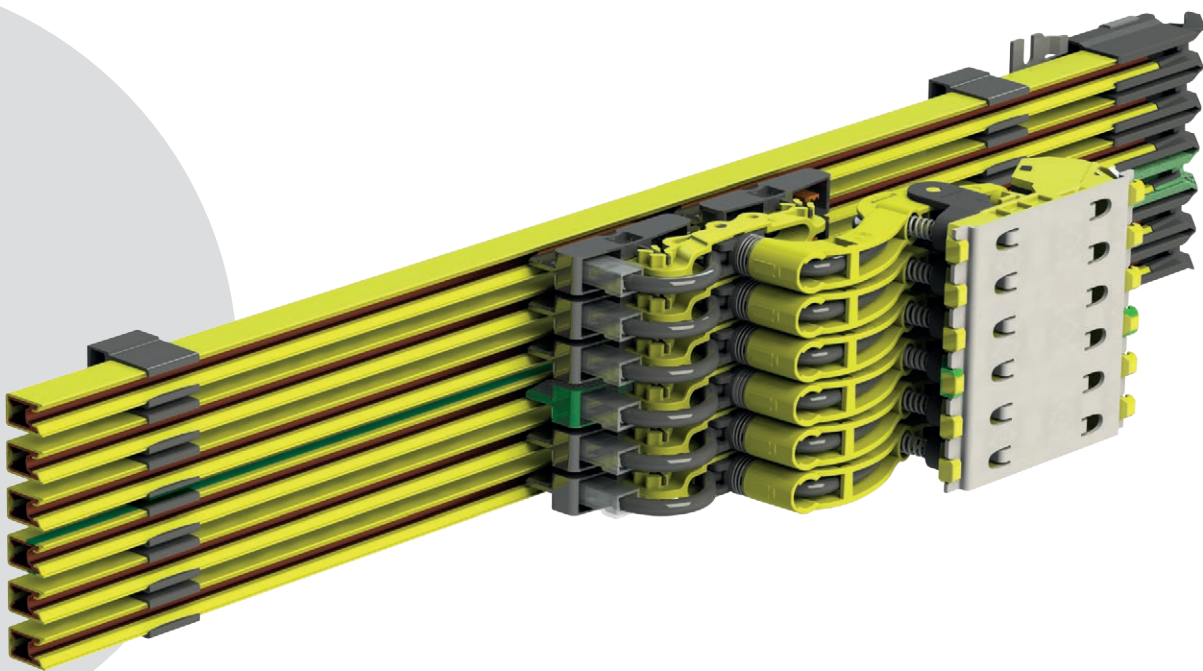


ProEMS Insulated Conductor Rail for Electrified Monorail Systems Program 0815



CONDUCTIX
wampfler
Ⓞ DELACHAUX GROUP

Supplementary Documents

Installation instructions:

MV0815-0007-EN Installation Instructions for Conductor Rail System 0815
MV0815-0005-D Installation Instructions for Expansion Units and Expansion Elements
MV0815-0008-0001-EN Mounting the BCB Support Profile (SEW)
MV0815-0002-D Current Collector 0815 – Replacement Instructions

Operating instructions:

BAL0800-0002-D Operating Instructions for Rail Cleaners

Maintenance instructions

WV0800-0001-D Cleaning of Conductor Rails
WV0800-0002-CS Maintenance Schedule Conductor Rails
WV0800-0004-D Copper Rail Applications

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ProEMS – the Solution for EMS Applications

Electrified monorail systems (EMSs) are now an integral part of many production and logistics processes and are spreading into many new fields of application beyond traditional automotive assembly. In addition to logistics, applications ranging from the transport of personnel or materials to the transport of cut flowers or seedlings are now practically standard.

Different system parameters and environmental conditions as well as new and unforeseen influences must be considered at an early stage in the design and planning phase.

As your partner for energy and data transmission systems, Conductix-Wampfler offers all the technologies available on the market from a single source.

As the preferred solution for electrified monorail systems in indoor areas, the new generation of the ProEMS 0815 system further advantages for planners, system engineers, service personnel, and operators. In addition to adjusting the performance characteristics to current and future requirements, the focus is on optimizing installation, reducing the number of different parts, optimizing service friendliness, and backward compatibility.

With several millions of meters of system installed in the most diverse markets, ProEMS 0815 offers the following advantages for the electrified monorail market:

- Proven modular conductor rail system with unique friction-locked and form-fitting connection technology.
- PE_{plus} protection against reverse polarity in accordance with the specifications of the automotive industry.
- Step-by-step refitting of systems without resulting in different brush-running heights with consequent restriction of the current collector kinematics.
- Adjustable transfer points, permitting correction of transitions without disassembly of the conductor rail.
- Factory pre-installed expansion units that simplify planning, installation, and adjustment by means of installation adaptors.
- New series of current collectors with integrated cable management and clamping point.
- Other novel functional features that eliminate problematic influences on the current collectors due to the routing of the connecting cable by the customer.
- Reduced consequential effects such as higher wear of brushes and rails.
- Pre-assembled modules and other product-line optimizations simplify the selection, assembly, and operation of components.

In total, it is an optimized version of the ProEMS series combined with the proven advantages to keep your systems moving according to our motto “We move your business”.

In addition to electrified monorail systems, the field of intralogistics is another application for the conductor rail system. Specifically, film stretching machines and logistics shuttles with linear and curved tracks in industrial storage and production buildings. In addition to standard components, special solutions and customer-specific adaptations are possible, such as the integration of data communications or positioning systems.



ProEMS 0815 for Electrified Monorail Systems – Project Planning

The ProEMS conductor rail system has been used for several decades in a variety of applications, and its components have been adapted for the most diverse conditions. As some applications rule out functionalities or components, this catalog has been compiled to give an accurate overview of the system components intended for electrified monorail systems. In addition to the components tailored for electrified monorail systems in accordance with guidelines and automotive-manufacturing requirements, this document includes practical tips for planners and plant engineers.

Intended Use

The components of the conductor rail system are designed for use in electrified monorail systems as well as systems with the same application and installation parameters. As such, areas of use are industrial indoor applications and non-public areas with installation away from manual reach or secured by other suitable measures. Technical approval must be obtained from the manufacturer for uses deviating from the technical specifications or other environmental parameters. All necessary information must be provided for the approval and associated risk assessment.

Technical Characteristics and Warranty

The system components of the conductor rail system are designed for use and function in an electrified monorail system. The following will void the system warranty: in cases of use other than this application, with different usage parameters or use of third-party components, or where the customer has modified the system. Responsibility for the system is then transferred to the system integrator, installation partner, or operator.

Electrified Monorail System Interfaces to the Conductor Rail System

The following points must be taken into account to ensure a perfect interplay between the EMS route, the hangers, and the system control unit.

- **Requirements for the EMS track**

The conductor rail is integrated into the aluminum track profiles using customer-specific hanger clamps. The interface here is the internal track geometry of the rail. The track tolerances for the extrusion of the aluminum rails must be agreed upon by the system engineer and Conductix-Wampfler to ensure the secure fastening of the hanger clamps. Since these dimensions are not primarily functional and are test dimensions for the system engineer, these requirements are not always passed on to the extruder. As a result, there may be “wandering” of the hanger clamps or excessively high pre-tensioning with a risk of breakage.

- **Additional components**

Any additional components that are installed apart from the conductor rail must be noted so that the installation space is correctly specified. Additional components can be slit waveguides, leaky coax cables, QR or barcode tapes, or optical or magnetic landmarks. Conductix-Wampfler has worked with manufacturers of these systems for many years and can supply already established solutions and tools.

- **Position of the protective earth pole**

In accordance with the generally accepted guidelines of the automotive industry, the protective earth pole is planned at the 4th position from the top (after the phase poles L1, L2, and L3) as standard. All modules, such as expansion modules, end caps, current collector units, sensor units, etc., are designed according to this industry standard.

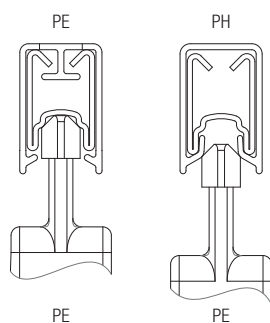
Further information (CAD data, project-planning tools, etc.) can be found at: www.conductix.de/en/downloads

ProEMS 0815 for Electrified Monorail Systems

- **PE_{plus} protective earth system (to automotive standard)**

The grounding collector of the Conductix-Wampfler PEplus system is a different shape than the phase collectors. This is designed to prevent the ground collector from accidentally jumping off the ground rail and onto a nearby phase rail. The system is backward compatible with the old PE system and can be retrofitted in stages and is color coded. The current collectors have the same kinematics as phase current sensors (no limitation of the lifetime by limiting the envelope as with other systems on the market).

The PE_{plus} system was developed in cooperation with the European automotive industry and specified in the factory standards and EMS guidelines. For existing systems, there is a version available with PE current collectors that do not have protection against misconnection and should not be used for new installations.



PE-PH misconnection protection



ProEMS 0815 for Electrified Monorail Systems

- **Installation position of the current collector / distance between the contact point and the wheel contact point**

Due to curves and inclines, particular attention must be paid to the installation position of the current collector. The ideal installation position is directly below the wheel contact point of the carriage. If the installation is away from this ideal point, there will be different distances between the current collector connection to the carriage (usually a maintenance hatch) and the running surface of the current collector in the rail curves. In general, the further the contact point of the current collector is from the wheel contact point, the larger the smallest permissible radius of curvature of the system. If an inside bend is less than the minimum permissible radius, the permissible compressive deflection of the current collector may be exceeded and the carbon brush may be pressed against the rail system with excessive force. This will increase brush wear and skew the running of the contact brushes, and even increase wear of the conductor rail. For external bends, the contact pressure may be too low, which will cause loss of contact, disengagement of the current collector, and skewed running of the contact brushes.

- **Maintenance hatch**

In most cases, current collectors are installed through a maintenance hatch of the EMS vehicle. This design element holds the current collector in position, but is crucial for the functioning of the system. Thus, accurate and, ideally, adjustable positioning is necessary to avoid vibrations and ensure that the current collectors properly engage when the hatch is closed. Replaceable hatches must be designed so that all components can be positioned and adjusted, thereby avoiding misalignment or other deviations.

- **Position height of the conductor rail and current collector**

The position of the conductor rail within the EMS profile is determined by consulting the system engineer. The position of the current collector must be adjusted to the position of the conductor rail. The upward and downward working range of the current collectors must not exceed any operating conditions, even when the drive rollers are worn. When undergoing maintenance, the height of the current collectors on the maintenance door should be adjustable depending on the wear of the running wheels and carrier rails.

Component Delivery is a thing of the Past – Conductix-Wampfler Partner Service is the Future

The high degree of customization, system availability, and technical communication in system engineering requires a smooth flow between trades. New technology, system parameters, and environmental influences and effects in new application fields require new paths and solutions. Conductix-Wampfler's Partner Service addressees all of these issues along with handling elaborate solution concepts, designing the framework of materials, and estimating assembly costs.

Conductix-Wampfler EMS Services:

- Planning and project management for EMS conductor rail systems
- Integration and supply of data transmission and positioning systems in electrified monorail systems
- Application advice and product training
- Design support and interface management
- Installation and commissioning
- Provision of replacement and spare parts packages
- Start-up support and maintenance
- Video diagnostics and system inspection
- Cleaning of systems, including disassembly and repair of systems

As a manufacturer of system solutions for conductor rails, contactless power transmission, data-transmission solutions, overhead monorail systems, supply systems for skid lines, and media-supply systems, we are a worldwide-recognized partner of the top system engineers and customers in the automotive, crane, and logistics sectors.

