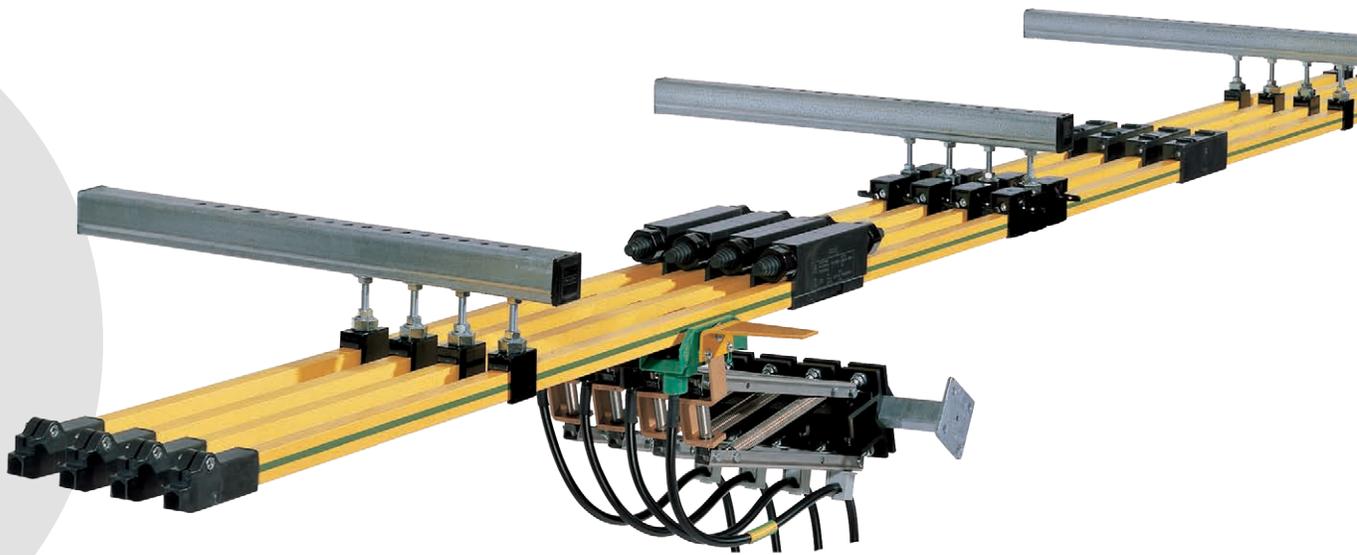


# Insulated Conductor Rail

## SinglePowerLine Program 0812



**CONDUCTIX**  
wampfler



# Table of Contents

<b>System Description</b>	4
<b>Technical Data</b>	5
<b>General Instructions</b>	6
<b>System Structure</b>	7
Components and their use	7
Insulated Conductor Rails	8
Comparison of different Conductor Rail materials	9
<b>Clamps and Connectors</b>	10
Hanger Clamps	10
Compact Hanger Clamps	11
Anchor Clamps	11
Rail Connectors	12
Power Feed Connectors	12
End Caps	13
Air Gaps	13
<b>Expansion Units</b>	14
Expansion Units	14
<b>Pickup Guide for Intersections</b>	16
<b>Current Collectors</b>	17
Current Collectors (Plastic Arm Type)	17
Current Collectors (Parallel Arm Metal Type)	18
Installation spacing for Current Collectors	18
Dual Current Collectors (Parallel Arm Metal Type)	19
Installation Instructions and Assembly Help for Current Collectors	20
<b>Dimensioning and Layout of Conductor Rail System</b>	22
<b>System Layout</b>	25
Layout Schematic and Component Overview	26
Example Material Overview / Example Order	26
<b>Mounting Accessories</b>	27
Support Arms 30 × 32 × 2 mm - perforated	27
Support Arms 40 × 40 × 2.5 mm - perforated	27
Permissible Load for Support Arms	27
Holders for Support Arm 32 × 30 × 2 for Screw Mounting with 2-holed Connector Plate	28
Holders for Support Arm 40 × 40 × 2.5 for Screw Mounting with 2-holed Connector Plate	28
Girder Clips, Clamping Thickness 4 - 20 mm	29
Girder Clips, Clamping Thickness 18 - 36 mm	29
Girder Clips, non-twistable, Clamping Thickness 6 - 25 mm	29
Towing Arms	30
End Caps	30
Insulators	30
Notch-type Cable Lugs for Power Feed Line	31
Connector Cables for Current Collector Head 081209	31
Spring Assembly (lateral insertion) for Current Collector Head 081209	31
<b>Tools and Assembly Accessories</b>	32
Mounting Comb 081045	32
Bending Device	32
Contact Grease for Connection Points	32
<b>Replacement Parts</b>	33
Complete Current Collector Head for Current Collector 081209	33
Stabilization Springs for Current Collector Head 081209	33
Replacement Copper Graphite Shoes with insulation for Current Collector Head 081205... / 081206... / 081207... / 081208...	33
Replacement Parts for Current Collectors	34

