations and may only be disposed of by authorized specialists.

Local authorities or specialist disposal companies can provide information regarding environmentally appropriate disposal.

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### 12 Further documents

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#### 12.1 Applicable documents

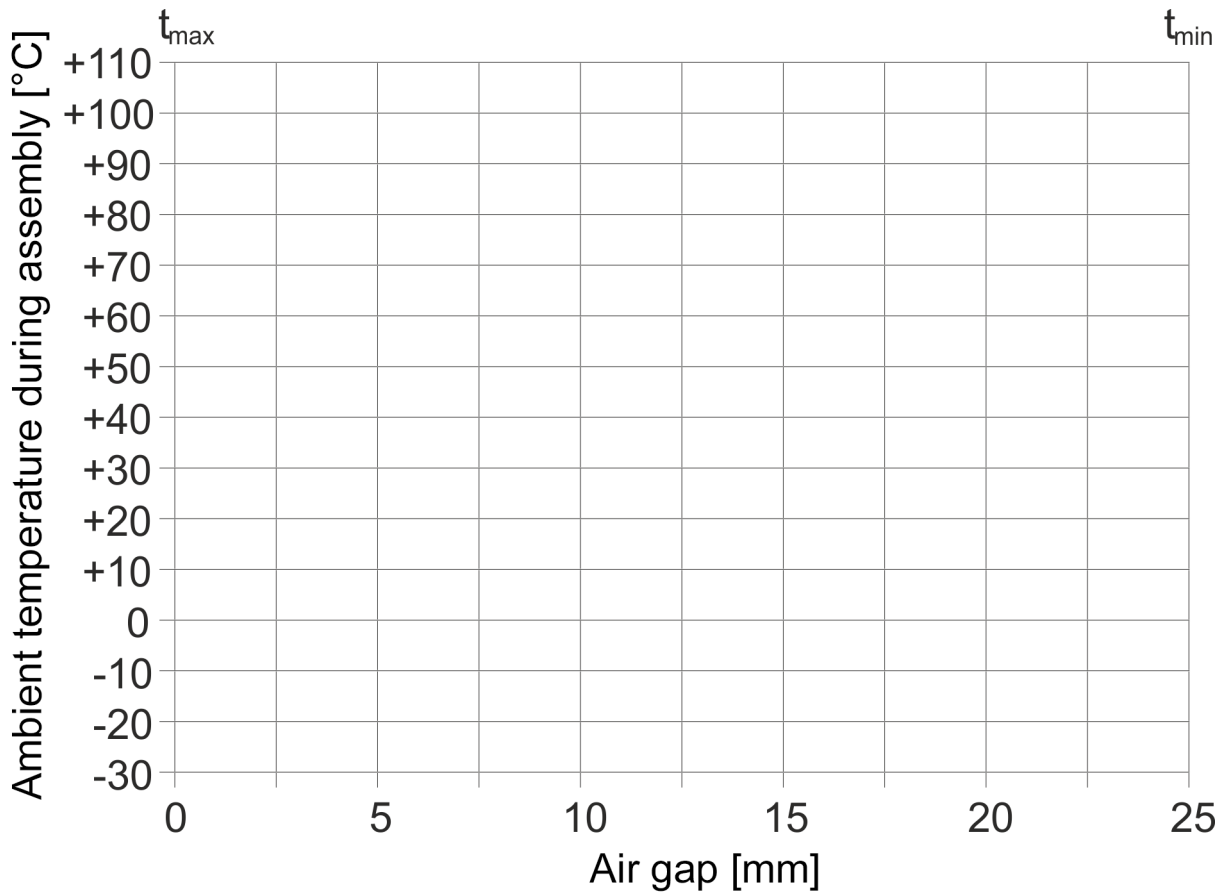
ID No.	Document Number	Document Name
01	WV0800-0001	Cleaning of conductor rails
02	WV0800-0002	Conductor rail maintenance plan
03	MV0800-0018	Heating cable insulation measurement
04	MV0800-0019	Conductor rail insulation measurement
05	MV0812-0002	Bending device
06	MV0812-0015	Mount heating conductor 0812
07	MV0812-0016	Brief instructions for Conductor Rail System 0812
08	MV0812-0017	Hanger clamp_Anchor point_Fall arrest device in vertical applications
09	IBC0812-0001	Commissioning Checklist 0812

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### 12.2 Ambient temperature



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