Technical Data

Conductor Rail	Copper, Roll formed
Type	081516
Field of application ¹⁾	Indoor industrial applications with linear and curved tracks, e.g., EMS systems and logistics applications
Installation orientation	Horizontal with entry from the side or from below
Installation clearances	Minimum distance between the rail insulation and the metallic structure: 5 mm
Rail length [mm]	Standard length 4000 ± 2 mm; shortening possible on-site, special length of 6 m by request
Maximum suspension interval [mm]	500 on linear tracks; 400/250 in horizontal/vertical curves
Maximum speed [m/min]	Uninterrupted linear track: 400
Max. transition speed [m/min]	40
Nominal voltage [V]	230/400, max. 500
External dimensions [mm]	9.6 x 15.2 (single rail)
Max. gap dimension at rail transitions (switches/lifters) [mm]	≤ 6 mm
Max. offset at rail transitions [mm]	± 3 mm (horizontal/vertical)
Rated rail current at 100% duty cycle and 30°C [A]	100
Rated system current at 100% duty cycle and 30°C [A]	54 ²⁾
Rated current for current collector [A]	See "Current collectors" Section starting on page 21.
Protection class	IP2x
Conductor cross section (rail) [mm²]	25
Ohmic resistance [Ω/m]	0.000745 (at 35°C)
Impedance for a 14-mm pole spacing / 50 Hz [Ω/m]	0.000748 (at 35°C)
Ambient temperature range	-5°C to +55°C (extended temperature range on request)
Storage temperature range	-30°C to +55°C (without condensation)
Max. temperature difference	43 K ³⁾
Protection against accidental contact	In accordance with VDE 0470 Part 1 / EN 60 529 / IEC 60 529 and EN 60 204 Part 1/32
PE position	4 th pole from top
Air clearance and creepage distances	In accordance with pollution degree 3; creepage distances in accordance with DIN VDE 0110 Part 1
Overvoltage category	III in accordance with DIN VDE 0100-443
Max. humidity	50% rel. at 40°C

Insulating profile (stabilized hard PVC, color yellow (similar to RAL 1018))	
Dielectric strength	22.4 kV/mm in accordance with DIN 53481
UL rating/combustibility	Compliant with requirements for insulating materials in accordance with UL94 V-0; flame-retardant and self-extinguishing (IEC) DIN EN 60895-11-10B3, 3

Relevant standards	
DIN EN 60664-1; VDE 0110-1: 2008-01	Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests (IEC 60664-1:2007); German version EN 60664-1:2007
DIN EN 60204-1; VDE 0113-1: 2007-06	Safety of machines – electrical equipment of machines – Part 1: General requirements (IEC 60204-1:2005, modified); German version EN 60204-1:2006
DIN EN 60529; VDE 0470-1: 2000-09	Degrees of protection provided by enclosures (IP code) (IEC 60529:1989 + A1:1999 + A2:2013); German version EN 60529:1991 A1:2000 A2:2013

Note: Subject to technical changes. Applications other than those described here or different framework conditions require consultation to check their technical feasibility. Technical specifications may be mutually restrictive. In case of doubt, we also recommend checking the suitability.

1) EMS vehicles are supplied in sections via several power feed points. The system is designed with a conductor cross section of 25 mm². The maximum current-carrying capacity is determined by the wiring and number of power feeds.

2) The current-carrying capacity of power feed connectors, end-cap units, and current collectors is determined by the type of the connecting cable, the type of installation, and the ambient temperature. The permissible currents are given in the local guidelines. The maximum current-carrying capacity and protection depends on the field of application and regional specifications.

3) In accordance with VDI 4441, a typical temperature range of +2°C to +45°C is to be used for EMSs.

Layout Tips

Circuit Breakers / Overload Protection

Depending on the system layout, the maximum permissible loads of the individual components must be taken into account in addition to the cable lengths / loop resistances.

Permissible Current Load

The conductor rail system is designed with a conductor cross section of 25 mm². The maximum current-carrying capacity is determined by the power feed and the type of cable used, the cross section, and the type of installation of the power feed. The installation space limits expansion modules and the factory cabling to 54 A.

Temperature-dependent Expansion

Increases in ambient temperature result in thermal expansion. These expansions are compensated for by expansion modules. The configuration of the expansion modules is based on the system layout and the ambient temperatures.

Product Approvals

The conductor rail has been developed in accordance with European and international standards, guidelines, and specifications. In addition to CE conformity and the regulations applicable to the product and production, the product meets further requirements such as UL, CSA, and GOST-R.

Current-carrying Capacity of the Current Collector

Specification of the rated current at 100% duty cycle, in motion, and at 20°C ambient temperature. At a standstill, the current-carrying capacity at 100% duty cycle is to be reduced. Reduction factors are available on request (depending on current collector and rail type). Higher current-carrying capacities are possible for short duty cycles, e.g., additional lifting movements / peaks (short-term operation).

Connecting Cable (mechanical load)

The customer must provide strain reliefs for connecting cables. Cable terminations must be provided with wire-end ferrules. Only fine-wired copper cables may be used.

Safety Markings

Terminal boxes and maintenance hatches of the EMS hangers must be marked with safety markings (hazardous voltage) by the customer.

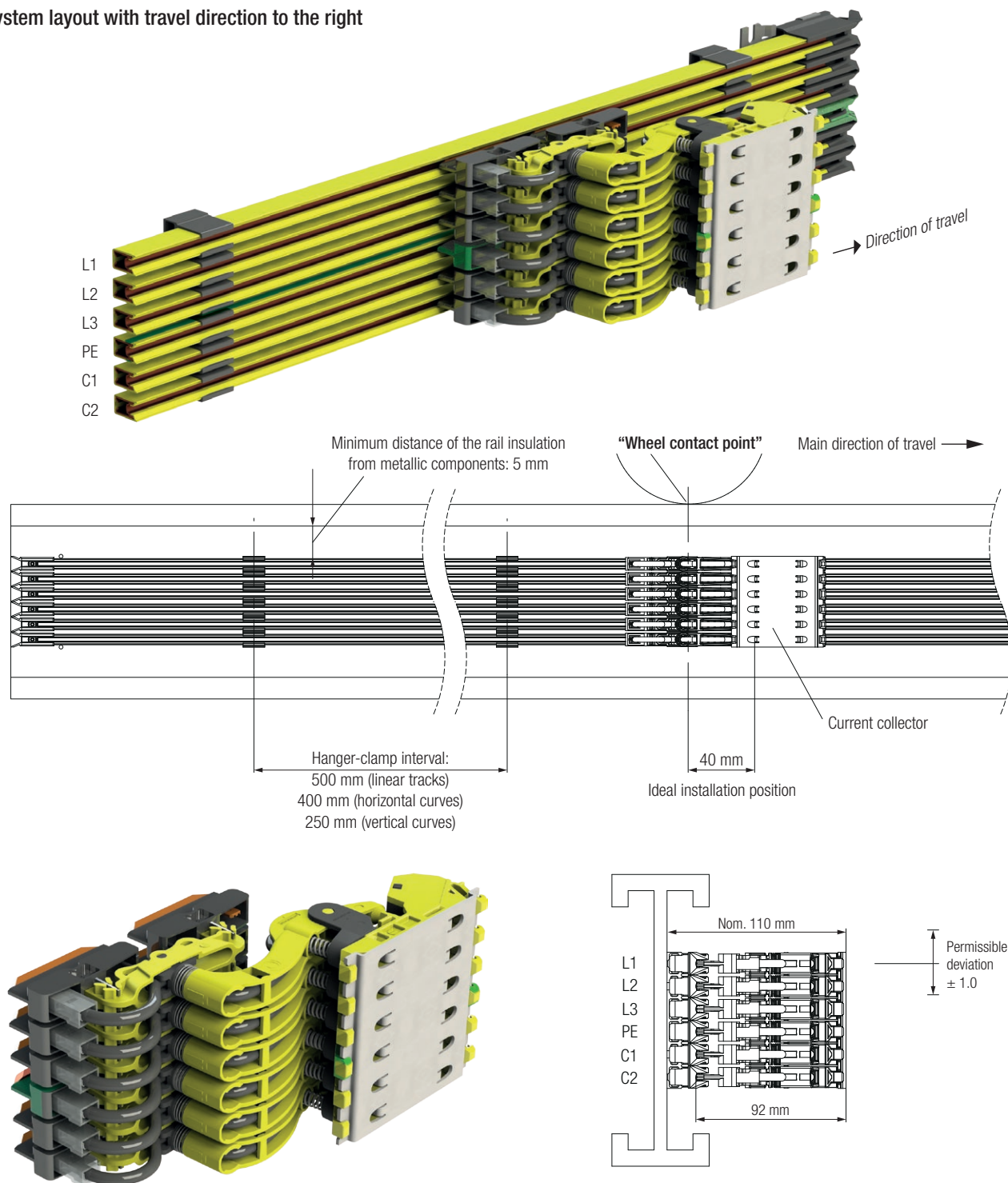
Track Profile

Profile dimensions and tolerances (function dimensions / interface for the hanger clamp) must be taken into account by the customer. For details, see the drawing of the customer-specific hanger clamp.

System Layout

System Layout

System layout with travel direction to the right



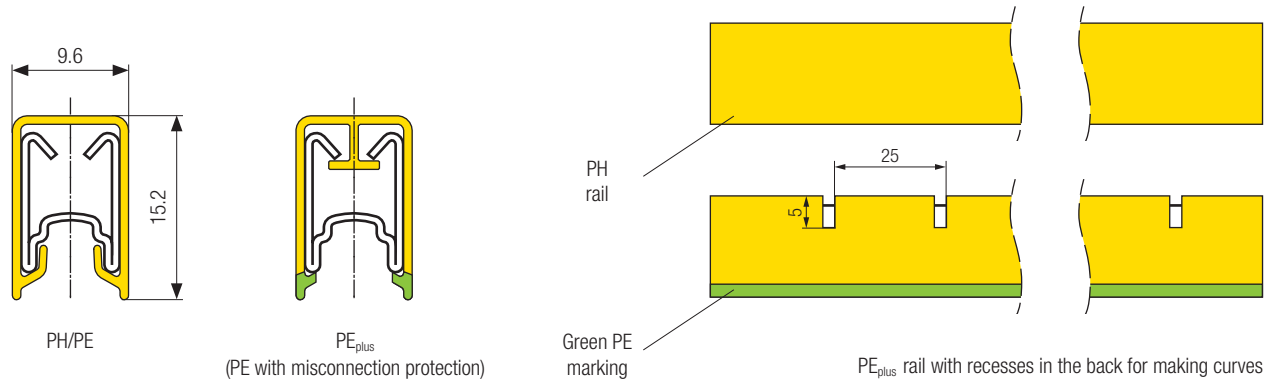
EMS current collector unit

Towing arm with current collectors including PE_{plus} function

Conductor Rails / Curves

Insulated Conductor Rails

The rails are available in the installation-optimized length of 4000 mm with yellow insulation (RAL 1018) as a phase rail or as protective earth in a yellow–green version in accordance with standards.



Type	Length [mm]	Order number			Weight [kg]
		Phase (PH)	Protective earth (PE)	Protective earth (PE _{plus})	
Conductor rail	4000	081516-4x11*	081516-4x12* ²⁾	081516-4x14*	1.06
Conductor rail	6000	081516-6x11	081516-6x12 ¹⁾	081516-6x14	1.59
Conductor rail for making PE _{plus} curves (R <1500 mm)	4000	—	—	081516-4x15	1.06

¹⁾ Special length of 6 m on request

²⁾ Existing systems without PE_{plus}

* Standard series

PE_{plus} Rail Polarity Protection

Protective earth current collectors with PE_{plus} have a wider design than phase current collectors and match the width of the PE_{plus} protective earth rails. The wider width prevents the protective-conductor (PE) current collector head from inadvertently contacting a phase (PH) conductor rail. This solution reliably avoids leakage of the phase voltage to the PE pole and prevents improper use of the PE current collector as a phase current collector.

- The PE_{plus} rail system can be retrofitted to existing SingleFlexLine 0815 conductor rail systems.
- Only the existing PE rails, end caps, and the PE current collectors need to be replaced.
- The hanger clamps and PH rails do not have to be replaced.
- The existing PE current collectors can be operated in the PE_{plus} rail, so a successive conversion of the existing current collectors can take place.

For new EMS systems or modernizations, the current state of technology generally requires PE_{plus} rail polarity protection.

Curves

Rail Curves

The conductor rail system is designed for the on-site preparation of curves or curved sections. For larger radii, the profile can be manually adjusted to the contour of the carrier rail during installation in the hanger clamps. A manual bending device is used for smaller bends or high system speeds.

Rail Curves for PE_{plus} Protective Conductors with Rail Polarity Protection

For PE_{plus} bends with radii less than 1500 mm, the rail profile has to be modified with incisions, or the rail component already prepared at the factory has to be used (see below).

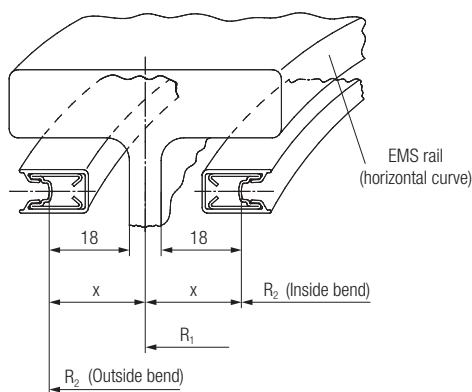
The PE_{plus} rail with rail polarity protection has an additional fixing of the insulating profile (T-profile on the insulating profile base).

Prefabricated Rail Curves

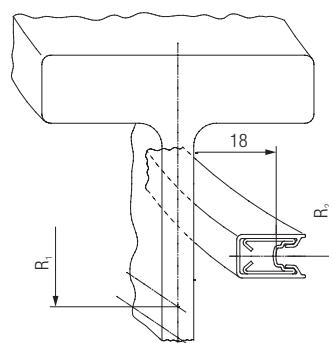
We also supply prefabricated rail curves and segments. Note that ordering and handling prefabricated curves increases the cost of the system and its installation.