# System Description

The SinglePowerLine 0812 conductor rail system is used as a standard product to power bridge, portal and process cranes, but can also be used in a wide variety of other applications such as amusement rides and people movers. For over 35 years, it is a specified, reliable, and approved product in these applications.

As an insulated single-pole safety conductor rail, the contact-protected system meets requirements for conductor rails according to European (CE) and current international standards.

With different insulation materials, the 0812 system can be used with applications with conductor temperatures of up to 115 °C. This is equivalent to a constant ambient temperature of 85 °C at 100% duty cycle under continuous load. The conductor rail can temporarily withstand up to 125 °C.

For conductor materials, copper, stainless steel, and aluminum in sea-water resistant alloy with stainless steel tread are available as well

our special material Copper**ECO III**. Copper**ECO III** offers you an alternative between copper and aluminum-stainless steel with good corrosion protection for high current requirements, even during standstill operation.

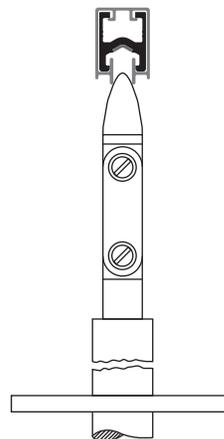
With the partial expansion compensation system (compensation for thermal expansion in every rail part), systems up to 200 m in length can be implemented without the use of additional expansion elements.<sup>1)</sup>

The safe, refined connector system and clip-on rail holders, in combination with optional mounting brackets, permit fast, economical assembly.

With the SinglePowerLine 0812 system and the 0813 product line extension for higher power ranges, Conductix-Wampfler offers a reliable, proven and robust solution for your application. Present around the world, our representatives and sales partners will be at your side from planning to implementation and service.

The plastic insulation of the conductor rails is colored safety yellow in accordance with general marking regulations, and the PE ("grounding") conductor rail components are green and yellow (continuous green color strips). Other colors are available upon request, with minimum order quantities.

**Safety conductor rail with a finger-safe design. Testing of contact protection with IEC / UL / NEMA jointed test fingers (12 mm foreign bodies).**



## System Advantages:

- Available in different conductor materials
- Finger-safe design
- Used around the world
- Modular, expandable system
- Can be formed into circular slip rings and curves either at the factory or on site
- Self-extinguishing insulation compliant with UL-94 standard
- Yellow safety-color
- Designed for 100% duty cycle
- according to European standards
- Self-aligning hanger clamps
- Saltwater-resistant
- Special seamless and corrosion-resistant process for connection of aluminum rails and stainless steel contact surfaces

<sup>1)</sup> Take arrangement and ambient temperature into consideration.