Standard Curves and the associated Suspension Intervals

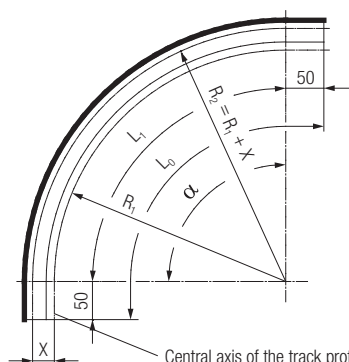
Conductor rail curve (side entry)



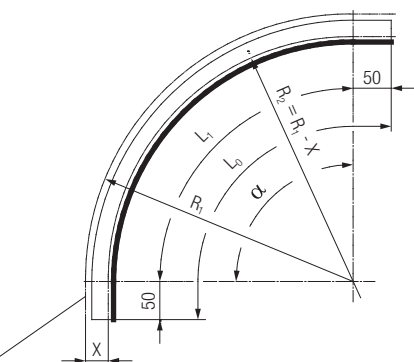
Inclined section (side entry)



Outside bend



Rail side open;
side entry



Inside bend

$$L_0 = L_1 + 2 \times 50$$

$$L_1 = \frac{R_2 \times \pi \times \alpha}{180}$$

L_0 = Length of rail

L_1 = Length of curved rail

α = Bending angle

R_1 = Radius of the track profile

R_2 = Radius of the conductor rail

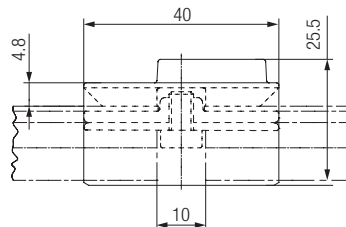
Maximum speed: 80 m/min

Layout	Min. bending radius		Suspension interval [mm]
	Ex works [mm]	On site [mm]	
Side entry	450	450	250
Entry from below	1000	1200	400

Rail Connectors / Power Feeds

Rail Connector

A screw connector accessible from the side of the conductor rail is used to connect the rails. This connector located “behind” the running surface provides a secure connection. The hexagonal-socket-headed screw (3 mm) is equipped with a TufLok® securing device and is tightened to a torque of 1.8 Nm.



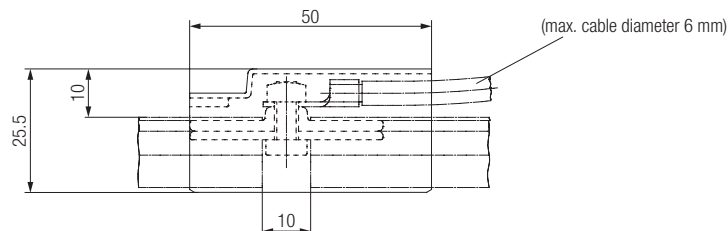
Type	Order No.	Weight [kg]
Connector	081521*	0.02

Connector can be used for PH, PE, and PE_{plus} rails

* Standard series

Power Feeds

The power feed is based on the basic principle of the rail connector. They are supplied as individual power feeds without cable or as bundles with pre-assembled and installed connection braids. The insulation caps are supplied loose. The cable length of 1 m is sufficient to reach the nearest clamping point. Special lengths can be prepared on-site.



Power Feeds with prefabricated Connecting Cable

Type	AWG	Variant	Order No.		Weight [kg]
			PH	PE / PE _{plus}	
Power Feed 2.5 mm ²	16	With 1 m cable – 2.5 mm ²	081551-1-001	081551-1-002	0.22
Power Feed 6.0 mm ²	10	With 1 m cable – 6.0 mm ²	081551-2-001	081551-2-002	0.22

Delivered as a bundle with pre-assembled clamping part. Caps are supplied loose in the bag. UL cables/low-temperature cables on request.

Power Feeds with ring terminal without connecting cable

Type	AWG	Variant	Order No.	Weight [kg]
			PH / PE / PE _{plus}	
Power Feed 1.5–2.5 mm ²	16–14	Without cable	081551-1	0.02
Power Feed 4.0–6.0 mm ²	10–12		081551-2	0.02

Delivery as bulk material in bags or in cartons separately by article depending on the order quantity.

Power Feeds can be used for PH, PE, and PE_{plus} rails.

Cables for Power Feeds / Hanger Clamps

Lead wires and Ring Cable Lugs for on-site assembly of Cables

Type / Sales Quantity	Cross section	AWG	Order No.	
			PH black	PE yellow-green
Single Core Wires (by the meter)	2.5 mm ²	14	H07V-K-1x2.5-SW	H07V-K-1x2.5-GNGE
	6.0 mm ²	10	H07V-K-1x6-SW	H07V-K-1x6-GNGE
Cable Lugs (Minimum lot size 300 pcs.)	1.5 – 2.5 mm ²	16–14	08-1630/4	
	4.0 – 6.0 mm ²	14–10	08-1650/4	

UL cables / low-temperature cables on request

Hanger Clamps

For quick and efficient assembly, specific clip-on or screw-on brackets are available for the different EMS support profiles.

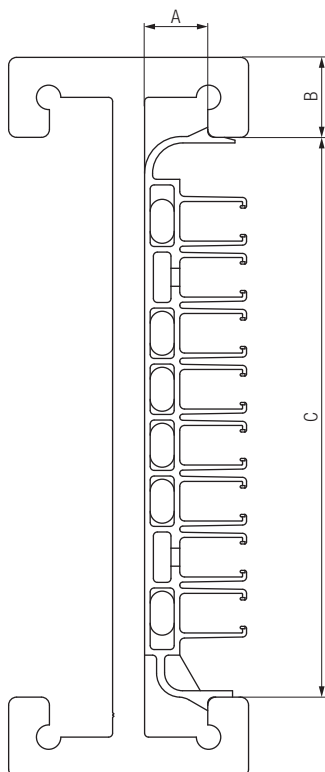
For the integration of data-transmission or positioning components, combination holders are provided for the installation of leakage or slotted waveguides as well as barcode or QR-code tapes. Clips-on and combination brackets are designed and manufactured specifically for each project and customer. The minimum lot size is 300 units. Please contact us if you require further information. If smaller quantities are required, such as for test systems or non-EMS track profiles, screw-on brackets for 2 to 10 poles are available from stock or at short notice.

See page 16 for the range of screw-on brackets.

Hanger Clamps – Customized

Customer-specific solutions are available to allow for screwless installation on the rail track (e.g. with clip-on brackets).

It should be noted that the tolerances of the rail track also play a role in the design of the hanger clamps. The figure below shows an example of important layout dimensions (A, B, C).



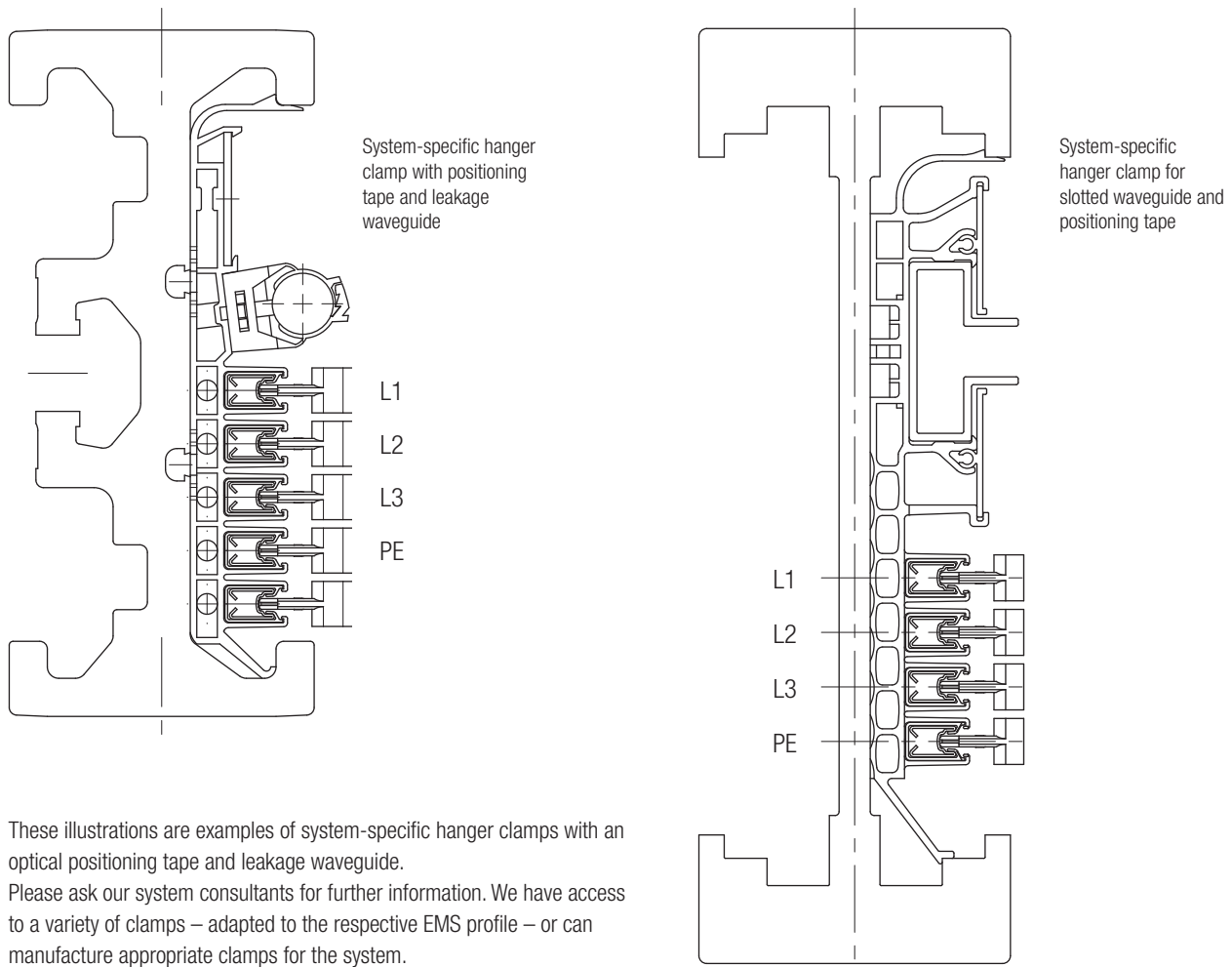
Design – a note on support-rail tolerances:

The conductor rail is integrated into the aluminum track profiles with hanger clamps in accordance with the internal track geometry of the rail. The track tolerances for the extrusion of the aluminum rails must be decided by the system engineer and Conductix-Wampfler to ensure the secure clipping in and hold of the hanger clamps. Since these dimensions are not primarily functional and are only test dimensions for the system engineer, these requirements are not always passed on to the extruder. As a result, there may be “wandering” of the hanger clamps or excessively high pre-tensioning with a risk of breakage.

Hanger Clamps

Hanger Clamps – Customized (cont.)

Regardless of the rail design, all standard, EMS, or customer-specific screw and quick-fit hanger clamps from the SingleFlexLine 0815 product range can be used.



Barcode and QR-Code Carriers

The carrier system for optical positioning systems (e.g., Sick, Leuze, Pepperl + Fuchs) is based on 4 or 6m long aluminum profiles with a width of 35 mm. The tape clips into the receptacles on the combination clamps and serves as a surface for the adhesive application of the respective code tape.

Type	Variant	Order No.	Weight [kg]
Code-tape carrier 4000 x 35 mm	Aluminum profile (minimum lot size 30 units)	08-B020-6780	0.76
Code-tape carrier 6000 x 35 mm		08-B020-7484	1.13
Screws for fixing	DIN 7982 – 2.9 x 9.5	7982-TX2,9x9,5-A2F (1000 units)	0.20
Grounding kit	Set for 10 profiles	08-L020-0255	0.45

The grounding kit includes the installation material and prefabricated cables for making the earth connection between the insulated suspended code tape and the EMS support profile. One earth connection per profile must be provided.

Note on the use of additional components (data-communication and positioning systems)

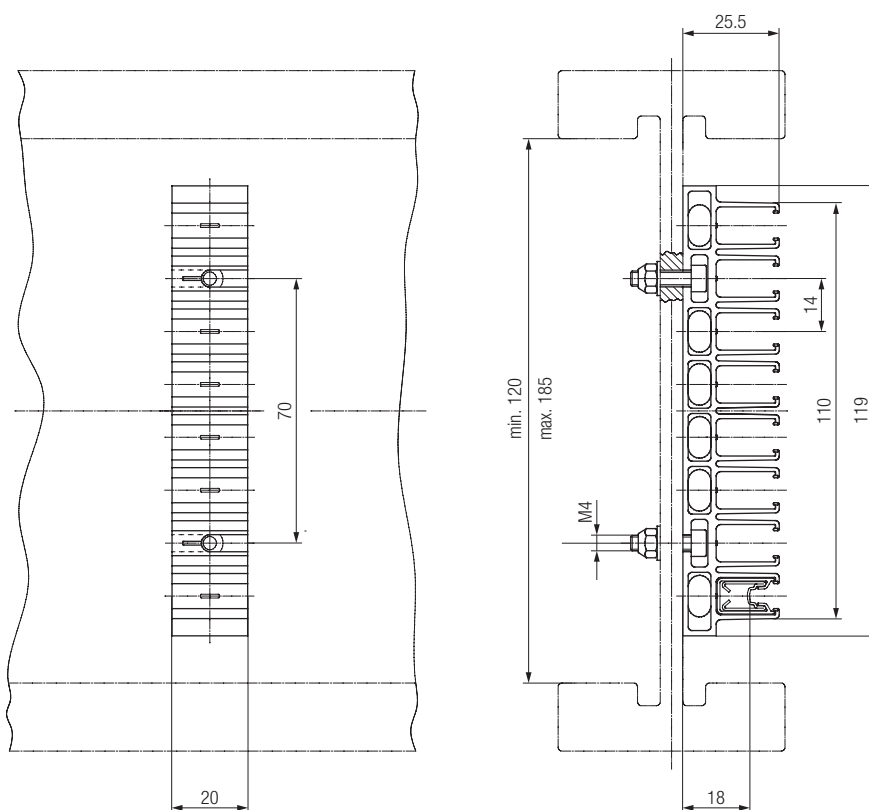
The optical code-tape systems must be placed above the conductor rail (contamination due to abrasion of the conductor rail). Additional components must be connected, grounded, and operated in accordance with the manufacturer's instructions.

Hanger Clamps

Standard Screw-on Version

Maximum suspension interval:

- 500 mm in straight sections
- 400 mm in horizontal curves
- 250 mm in vertical curves



14 mm pole spacing. The 8-pole hanger clamp is shown.

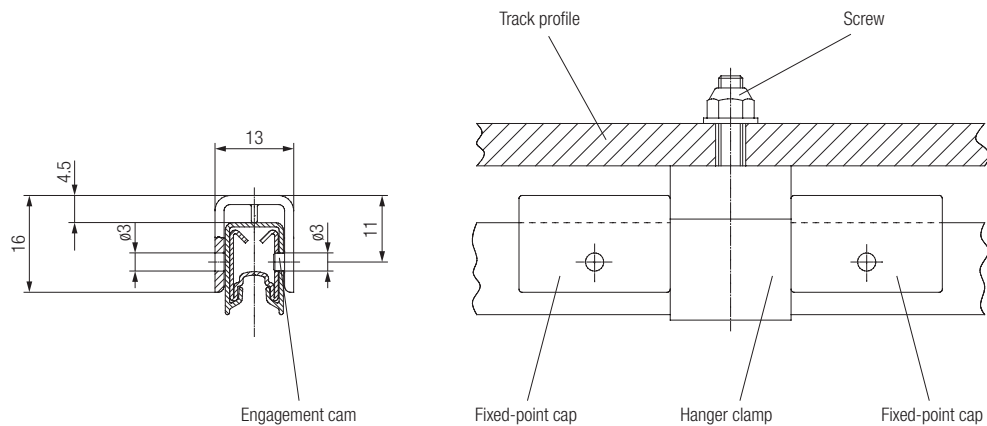
Type	Order No.	Number of poles	A [mm]	B [mm]	C [mm]	D [mm]	Weight [kg]
Hanger clamps	081543-04x14	4	28	54	56	7	0.009
	081543-06x14	6	42	92	94	21	0.01
	081543-08x14	8	70	110	119	24	0.02

Delivery includes screw set DIN 912 4x16 + washers + nuts

Anchor Clamps

Fixed Point

A conductor rail has to be fastened to prevent it from “wandering” due to thermal expansion and friction. This is done by attaching two fixed-point caps per pole, which are mounted on either side of the hanger clamp. Screwing the hanger clamp to the track is recommended.



The fixed-point caps are attached to the left and right of a hanger clamp and should be screwed to the track profile.

Type	Order No.	Weight [kg]
Fixed-point cap	081531*	0.002

Note: Two fixed-point caps are required per pole and per fixed point.

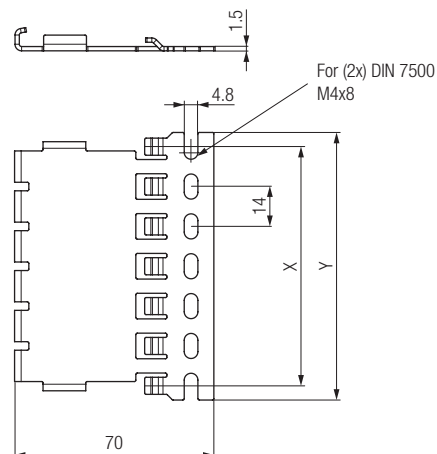
* Standard series

The position and number of fixed points depends on the system layout. In addition to the fixed points listed here, rail connectors and curves also act as fixed points. Our application engineers will determine the fixed points in conjunction with the expansion modules as part of the project design.

End-Caps

For Rail Ends and Transitions

These assemblies were designed for transitions at points where the EMS guideway profile splits, such as at switches and lifters. They permit a re-adjustment of transition points without disassembly of the conductor rail, such as when switches set or get deformed. This service function allows transitions to be adjusted with short downtimes. The end caps also take on the function of a fixed point.



Distance (cap-to-cap): max. 5 mm
Vertical displacement: max. ± 3 mm
Lateral displacement: max. ± 5 mm
 (see Installation Instructions MV0815-0005)

Type	Variant	Order No.	X [mm]	Y [mm]	Weight [kg]
Complete end-cap unit without clamp and cable	4-pole (3 x PH + 1 x PE _{plus})	08157A-04x14x0	56	66	0.07
	6-pole (5 x PH + 1 x PE _{plus})	08157A-06x14x0	84	94	0.10
	8-pole (7 x PH + 1 x PE _{plus})	08157A-08x14x0	112	122	0.19
End-cap unit complete with clamping part and cable lug, 1.5–2.5 mm ² , without cable	4-pole (3 x PH + 1 x PE _{plus})	08157A-04x14x5	56	66	0.13
	6-pole (5 x PH + 1 x PE _{plus})	08157A-06x14x5	84	94	0.19
	8-pole (7 x PH + 1 x PE _{plus})	08157A-08x14x5	112	122	0.25
End-cap unit complete with clamping part and cable lug, 2.5–4 mm ² , without cable	4-pole (3 x PH + 1 x PE _{plus})	08157A-04x14x7	56	66	0.13
	6-pole (5 x PH + 1 x PE _{plus})	08157A-06x14x7	84	94	0.19
	8-pole (7 x PH + 1 x PE _{plus})	08157A-08x14x7	112	122	0.25

Supplied unassembled. Fastening screws, 3 units, M4 x 10 with hexagonal socket included in delivery. Recommended securing screws: Self-tapping screw in accordance with DIN 7500-1 M4 (length corresponding to the width of the web of the track profile).

Tool for assembly of the unit (drilling jig 08157A), see program 0815 installation documentation.

Pre-assembled connecting cable for end-cap unit

Type	Variant	AWG	Order no.: (PH)	Order No. (PE/PE _{plus})	Weight [kg]
Cable L = 1000 mm, highly flexible, pre-assembled with clamping part	1.5–2.5 mm ²	16–14	08-K011-0617-001	08-K011-0617-002	0.03
	4.0–6.0 mm ²	12–10	08-K011-0614-001	08-K011-0614-002	0.12

Phase cables are double insulated

Notes: The use of end-cap units is mandatory for effective PE_{plus} rail polarity protection.

If the specified distance between 1st pole and outer edge of the guide profile is reduced, the inner longitudinal holes (A) must be used and lugs (B) should be shortened on site. The distance between the rail insulation and track profile must not be less than 5 mm.

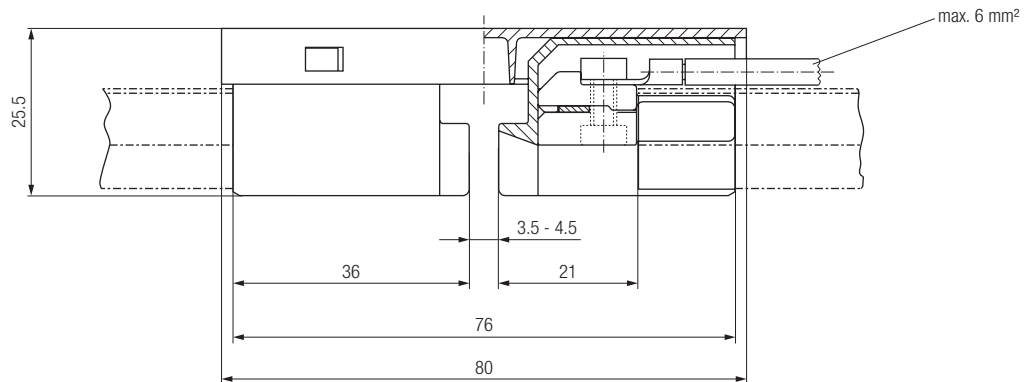
Air Gaps, Expansion Units

Air Gaps – without Expansion

Air gaps are used for electrical (galvanic) separation, e.g., for electrical segmentation or block separation. These are used on all poles or single poles depending on the required function.

Scope of delivery: 2 x end cap including connecting bar and clamping part with power feed option.

Note: Conversion of the power feed is possible by the customer by replacing the clamping part with a cable lug.



Type	Variant	AWG	Order No.		Weight [kg]
			PH/PE	PE _{plus}	
Air gap with a power feed option	1.5–2.5 mm²	16–14	081594-2	081594-5	0.04
	4.0–6.0 mm²	10–12	081594-3	081594-7	

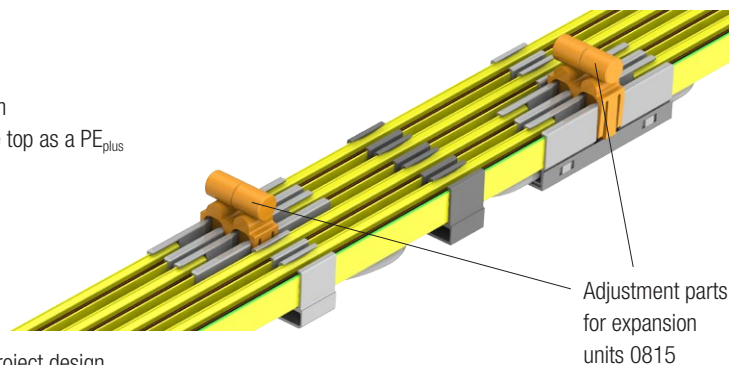
Expansion Units

Pre-assembled multi-pole expansion units are used to compensate for thermal expansion of the conductor rail system and of the building (track profile expansion joints). Larger expansion distances (e.g., support profile expansion joints) can be achieved by installing expansion units in a row. The units can be adjusted with separately available adjustment parts for an installation temperature range between +10° and +25° C. The adjustment parts are removed before commissioning the system and are used to adjust the gap dimensions of the expansion points.

Technical specifications

- Max. expansion distance per element and pole $2 \times 8 = 16$ mm
- Protective conductor implemented in the 4th position from the top as a PE_{plus}
- Suitable for PE and PE_{plus} current collectors
- Max. current-carrying capacity 54 A

The position and the number of expansion modules depend on the system layout and the ambient temperature range. Our application engineers will specify them in conjunction with the existing fixed points and partial lengths as part of the project design.



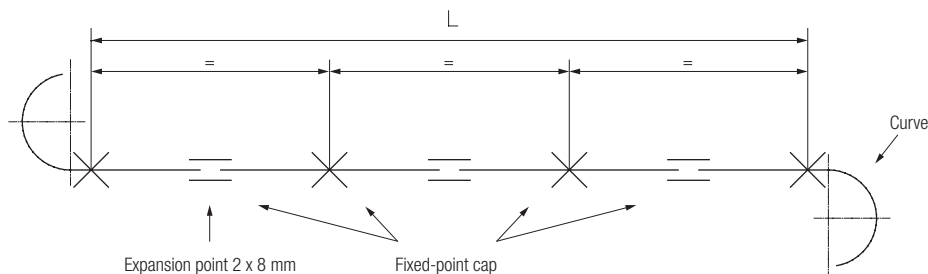
Type	Expansion	Length	Order No.	Weight [kg]
Expansion unit, 4-pole, PE _{plus} /PE	2 x 8 mm	1200	081563-611-3425	2.50
Expansion unit, 6-pole, PE _{plus} /PE		1200	081563-611-3625	3.20
Expansion unit, 8-pole, PE _{plus} /PE		1200	081563-611-3825	4.40

Adjustment part set (Order No.: 08-2009-0014P) with 16 pcs. adjustment parts available separately.

Expansion Units/Current Collectors

With 2 x 8 mm expansion / number of expansion points / gap adjustment

Determination of the number of expansion points required:



L = Length* [m]	Δt 10 °C	Δt 20 °C	Δt 30 °C	Δt 40 °C
20	—	—	1	1
40	—	1	2	2
60	1	2	2	3
80	1	2	3	4
100	2	3	4	5
120	2	3	4	6

* = Distance between end caps, curves (90–180° curves with $R \leq 1000$ mm can be regarded as fixed points) or other parts of the installation acting as fixed points.