# Technical Data

Conductor Rails	Stainless Steel		Aluminum		CopperECO II		Copper	
Type	081217	081213	081214	08121C	08121D	081215	081216	
Current load [A] At 100% duty cycle and 35 °C (rated value) At 60% duty cycle and 35 °C	25 32	200 260	320 380	200 260	320 380	250 320	400 480	
Rated voltage [V]	690 (UL 600 V) – min. 24 V / 1A (minimum load)							
Protection type	Vertical insertion of Current Collector: IP23 (DIN EN 60529, VDE 0470-1); horizontal insertion of Current Collector: IP21							
Safety level	Finger-safe design (collector: finger-safe entry only)							
Installation orientation	Horizontal with collector entry on bottom side; collector entry sideways optional, for indoor use only							
Application area	Cranes, people movers, and similar applications							
Environment	Indoors and protected outdoors (see protection class)							
Rated suspension spacing [m]	1.5 (59.1 inches) typically 1.4 to 1.5							
Rail length [mm]	4000 (157.5 inches) (rated dimensions at 20 °C / tolerance ± 3 mm)							
System length [m]	unlimited (depending on power feed design, temperature, and expansion connectors)							
Exterior dimensions [mm]	18 x 26 (rail cross section)							
Rated rail spacing [mm]	50 (1.97 inches) (minimum spacing can be extended as needed)							
Travel speed [m/min]	600 m/min (straight segments without interruptions, such as Pickup Guides, Air Gaps, etc.)							
Expansion / expansion connectors	Compensation up to 200 m (565 feet) in system length, above 200 m the use of expansion elements is necessary							
Permitted ambient temperature <sup>1)</sup>	-15 °C to +55 °C (85 °C in heat-resistant design / PPE + SB) [deeper temperatures on request] <sup>2)</sup>							
Maximum conductor temperature	+85 °C (115 °C in heat-resistant design / PPE + SB, temporarily (t < 30 s) 125 °C)							
Storage temperature	-30 °C to +40 °C (dry storage; avoid condensation)							
Conductor materials	Depending on type, electrolytic copper, saltwater-resistant aluminum with stainless steel contact surfaces, our hybrid material CopperECO III, or stainless steel							
Rail insulation	Stabilized hardened PVC (standard material) and PPE + SB (heat-resistant design for interior use)							
Overvoltage category	III (EN 60664-1-2007/VDE0110-1)							
Installation- / Mounting tolerance	Distance between isolation items and steel structure: min. 10 mm (also see system sketch)							
Flammability / fire safety	Meets requirements for insulation materials in UL 94 V-1; Flame retardant and self-extinguishing (IEC 60695-11-10), halogen-free PPE-SB							
Local approvals	UL / CSA / GOST-R							
Coloration	Rail insulation in safety warning color RAL 1018 Zinc yellow or RAL 1021 Rape yellow in heat-resistant design							

## Program 0812:

Used for the power supply of cranes, construction of larger slip ring assemblies, transfer carriages, cable trays outside the public accessible area, mounted out of immediate reach (indoor) and weatherproof outdoor applications (IP2x).

- Current collectors oriented sideways or from below
- Horizontal mounting of the rails only (contact us for vertical mounting/application)
- Additional equipment needed for outdoor use, e.g. insulators, overhead covers, rail-heating elements, must be considered
- Touching the current collectors is prevented by appropriate measures on the plant side. Contact protection class IP23 (with vertical current collector insertion) or IP21 (with horizontal current collector insertion)

Relevant Standards	
DIN EN 60664-1, VDE 0110-1:2008-1	Insulation coordination for electrical equipment in low-voltage installations - Part 1: Principles, requirements and testing (IEC 60664-1:2007); German edition EN 60664-1:2007
DIN EN 60204-1, 60204-32, VDE 0113-1:2007-06	Safety of machines - electrical equipment of machines - Part 1: General requirements (IEC 60204 - 1:2005, modified); German edition EN 60204-1:2006
DIN EN 60529, VDE 0470-1:2000-09	Protection classes using housings (IP code): (IEC 60529:1989 + A1:1999): German edition EN 60529:1991 A1:2000

Subject to technical modifications

<sup>1)</sup> At temperatures below -10 °C, the mechanical stress due to physical limitation of the breaking strength must be limited.

<sup>2)</sup> At low temperatures, temperature flexible cables should be used.

# General Instructions

## Application Area

This product is intended to supply electric power to mobile machines at the rated current range up to 400 A and voltages up to 690 V / 1000 V. Target applications are crane installations, people movers, and other rail systems, as well as storage/retrieval systems and similar applications with one or more mobile units. The production of arcs / curve elements can be done either at the factory or on-site using appropriate bending tools.

The insulation materials used are resistant to many ingredients used in the industrial environment, depending on concentration and exposure time. All metal parts are available in copper, stainless steel, or saltwater-resistant aluminum depending on construction type, and should be evaluated in accordance with the general suitability of these basic materials.