$\Delta t = \Delta t_u + \Delta t_{sch}$
 Δt_u = Variation in the ambient temperature
 Δt_{sch} = Temperature increase of the current-carrying rail
 up to 40% of duty cycle $\Delta t_{sch} = 10^\circ\text{C}$
 up to 65% of duty cycle $\Delta t_{sch} = 20^\circ\text{C}$
 up to 100% of duty cycle $\Delta t_{sch} = 30^\circ\text{C}$

ProEMS Current Collectors

The ProEMS current collector unit is specially designed for electrified monorails. It features a broad mechanical tolerance spectrum, integrated cable management, and connection via spring clamps.

The geometry has been optimized for typical operation in one direction of travel (towing mode) to maximize brush life.

The current collector can also be used in reverse mode.

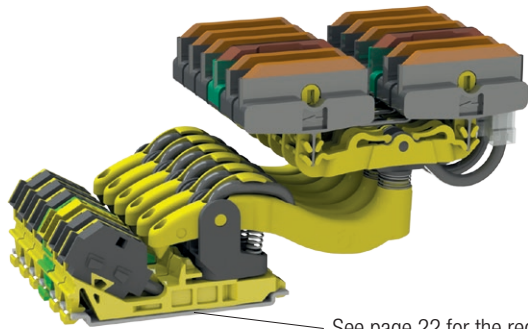
The current collector unit is ordered and supplied as a single item consisting of phase and PE current collecting components and an installation / base plate. Once the base plate has been installed, the current collectors are locked into it. The screw heads for fixing the installation plate are located in the foot of the current collector.

Rated current: Pure graphite 16 A, copper-graphite 25 A
 Max. current*: Pure graphite 22 A, copper-graphite 43 A
 Rated voltage: max. 500 V AC
 Minimum current: 1 A
 Nominal stroke: ± 15 mm
 Max. deflection: ± 15 mm
 Cable: 2.5 mm² (AWG 16)
 Spring clip: 0.5–6 mm²

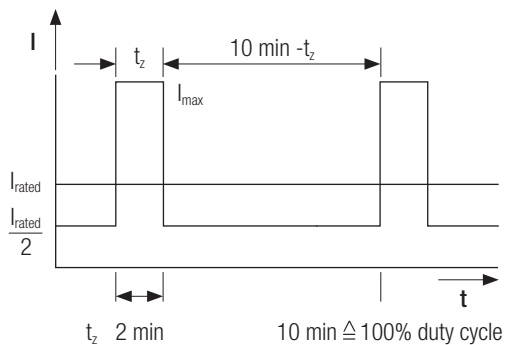
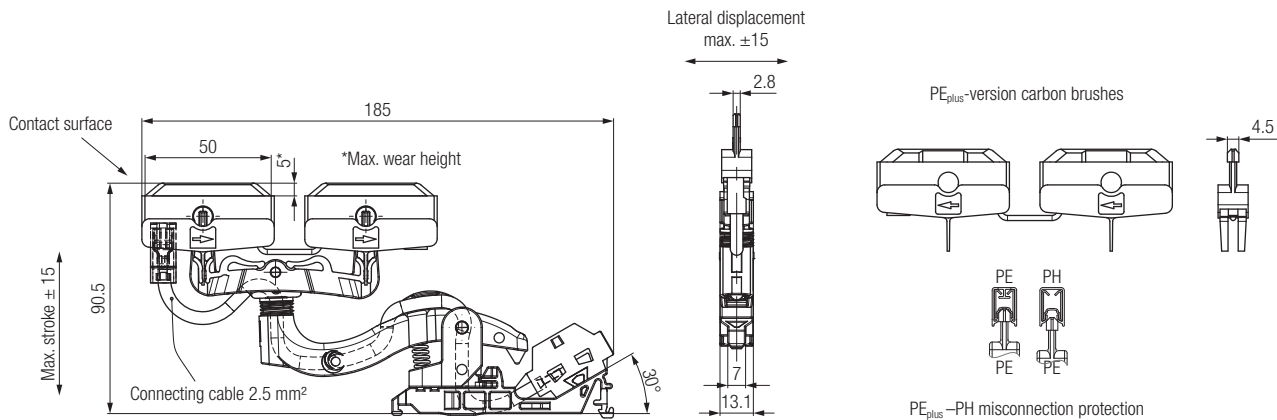
* Operating mode S6, basic load 50% I_n + 2 min additional load (VDE 0530/IEC 60034-1), see page 21 also.

Current Collectors

ProEMS ProEMS Current Collectors (cont'd.)



See page 22 for the required installation base plate.



Type	I_{rated} (100% duty cycle)	$\frac{I_{\text{rated}}}{2}$	I_2 at t_z		
			2 min	4 min	10 min
08150A-...	16 A	8 A	17 A	12 A	8 A
08150B-...	22 A	11 A	32 A	23 A	11 A

Example: load equivalent 50% rated current as base load (e.g. drive) + additional load (e.g. for lifting or turning device).

Description	Number of poles	Type	Order No.	Weight [kg]
Current collectors 16 A pure graphite / pure carbon	1	Phase	08150A-0141	0.13
	1	Protective earth PE _{plus}	08150A-0144	0.13
	1	Protective earth PE ^{*)}	08150A-0142	0.13
Current collectors 25 A, copper-graphite	1	Phase	08150B-0141	0.14
	1	Protective earth PE _{plus}	08150B-0144	0.14
	1	Protective earth PE ^{*)}	08150B-0142	0.14

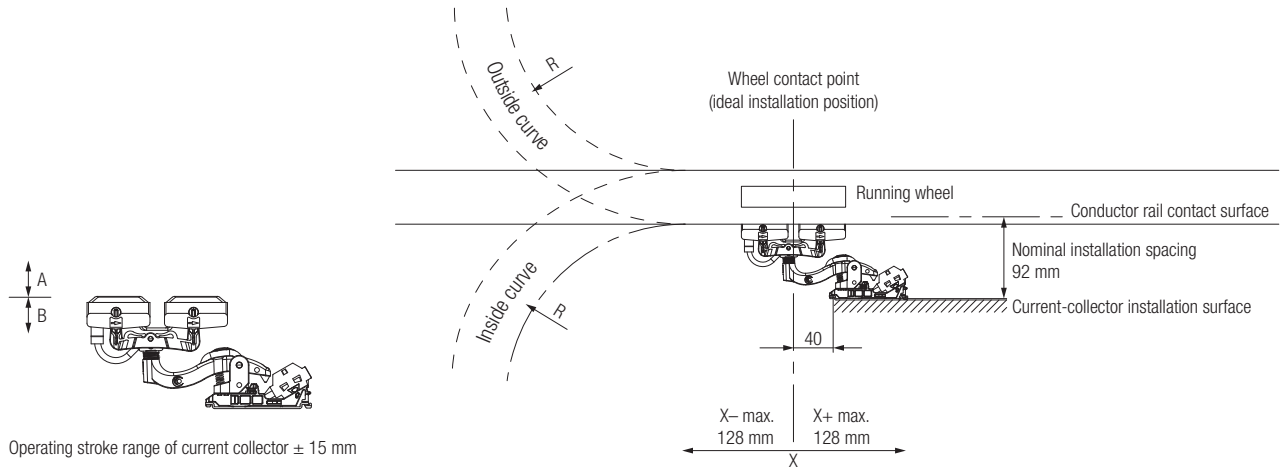
^{*)} PE without rail polarity protection only for existing systems.

Note:

The determining factors for the maximum current are the type of conductor used, the cross section, the installation method, and the ambient temperature. The limit values of the cable as well as reduction factors must be observed in the design and execution.

Current Collectors

Reduction of the Operating Range as a Function of the Current Collector Position in Inside and Outside Curves

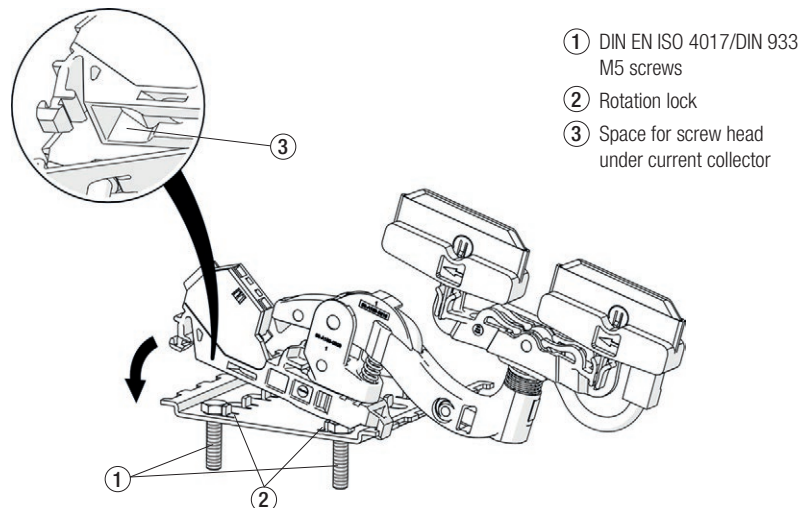


Maximum permissible offset of the installation position to the wheel contact point

Working range	[mm]	Curve	-128	-60	X	+60	+128
A = Extension	[mm]	Inside	15	7	0	7	15
B = Compression	[mm]	Outside	15	7	0	7	15

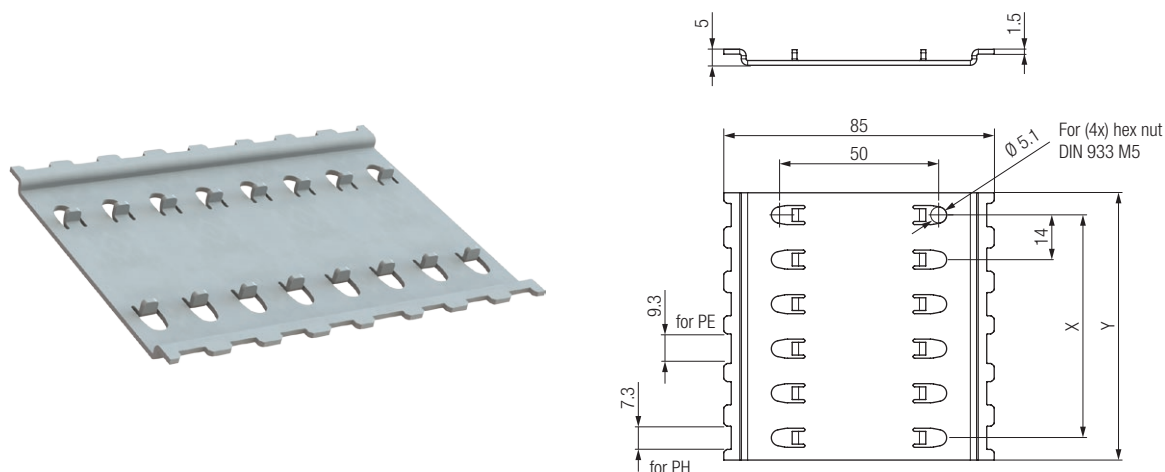
Specifications for 1000-mm rail radius (typical radius for electrified monorails)

Installation Base Plate for Current Collector



Current Collectors and Accessories

Installation Base Plate for Current Collector (cont.)



Description	Number of poles	Order No.	X [mm]	Y [mm]	Weight [kg]
Installation base plate for PE _{plus} current-collector unit (protective conductor in 4 th position from the top)	4	08-M001-0089-004	42	56	0.06
	6	08-M001-0089-006	70	84	0.08
	8	08-M001-0089-008	98	112	0.11

Note:

Hexagonal screws in accordance with DIN933 (M5) must be used for fastening the installation base plate. The screw head is located in a recess in the foot of the current collector. The position of the PE current collector is indicated by a recess in the 4th position and prevents the use of the PE current collector in a phase position.

Terminal Box for Conductor Rail Connection

Terminal box for the interface between the conductor rail and the electrical components of the system.