Before using 0812 conductor rails in critical environmental conditions such as galvanizing plants, pickling plants, compost works and locations with high concentrations of chemicals (e.g. solvents, aromatics, benzols, etc.), please contact the factory.

## Layout

There are several decisive factors in the selection and layout of conductor rails. One main characteristic is the current load that actually occurs (total current to be expected during operation – not to be confused with the installed power or the resulting maximum current) and the resistance values of the system. Here we look at the longest segment between the power feed and the position of the moving vehicle during start-up. The criterion in question is the resulting voltage drop. Depending on the conductor material and cross section, different losses can result for the same length and current. A conductor rail is properly dimensioned from the point of view of voltage drop when the drop lies within the permitted tolerance range, generally 2-5% and at most 10% including the connection feed cable.

Conductor rails are classified by their rated current. This corresponds to the maximum continuous current for the conductor rail and is based on the standard parameters of

30 °C ambient temperature and 100% duty cycle (according to IEC  $\geq$  10 min ON). If the duty cycle or ambient temperature is lower, higher currents can be transmitted. Further information about the layout of conductor rails and corrections to rated current specifications is listed starting on page 22.

## Electrical Safety

Insulated SinglePowerLine 0812 conductor rails are designed according to applicable international standards and guidelines, meet today's requirements for the safety of a conductor rail, and have contact protection compliant with DIN EN 60529 (protection class IP 21 / IP 23). They meet the general requirements for classification and evaluation defined in DIN EN 60204 part 32 - electrical requirements for hoisting machines.

Conductor rails and rail components have a high level of safety. With contact protection, direct contact between body parts and electrically conducting parts is prevented (finger protection with DIN VDE and EN / NEMA test fingers / 12 mm foreign bodies). The current collectors are also designed finger-safe when engaged in the rails, but in areas where they leave the rails, such as intersections and switch points, they must be additionally protected using power switches, covers or distance. Installations with voltages over 48 V AC and 60 V DC in publically accessible areas must be secured by covers, installation away from accessible areas, or other suitable means.

Installations in which the insulation characteristics may be reduced by conductive dust or moisture must be installed away from access by people and be marked as high-voltage electrical equipment with warning signs. In areas with high operating voltage ( $>$  690 V) and installations in a highly contaminated environment with conductive dust or moisture, insulators must be used.

The single-pole system can be built with any number of poles and extended in a modular manner. Components for the protective conductor are marked in green or green/yellow and may not be used as phase components. Using installed parts and position coding, it

is impossible to engage the PE Current Collector into a phase pole, or to mix phases. We recommend laying out the PE ("grounding") contact redundantly with dual current collectors.<sup>1)</sup>

## Mechanical Safety

Please note that the layout of conductor rails and current collectors between fixed and moving system parts must maintain a safety spacing of at least 0.5 m to reduce the possibility of collisions between the moving machine and the rail system – or measures must be taken to prevent this risk. In exposed installation situations, for example over traffic ways, please ask for recommendations.

## Use of Conductor Rails

Conductor rails are classified as components according to low voltage directive. The conductor rails of Program 0812 meet current standards and guidelines for the intended use of the components. For installation into the final product, the specifications valid for this product must be taken into consideration and you must proceed in accordance with the Machine Directive or with the guidelines valid for the place of installation.

## Use outdoors

Outdoors, the conductor rail should be protected from environmental influences as much as possible. Use in high humidity and low temperature areas runs the risk of condensation, the formation of frost and ice build-up on the contact surfaces. For installations in this environment, the rails, in particular aluminum rails, must be equipped with an optional rail heater. Our sales department will be glad to assist you with the layout.

## Approvals

This conductor rail product line meets the product parameters required for international use for these products and has been developed in accordance with the existing standards and guidelines in the EU and industrial markets. In addition to IEC/EN standard compliance, the product line also has local UL/CSA and GOST-R approvals.

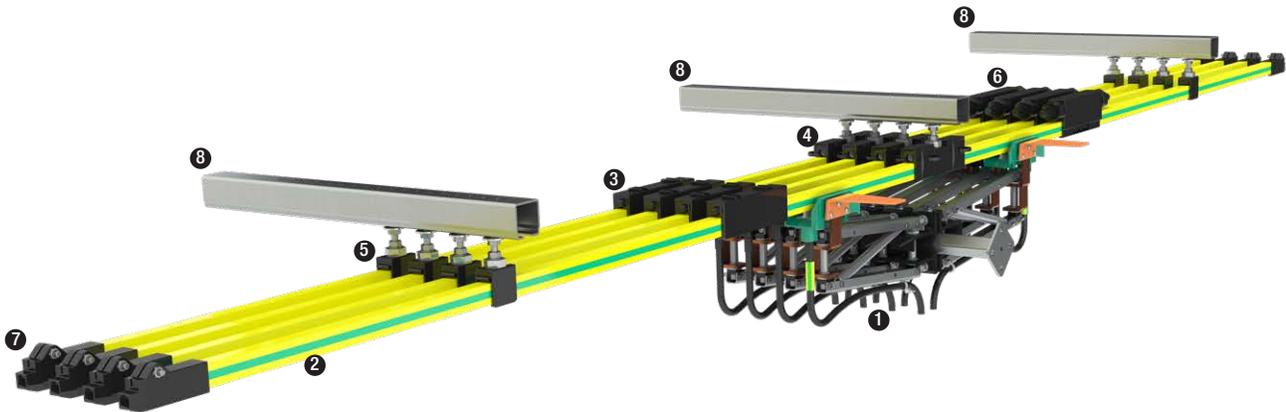
<sup>1)</sup> Partly specified as standards

# System Structure

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## Components and their use

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- ❶ **Current Collector:** Connects to the moving part of the system. Maintains positive contact with the rail as it slides.  
Available in different sizes as single or dual Current Collector.
- ❷ **Conductor Rails:** Stable basic body of conductive material with contact-safe insulated profile.
- ❸ **Rail Connectors:** Clamping connectors with insulated cap. Can only be removed with a tool (safety requirement).
- ❹ **Anchor Clamps:** Clamping element for anchoring the system. Forces the rail to expand to either side of the anchor point.
- ❺ **Hanger Clamps:** Freely rotating and thus self-aligning clip-on holder for quick, safe assembly. Mounting height adjustable.  
Allows the rail to slide during thermal expansion.
- ❻ **Power Feed Connectors:** Used instead of a rail connector. Universal connection of single strands with outer diameters of up to 17 mm.
- **Expansion Units (not shown):** Changing temperature causes the conductor rail system to expand. To compensate for the expansion in systems longer than 200 m or systems with multiple fixed points or curves, expansion joints are used.
- ❼ **End Caps:** Rail terminator as protection against accidental contact.
- ❽ **Support Arms**
- **Pickup Guide (not shown):** For areas in which the collector must be driven in or out of the conductor rail system.
- **Air Gap (not shown):** For galvanic isolation, for example of segments during maintenance.

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## System Advantages

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- Robust, tried and tested industrial design
- Safe conductor rail with contact protection (finger-safe design)
- Designed to national and international standards
- High availability
- Expandable
- Partial compensation for thermal expansion
- Simple installation
- Optional safety components / functions
- Rails in safety warning color RAL 1018/1021
- CE-compliant design
- Available with any number of poles

# System Structure

## Insulated Conductor Rails

The standard product line offers the following conductor materials: electrolytic copper, aluminum, and our new special material Copper**ECO III**.

We therefore offer the ideal solution for every requirement:

- Copper, with its good conductivity and low voltage drop, is the ideal conductor, with restrictions in applications in aggressive or corrosive environments. Used when high amperage is needed, particularly in standstill operation..
- As a budget-priced alternative, aluminum rails with a stainless steel contact surface are also available. Using a special procedure, stainless steel and saltwater-resistant aluminum are firmly joined with no gap, combining the advantages of both materials, that is, good conductivity and low wear, without the disadvantages of other aluminum rails available on the market with stainless steel inserts.
- As another option, for low current and control signals, there are stainless steel rails available as well.
- The portfolio is complemented by our new special material Copper**ECO III**. This innovation offers a significantly improved conductivity compared to aluminum-stainless steel and thus allows high power transmission even when the system is in standstill. Copper**ECO III** is suitable for demanding outdoor environments including saltwater areas. Thereby we can offer an excellent price-performance alternative inbetween copper and aluminum-stainless steel.