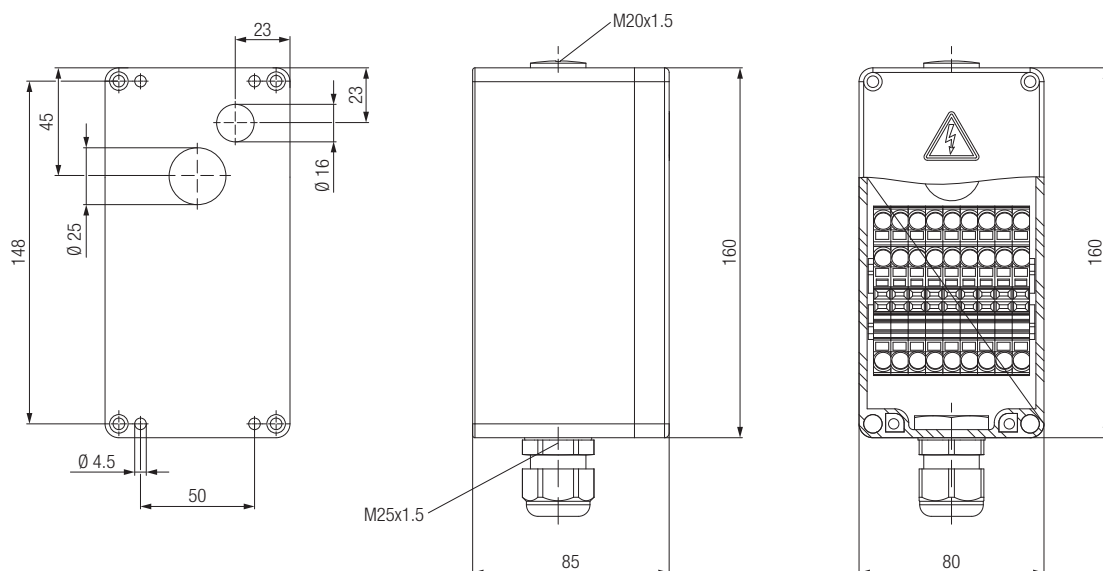
Order number 08-K040-0354 (further versions on request)

Protection class: IP20

Terminal assignment: Per drawing 08-K040-0354

Weight: 0.5 kg

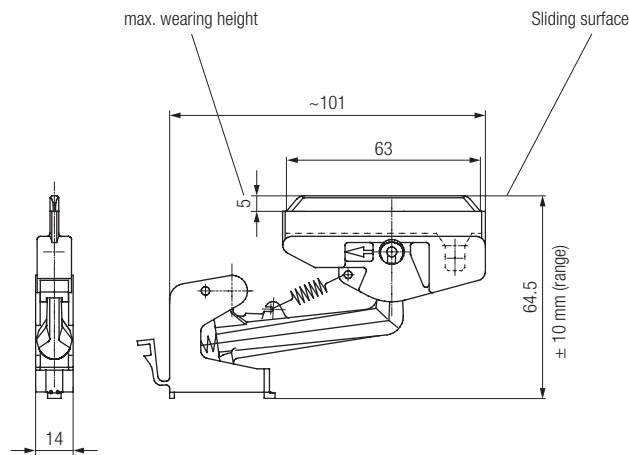
Items included: Qty 7 PH clamps, qty 2 PE clamps, qty 1 6 mm² ground connection, qty 5 DIN 7513 M4x12 self-tapping screws, qty 1 M20x1.5 screw connection



Current Collectors for Existing Systems

Current Collector with 63 mm Contact Length for 16 A / 35 A, Single Pole; with Plug Connection

Connection: 6.3 mm flat plug
 Implementation: Towing mode
 Max. stroke: ± 10 mm
 Max. lateral offset: ± 10 mm



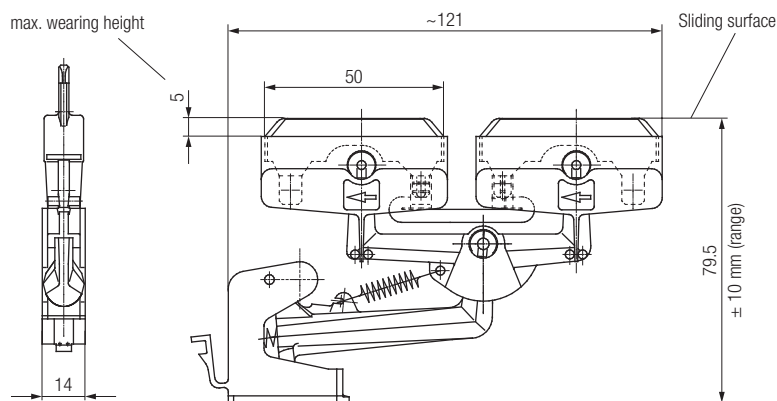
Brush material: graphite / copper graphite

Type		Material	Order No.	For pole spacing [mm]	Weight [kg]
Current collector (existing systems)	16 A, PH	Graphite	081506-0141	14	0.03
	16 A, PE	Graphite	081506-0142	14	0.03
	35 A, PH	Copper graphite	081507-0141	14	0.03
	35 A, PE	Copper graphite	081507-0142	14	0.03

Note: Maximum current depends on the type of conductor used, the cross section, the installation method, and the ambient temperature. The limit values and reduction factors of the cable must be observed in the design and execution.

Double Current Collector with 2 x 50 mm Contact Length for 2 x 16 A / 2 x 25 A, Single Pole; with 2 Plug Connections

Connection: 6.3 mm flat plug
 Implementation: Towing mode
 Max. stroke: ± 10 mm
 Max. lateral offset: ± 10 mm



Brush material: graphite / copper graphite

Supply details with 2 x 2.5 mm² connecting leads

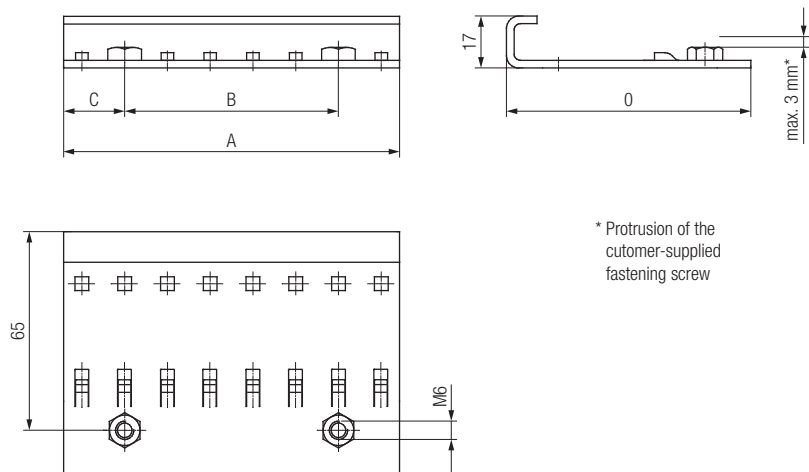
Type		Material	Order No.	For pole spacing [mm]	Weight [kg]
Double current collector (existing systems) Towing mode	2 x 16 A, PH	Graphite	081508-0141	14	0.04
	2 x 16 A, PE	Graphite	081508-0142	14	0.04
	2 x 16 A, PE _{plus}	Graphite	081508-0144	14	0.04
	2 x 25 A, PH	Copper-graphite	081509-0141	14	0.05
	2 x 25 A, PE	Copper-graphite	081509-0142	14	0.05
	2 x 25 A, PE _{plus}	Copper-graphite	081509-0144	14	0.05

Note: Maximum current depends on the type of conductor used, the cross section, the installation method, and the ambient temperature. The limit values and reduction factors of the cable must be observed in the design and execution.

Current Collectors and Accessories for Existing Systems

Installation Base Plate for Current Collector Types 081506- / 081509-

The 8-pole version is shown.

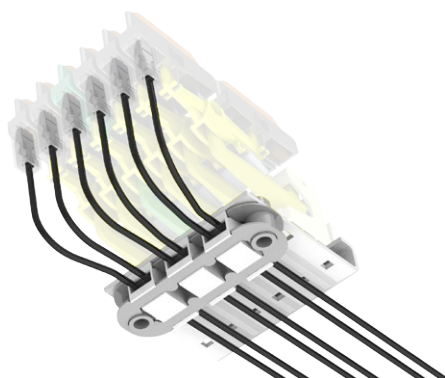


Type	Order No.	Number of poles	Pole spacing [mm]	A [mm]	B [mm]	C [mm]	Weight [kg]
Installation base plate for current collector	08-S138-0056	4	14	54	42	6	0.11
	08-S138-0054	6	14	82	70	6	0.16
	08-S138-0052	8	14	110	70	20	0.21

Recommended Cable Package with Strain Relief

The optional cable package is recommended to prevent the connecting cables from interfering with the free movement of the the current collectors. The unit is installed under the installation base plate and ensures that the cable is guided without tension or directional forces.

Note: The cable package is configured according to the number of poles, cross section, and cable length for the order.



Dimensions and design instructions:
See Technical Data Sheet TDB0815-0004-EN
"Cable package with strain relief – 08-L020-0210"

Configuration item	Ordering parameter				
08-L020-0210	Cross section	Number of poles	Current-collector type	Cable length	PE in 4th position (coding)
	1.5 mm ²	4	081506-... / 081507-...	0.2 to 2 m	Yes/No
	2.5 mm ²	6			
	4.0 mm ²	8	081508-... / 081509-...		

Connecting Cables for Existing Systems

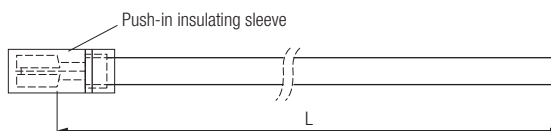
Connecting Cables with Straight Connectors for Free Installation, Applications in Power Supplies > 48 V

These connecting cables are highly flexible and **double** insulated for phase conductors / **individually** insulated for protective conductors.

They must be ordered in the required sizes and lengths.

Connecting cables: PH = black, PE = yellow/green

UL/CSA-listed cables



Cross section [mm²]	AWG	Order No.		Length [m]	Cable diameter [mm]	Current [A]	Weight [kg]
		Phase (PH)	Protective earth (PE)				
1.5	16	081109-0.5 x 1.5 x 21	081109-0.5 x 1.5 x 42	0.5	4/3	24	0.02
1.5	16	081109-1 x 1.5 x 21	081109-1 x 1.5 x 42	1	4/3	24	0.02
2.5	14	081109-0.5 x 2.5 x 21	081109-0.5 x 2.5 x 42	0.5	5/3.5	32	0.04
2.5	14	081109-1 x 2.5 x 21	081109-1 x 2.5 x 42	1	5/3.5	32	0.04
4	12	081109-1 x 4 x 21	081109-1 x 4 x 42	1	6	42	0.06

Other lengths and sizes on request

Cable configurator (SAP CONFIG 3126191)

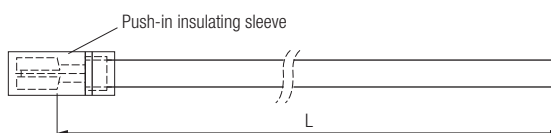
Connecting Cables with Straight Connectors for Protected Installation

The connecting cables are highly flexible and **individually** insulated.

They must be ordered in the required size and length.

Connecting cables: PH = black, PE = yellow/green

UL/CSA-listed cables



Cross section [mm²]	AWG	Order No.		Length [m]	Cable diameter [mm]	Current [A]	Weight [kg]
		Phase (PH)	Protective earth (PE)				
1.5	16	081109-0.5 x 1.5 x 41	081109-0.5 x 1.5 x 42	0.5	3	24	0.02
1.5	16	081109-1 x 1.5 x 41	081109-1 x 1.5 x 42	1	3	24	0.02
2.5	14	081109-0.5 x 2.5 x 41	081109-0.5 x 2.5 x 42	0.5	3.5	32	0.03
2.5	14	081109-1 x 2.5 x 41	081109-1 x 2.5 x 42	1	3.5	32	0.03

Other lengths and sizes on request

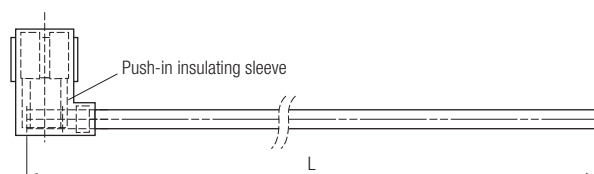
Cable configurator (SAP CONFIG 3126191)

Connecting cables with angled connectors for protected installation

The connecting cables are highly flexible and **individually** insulated.

They must be ordered in the required size and length.

UL/CSA-listed cables



Cross section [mm²]	AWG	Order No.		Length [m]	Cable diameter [mm]	Current [A]	Weight [kg]
		Phase (PH)	Protective earth (PE)				
1.5	16	081509-0.5 x 1.5 x 41	081509-0.5 x 1.5 x 42	0.5	3	24	0.02
1.5	16	081509-1 x 1.5 x 41	081509-1 x 1.5 x 42	1	3	24	0.01
2.5	14	081509-0.5 x 2.5 x 41	081509-0.5 x 2.5 x 42	0.5	3.5	32	0.03
2.5	14	081509-1 x 2.5 x 41	081509-1 x 2.5 x 42	1	3.5	32	0.03

Other lengths and sizes on request

Cable configurator (SAP CONFIG 3126191)

Note:

Be sure to use double-insulated cables for voltages above 48 V. Load-carrying capacity is in accordance with VDE 0298-4, installation method C at 100% duty cycle, ambient temperature 30°C, 1.5 mm² max. 19.5 A, 2.5 mm² max. 27 A, 4.0 mm² max. 36 A, 6.0 mm² max. 46 A. Cables in accordance with DIN VDE 0298 Part 4; plug in accordance with DIN 46 257 Part 3.

Current Collector Heads

Selection Aid for Contact-Brush Material

Two different contact-brush materials are available for use in EMS applications:

- Copper–graphite brushes
- Graphite brushes

Areas of Application for Contact Brushes

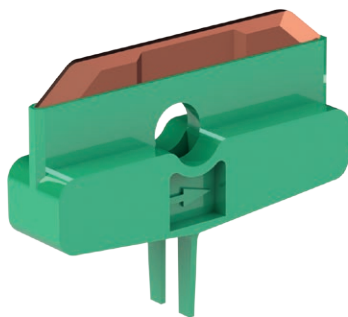
Copper–graphite contact brushes are preferably used for higher current loads and frequent peak currents.

The impedance/resistance of copper–graphite contact brushes is low. The voltage drop and thus the heating of the current collector head are lower than for graphite contact brushes. Copper–graphite contact brushes have a shorter service life and find use in systems with low traversing speeds and few vehicles (low throughput rates).

Graphite contact brushes have a significantly longer service life and are suitable for systems with high throughput rates. The impedance/resistance of the graphite contact brushes is slightly higher, which is reflected in the low permissible nominal currents.

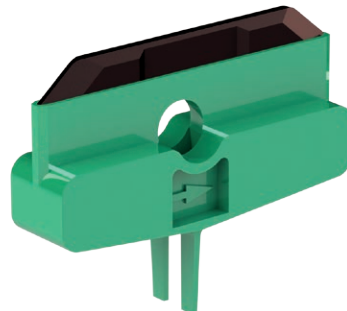
	Graphite	Copper–graphite
Current load	+	++
Service life	++	+
Breaking strength	+	++
Contact resistance	+	++
Resistance at transitions	++	+

Copper Graphite Contact Brush



Current Collector Head

Graphite Contact Brush



Current Collector Head

Replacement and Spare Parts

Small Parts Service Package

We recommend the following parts package for use in servicing and as an on-site spare parts package:

Description	Use	Quantity	Order No.
Rail connector	Connection of PE/PE _{plus} and PH rails	20	08-Z009-0016
Power feed connector 2.5 mm ²	Power feed 1.5–2.5 mm ²	10	
Power feed connector 4.0 mm ²	Power feed 2.5–4.0 mm ²	10	
Fixed-point cap	For fastening the rails	20	
End cap, complete (single pole), black	Spare part for phase- and PE-rail transition	10	
End cap, complete (single pole), green	Spare part for PE _{plus} -rail transition	10	
Expansion connector, single pole, PH	Spare part for expansion module, phase	4	
Expansion connector, single pole, PE _{plus}	Spare part for expansion module, protective conductor	2	
Crimping cable lug 1.5–2.5 mm ²	Cable connection	20	
Crimping cable lug 2.5–6 mm ²	Cable connection	20	
Disassembly tool	Disassembly of the conductor rail from the clamp	5	
DIN screw set	for installing end caps and current collectors	1	
Insulating caps	Cover for unused current collector connections	20	

Spare Parts for Customer-specific Special Components / Special Colors

Requirements for shrinkage, transport damage, and spare parts must be taken into account when ordering customer-specific components such as special hanger clamps or profiles in special colors. Follow-up production is not always possible in the short term, and only possible in the full minimum order quantity. The guideline values are at least 300 units for special injection-molded parts: min. 300 pieces and at least 1000 meters of profile for special profile colors.

Replacement and Spare Parts

Contact Brushes

Replacement contact brushes are installed as follows:

a) Single current collectors

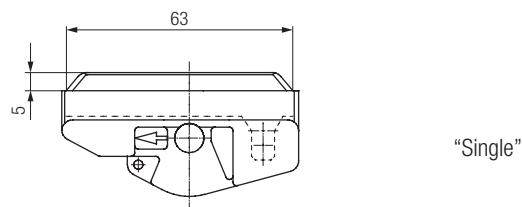
1. Disengage the stabilizing spring from the old current collector head
– do not overstretch.
2. Pull off the cable connection.
3. Swivel the current collector head sideways to the stop and pull it out through the insertion point.
4. Install the new current collector head in the reverse sequence.

b) Double current collector

1. Disengage the stabilizing spring from the rocker
– do not overstretch.
2. Pull off the cable connection.
3. Remove the pair of contact brushes from the rocker.
4. Install the new pair of contact brushes in the reverse sequence.

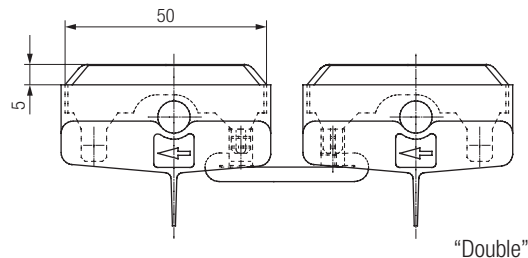
Contact Brushes (Pure Carbon)

- 63mm contact length; max. 16 A
- Brush material: Pure carbon



Type	Order No.	For pole spacing [mm]	Weight [kg]
16 A, PH	081006-124	14	0.01
16 A, PE	081006-224	14	0.01
16 A, PE _{plus}	081006-424	14	0.01

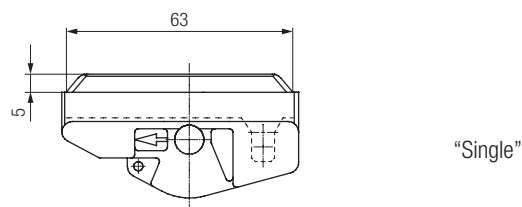
- 2 x 50 mm contact length; max. 2 x 16 A
- Brush material: Pure carbon



Type	Order No.	For pole spacing [mm]	Weight [kg]
2 x 16 A, PH	081006-114	14	0.02
2 x 16 A, PE	081006-214	14	0.02
2 x 16 A, PE _{plus}	081006-414	14	0.02

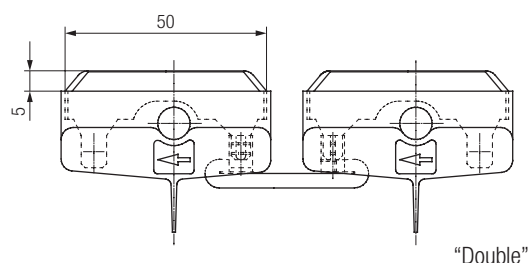
Contact Brushes (Copper–Graphite)

- 63 mm contact length; max. 35 A
- Brush material: Copper–graphite



Type	Order No.	For pole spacing [mm]	Weight [kg]
35 A, PH	081006-144	14	0.02
35 A, PE	081006-244	14	0.02
35 A, PE _{plus}	081006-444	14	0.02

- 2 x 50 mm contact length; max. 2 x 25 A
- Brush material: Copper–graphite



Type	Order No.	For pole spacing [mm]	Weight [kg]
2 x 25 A, PH	081006-134	14	0.03
2 x 25 A, PE	081006-234	14	0.03
2 x 25 A, PE _{plus}	081006-434	14	0.04

Replacement and Spare Parts / Accessories

RZ-... / Z-... Stabilizing springs for current collector heads

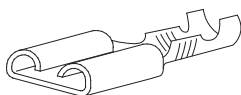


Type	For current collector	Contact length [mm]	Mode	Order No.
Stabilizing spring	081506-...	63	Towing mode / reverse mode	RZ-0371
	081507-...			
	081508-...	50	Towing mode	Z-066RI
	081509-...		Reverse mode	Z-073I

Accessories: Installation Materials

Push-in connector for 1.5 mm² to 4 mm²

– for plug connection on the current collector head

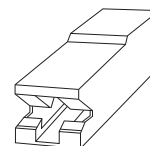


Type	Order No.
Push-in connector 1.5–2.5 mm ²	08-160304-2
Push-in connector 4–6 mm ²	08-160314-2

Minimum order quantity: 100 units

Insulating sleeve for max. ø 6 mm

– for use with push-in connector

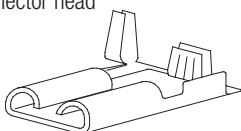


Type	Order No.
Insulating sleeve for max. ø 6 mm	08-925068-0

Minimum order quantity: 100 units

Push-in connector for 1 mm² to 2.5 mm²

– for plug connection on the current collector head

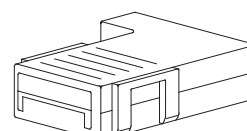


Type	Order No.
Push-in connector, 90° 1–2.5 mm ²	08-180429-2

Minimum order quantity: 100 units

Insulating sleeve for max. ø 3.5 mm

– for use with push-in connector

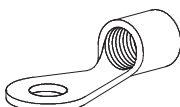


Type	Order No.
Insulating sleeve, 90° for max. ø 3.5 mm	08-180984-0

Minimum order quantity: 100 units

Crimping cable lug for 1.5 mm² to 2.5 mm²

– for infeed and transition cap

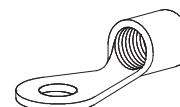


Type	Order No.
Crimping cable lug 1.5–2.5 mm ²	08-1630/4

Minimum order quantity: 100 units

Crimping cable lug for 4 mm² to 6 mm²

– for infeed and transition cap



Type	Order No.
Crimping cable lug 4–6 mm ²	08-1650/4

Minimum order quantity: 100 units

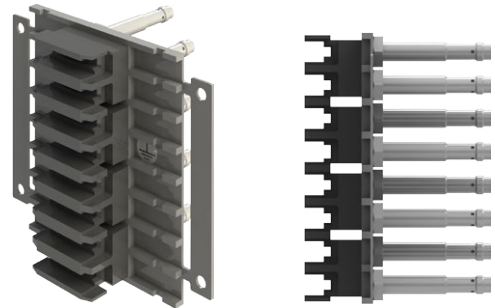
Optional Accessories

Contact-Brush Sensor Unit for Checking the Current Collectors

The optional contact-brush sensor unit is available for checking the current collectors (losses and wear of contact brushes).

The unit is integrated into the conductor rail and allows for separate monitoring of the current collectors when they pass over it. Possible test parameters in the respective evaluation are:

- Contact brushes present
- Contact brushes OK
- Contact brush wear limit exceeded
- Contact brush / current collector not detected / missing

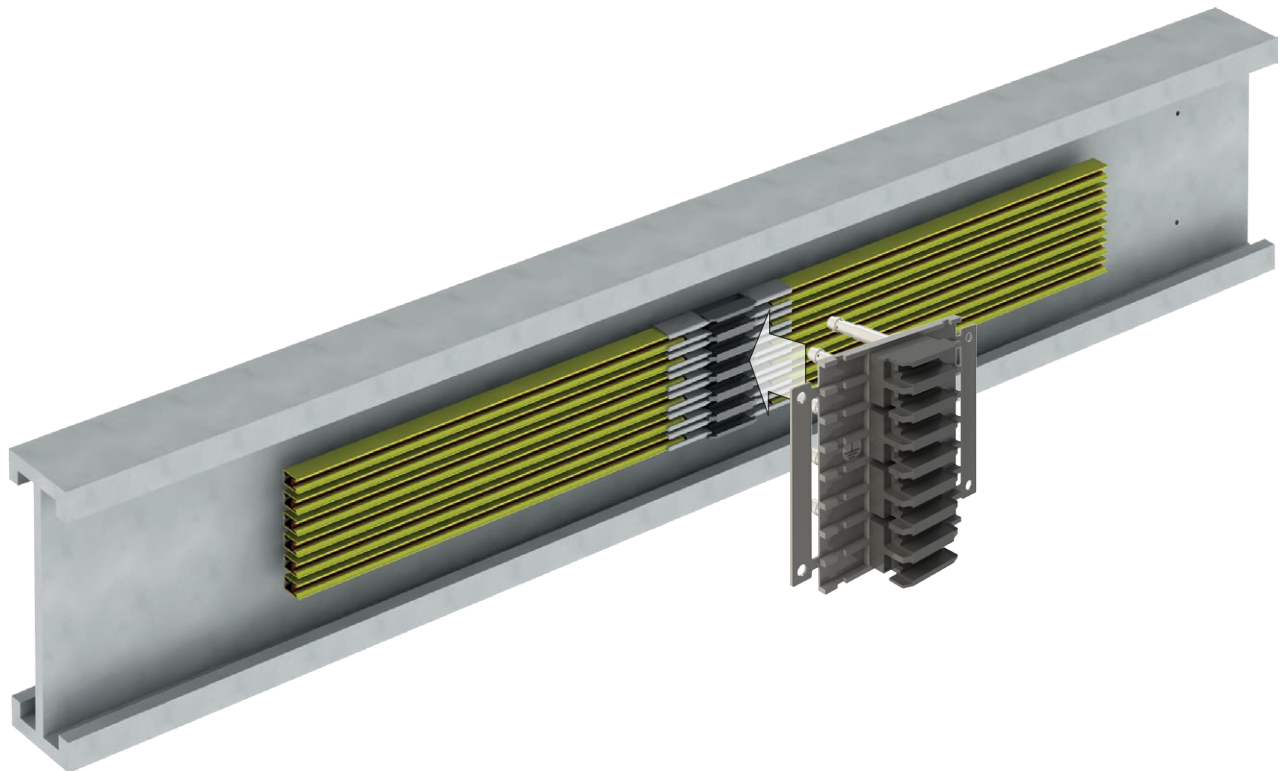


Type	Number of poles	Order No.	Weight [kg]
Sensor unit, 4-pole, PE _{plus}	4	08-P102-0110	0.30
Sensor unit, 6-pole, PE _{plus}	6	08-P102-0111	0.42
Sensor unit, 8-pole, PE _{plus}	8	08-P102-0112	0.54

Supplied ex factory assembled and adjusted

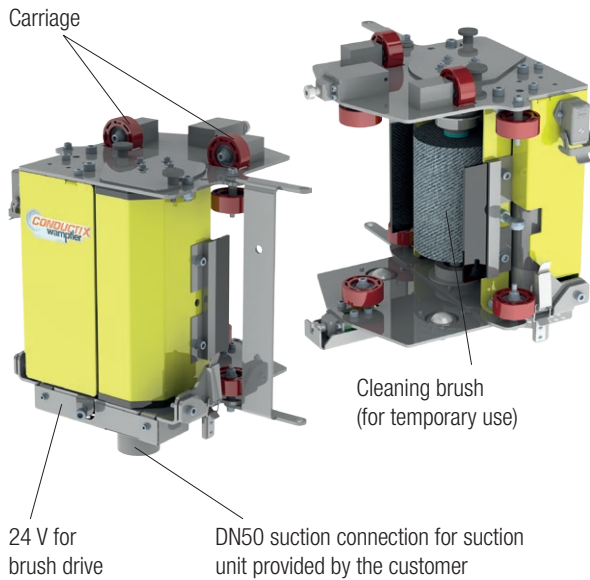
Note:

We recommend to integrate the contact-brush sensor unit into a section where the collectors can pass over the unit at low and even speed. The maximum traversing speed is determined by the cycle time of the system control unit. See operating instructions BAL 0815-0001 for more detailed information. An adapter frame for conversion of existing sensor units is available on request.