The conductor rails consist of the conductive rail body and the protective insulation in a contact-safe design.

As insulation material, PVC is used in standard applications

For higher ambient temperatures halogen-free PPE+SB is used.



PH = Phase  
PE = Potential Earth ("grounding")

Rated length: 4000 mm

Colour: Safety warning RAL 1018 (PVC) / RAL 1021 (PPE+SB)

**NEW**

	Stainless steel	Aluminum (with stainless steel contact surface)		Copper <b>ECO III</b>		Copper	
Rated current (100% duty cycle)	25 A	200 A	320 A	200 A	320 A	250 A	400 A
Rated current (60% duty cycle)	32 A	260 A	380 A	260 A	380 A	320 A	480 A
Cu figure	–	–	–	–	–	0.59 kg/m	0.92 kg/m

Part No.	Standard insulation for ambient temperatures up to +55 °C						
PH	081217-4X11	081213-4X11*	081214-4X11*	08121C-4x11*	08121D-4x11*	081215-4X11	081216-4X11*
PE (green color stripes)	081217-4X12	081213-4X12*	081214-4X12*	08121C-4x12*	08121D-4x12*	081215-4X12	081216-4X12*

Part No.	Insulation for ambient temperatures up to +85 °C						
PH	081217-4X21	081213-4X21	081214-4X21	08121C-4x21	08121D-4x21	081215-4X21	081216-4X21
PE (green color stripes)	081217-4X22	081213-4X22	081214-4X22	08121C-4x22	08121D-4x22	081215-4X22	081216-4X22

Short lengths of 1, 2 and 3 m are available upon request for an additional price for cutting costs

Part No. for semistandard: 0812XX\_\_ length X \_\_ (length = 1 for 1 m, 2 for 2 m, and 3 for 3 m) short lengths upon request – example **1m**: 0812xx-1X11

\* Standard range

### Technische Daten

Conductor cross section (mm <sup>2</sup> )	70	100	120	100	120	70	110
DC resistance [Ω/1000m] 20 °C	1.160	0.337	0.267	0.337	0.267	0.278	0.168
DC resistance [Ω/1000m] 35 °C	1.163	0.358	0.282	0.358	0.282	0.298	0.178
Impedance [Ω/1000m] 20 °C/50Hz	1.160	0.361	0.297	0.361	0.297	0.307	0.209
Impedance [Ω/1000m] 35 °C/50Hz	1.163	0.377	0.306	0.377	0.306	0.321	0.217
Weight [kg]	2.5	1.7	1.8	1.7	1.8	2.7	4.1
Min. bending radius horizontal	Upon request (depending on outdoor/indoor use, horizontal/vertical orientation and materials)						
Min. bending radius vertical							

# System Structure

## Comparison of different Conductor Rail Materials

	Aluminum-Steel	CopperECO III	Copper
			
Conductivity	Conductivity		
Corrosion resistance	Corrosion resistance		
Price	Price		
Suitable for corrosive environments	✓	✓	–
Application requirements	Standard requirements	High amperage requirements, especially in standstill mode (e.g. crane hoist/AS/RS)	Highest requirements on current carrying capacity
Application example			

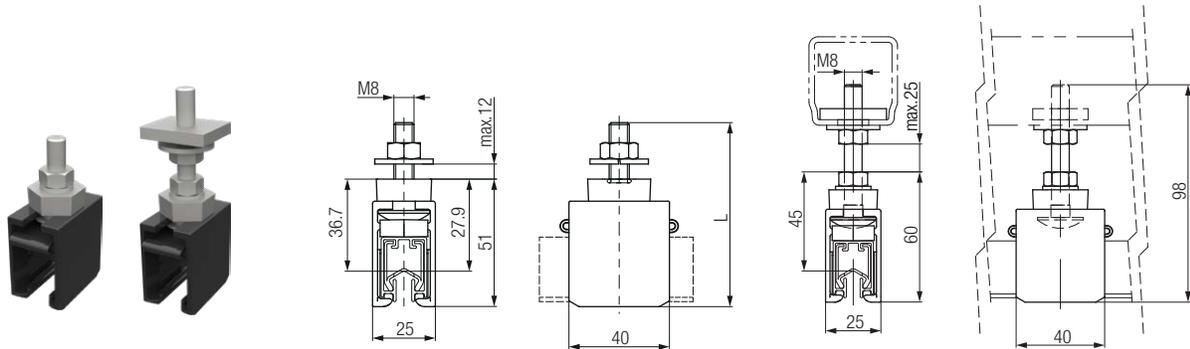
### Max. Current Carrying Capacity of Current Collectors (100 A) with different rail materials at 30° C ambient temperature