Optional Accessories / Installation Tools

Cleaning Unit for Dust Extraction / Support-Profile Cleaning (160 x 60 / 160 x 80 / 240 x 80)



Component	EMS support profile		
	180 x 60	180 x 80	240 x 80
	Order number		
Cleaning head	08-G023-0138	08-G023-0135	08-G023-0183
Current collector housing (optional)	08-G023-0139	08-G023-0136	On request
Control unit (optional)	08-S210-0261	08-S210-0261	08-S210-0261
Connector plate (optional)	08-B020-7145		

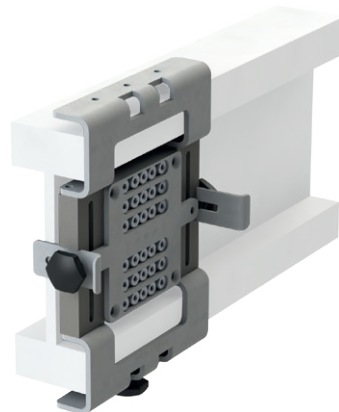
Drilling Fixture Installation Tool

A drilling fixture is used for quick installation and accurate positioning of end caps at transitions on lifters and switches. The fixture is designed for use on support profiles and for straight and angled cuts. Use on 180- and 240-mm guideway profiles is made possible by exchanging the upper and lower components. Maximum web width 8 mm.

Scope of Delivery

- 1 x drilling fixture with adjustable stop and end stops
- 1 x installation bracket for 180-mm tracks
- or
- 1 x installation bracket for 240-mm tracks

See Installation Instructions MV0815-0006



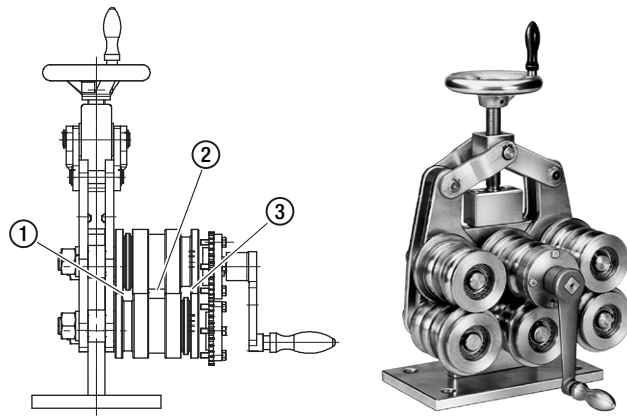
Type	For rail [mm]	Order No.	Weight [kg]
08-V015-0474-001	180	3196055	0.92
08-V015-0474-002	240	3196056	1.04

Installation Tools

Bending Device

Conductor rails (including insulation profile) can be bent using the three-roller bending device 081091. By means of the adjustment screw, any curve can be produced on-site with a bending radius "R" from 450 mm to ∞ vertically and from 1200 mm to ∞ horizontally.

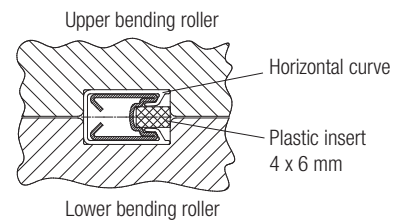
1. Bending groove for **vertical curves with entry on the inside curve**. Turn the entry upwards.
2. Bending groove for **horizontal curves**. Turn the entry to the left or right, introduce the insert for the bending device.
3. Bending groove for **vertical curves with entry on the outside curve**. Turn the entry downwards.



Type	Order No.	Weight [kg]
Bending device	081091*	17.50
Insert / filler profile	08-V015-0357*	0.05

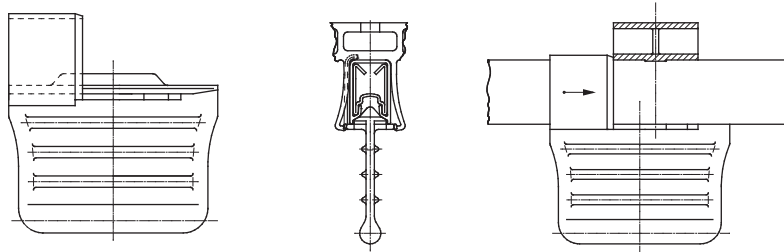
See also Installation Instructions MV0815-0007-EN

* Standard series



Disassembly Tool

The disassembly tool is required for the disassembly of conductor rails fastened with hanger clamps and end caps.



Type	Order No.	Weight [kg]
Disassembly tool	081092*	0.006

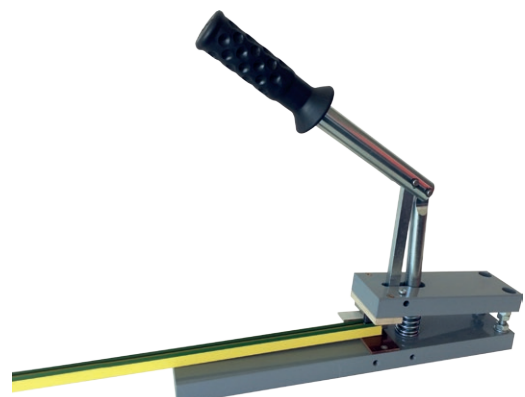
See also Installation Instructions MV0815-0001-D

* Standard series

Notching Tool for PE_{plus} rail

Tool for forming the U-shaped notch when producing short lengths of PE_{plus} rail.

Type	Order No.	Weight [kg]
Notching tool	081094	4.80
Replacement blade	08-W100-0605	0.08



FAQ

Is a Combination of the Conductor Rail with Data-Transmission and Positioning Systems / Barcodes possible?

The integration of leaky coax cables, slotted waveguides, and barcode systems is common. Special hanger clamps are available for this purpose and can be implemented as required for the order. Ensure that the bar code is planned to be above the conductor rail. Please contact us for further information regarding combinations with other components.

Are Current Collector Units with the ProEMS Current Collector available as an Alternative to the Current Collectors listed in the Catalog?

Pre-assembled units are not available, since the current collectors have to be separated from the carrier for installation of the carrier. Because it takes only a few seconds to click the current collectors into place, only the unassembled variant is provided in order to keep the assembly times on the construction site short.

Can the ProEMS Current Collectors also be used for a Reversible Application?

Backing up or reversing is possible with the current collector. When used in a fully reversible application, such as transfer cars, the wear compensation is not effective and the service life of the contact brushes may be slightly shorter due to oblique running.

Is it possible to change the PE position (4th pole from the top by default)?

A different position of the protective conductor is not possible with standard components. The system has been designed in accordance with the international specifications of the automotive industry, in which the protective conductor must be placed in the 4th position from the top after the energy poles.

Can Data be transmitted through the Conductor Rail?

The transmission of data via the conductor rail is standard in electrified monorail systems with a busbar system. We recommend talking with the control engineer or our application experts.

What is the Current-Carrying Capacity of the ProEMS Conductor Rail System?

An electrified monorail system is a circular system with several consumers and feeds, and is subdivided into sections/segments. Based purely on the rail, the current-carrying capacity of the rail is 100 A at 100% duty cycle. However, the current-carrying capacity is defined by the limits of the individual components and by the connection cables and current collector cables (see information and instructions for the respective components). The current-carrying capacity values for the current collectors refer to a moving system.

Is the System also available with a standard PE Current Collector?

Leading automotive manufacturers, system engineers, etc., recommend the use of an active polarity-reversal protection for conductor rails as a safety function; this is a fixed requirement for building electrified monorail systems – even outside the automotive sector. All new systems and conversions are fitted with PE_{plus} protective conductors. Other current collectors are available for other systems or systems with a different protection system.

How does PE_{plus} work?

The protective-conductor pole and the PE_{plus} contact brushes are broader and cannot engage in a phase rail. Voltage leaks to the steel construction on the vehicle side are actively prevented in the case of a double fault (breaking off of a PE current collector and engagement of the second PE current collector in a phase rail).

What has to be observed in the layout of the Current Collectors?

Essentially, a few static and dynamic points have to be taken into account.

Statics:

- For the correct contact pressure and the mean operating point (stroke), the specified installation dimension between the underside of the current collector / carrier and the contact surface of the conductor rail must be complied with.
- The current collectors must be installed such that each contact brush is aligned with the center of the contact surface (no vertical offset). Cables must not exert any tensile or compressive force on the current collector.

Dynamics:

- Depending on the distance of the current collector entry point to the wheel contact point and the radius of the curve, the distance between the rail and the current collector carrier plate will vary in curves, i.e., the current collector spring is extended or compressed. If too great a distance is selected, the stroke of the current collector may exceed or fall below the permissible value. This results in increased wear on the rail and current collectors, and even breakage of the current collectors.

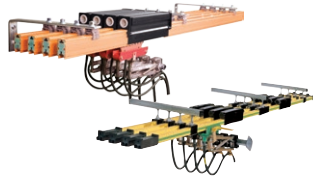
Your Applications – our Solutions

ProEMS from Conductix-Wampfler represents only one of the many solutions made possible by the broad spectrum of Conductix-Wampfler components for the transport of energy, data and fluid media. The solutions we deliver for your applications are based on your specific requirements. In many cases, a combination of several different Conductix-Wampfler systems can prove advantageous. You can count on all of Conductix-Wampfler's Business Units for hands-on engineering support – coupled with the perfect solution to meet your energy management and control needs.



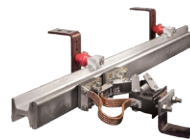
Festoon systems

It's hard to imagine Conductix-Wampfler cable trolleys not being used in virtually every industrial application. They're reliable and robust and available in an enormous variety of dimensions and designs.



Conductor rails

Whether they're enclosed conductor rails or expandable single-pole systems, the proven conductor rails by Conductix-Wampfler reliably move people and material.



Non-insulated conductor rails

Extremely robust, non-insulated conductor rails with copper heads or stainless steel surfaces provide the ideal basis for rough applications, for example in steel mills or shipyards.



Slip ring assemblies

Whenever things are really "moving in circles", the proven slip ring assemblies by Conductix-Wampfler ensure the flawless transfer of energy and data. Here, everything revolves around flexibility and reliability!



Motorized Cable & Hose Reels

Motorized reels by Conductix-Wampfler hold their own wherever energy, data, media and fluids have to cover the most diverse distances within a short amount of time – in all directions, fast and safe.



Spring Cable & Hose Reels

With their robust and efficient design Spring Cable and Hose Reels from Conductix-Wampfler are unbeatably reliable in supplying energy, signals, data and fluids to a vast range of tools, cranes and vehicles.



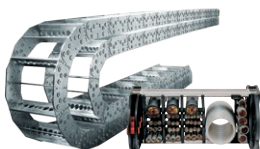
Inductive Power Transfer IPT®

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Retractors and Balancers

Our wide range of high reliable retractors and balancers remove the load from your shoulders and allow you to reach top productivity.



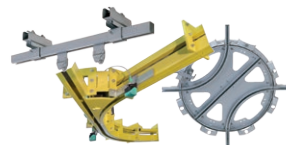
Energy guiding chains

The "Jack of all trades" when it comes to transferring energy, data, air and fluid hoses. With their wide range, these energy guiding chains are the ideal solution for many industrial applications.



Jib booms

Complete with tool transporters, reels, or an entire media supply system – here, safety and flexibility are key to the completion of difficult tasks.



Conveyor systems

Whether manual, semiautomatic or with Power & Free – flexibility is achieved with full customization concerning layout and location.

www.conductix.com

Conductix-Wampfler

has just one critical mission:

To provide you with energy and data transmission systems that will keep your operations up and running 24/7/365.

To contact your nearest sales office, please refer to:

**[www.conductix.com/
contact-search](http://www.conductix.com/contact-search)**