		Aluminum-Steel	CopperECO III	Copper
a) moving ( $v > 10$ m/min)	Current carrying capacity per current collector	100 A = $I_{\text{henn}}$	100 A = $I_{\text{henn}}$	100 A = $I_{\text{henn}}$
b) brief standstill	Max. duration $t_s$ of current carrying capacity during brief standstill *	5 minutes	15 minutes	(no limit)
	Current carrying capacity per current collector	50 A = 50% $I_{\text{henn}}$	100 A = $I_{\text{henn}}$	100 A = $I_{\text{henn}}$
c) standstill for a longer period ( $t > t_s$ )	Current carrying capacity per current collector	30 A = 30% $I_{\text{henn}}$	80 A = 80% $I_{\text{henn}}$	100 A = $I_{\text{henn}}$

\* thereafter moving the current collector by at least 1 m / cooling off for at least the same duration as previous current load

# Hanger Clamps

## Hanger Clamps



Suspension is carried out using freely swivelling clip-on Hanger Clamps that are self-aligning and permit low-friction slipping in case of thermal expansion. Hanger Clamps are available with hex nuts or square nuts for the mounting of Support Arms / C-rails (see installation accessories).

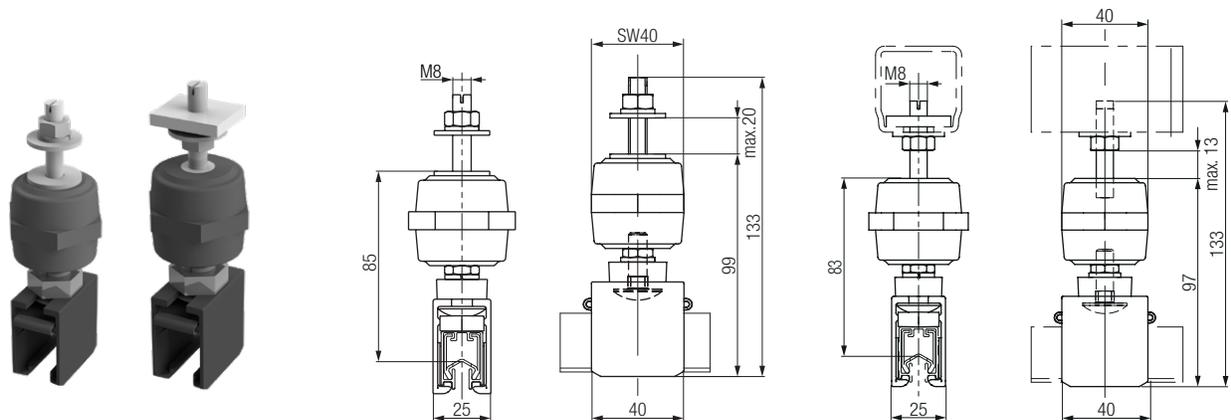
**Note:**

- Rated suspension spacing 1.5 m, typically 1.4 to 1.5 m
- Max. suspension spacing 1.5 m
- Minimum spacing from connectors or power feed 250 mm

	Part No.	Weight [kg]
Hanger Clamp galvanized with hex nut	081241-01*	0.050
Hanger Clamp galvanized with square nut	081243-01*	0.095
Hanger Clamp in stainless steel with hex nut	081241-02*	0.050
Hanger Clamp in stainless steel with square nut	081243-02*	0.095

\* Standard range

## Hanger Clamps with Insulators



	Part No.	Weight [kg]
Hanger Clamp galvanized with hex nut	081241-11*	0.16
Hanger Clamp galvanized with square nut	081243-11*	0.20
Hanger Clamp in stainless steel with hex nut	081241-12*	0.16
Hanger Clamp in stainless steel with square nut	081243-12*	0.20

\* Standard range

**Calculation Hint for Hanger Clamps:**

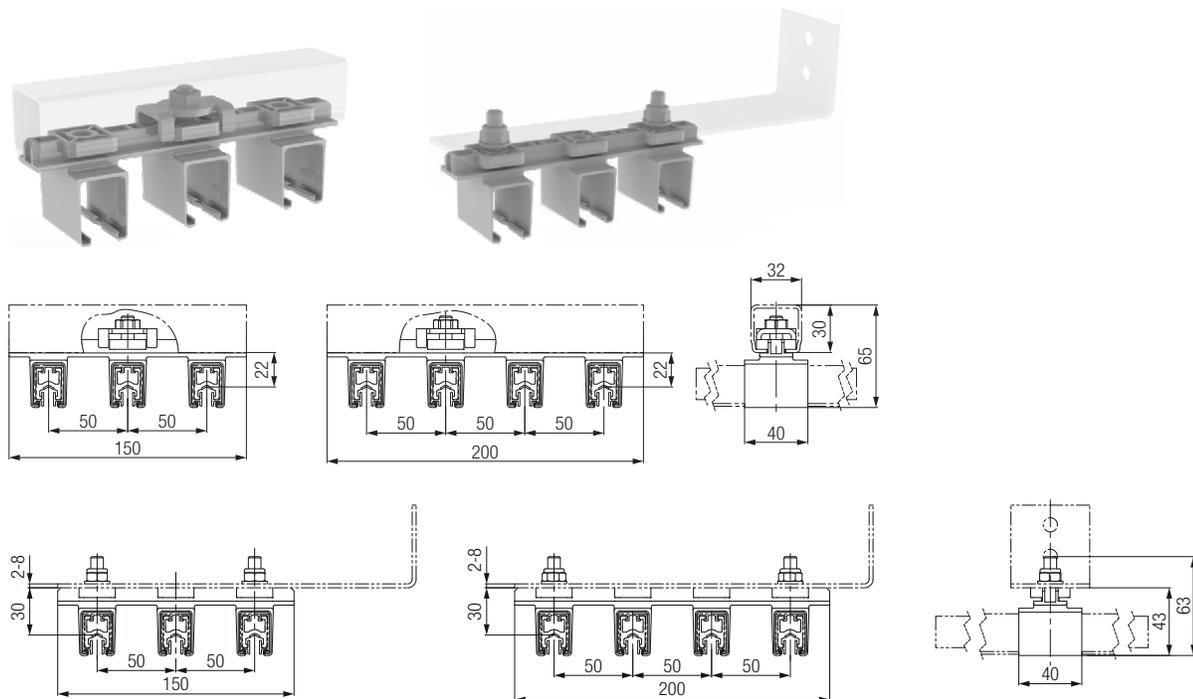
$$\text{Quantity } n = \frac{L_{\text{SYSTEM}}}{1.5 \text{ m (hanger distance)}} + 1 + \text{spare part}$$

**Installation note**

- Phase spacing with Insulators  $\geq 60$  mm
- Hole drilled for mounting  $\varnothing 9$  mm

# Compact Hanger Clamps and Anchor Clamps

## Compact Hanger Clamps

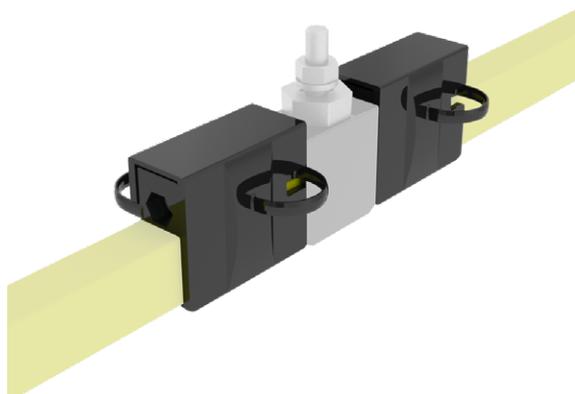


Compact Hanger Clamps for fast assembly of 3 or 4 rails indoors. Available for surface mounting or insertion into Conductix-Wampfler C-rails and mounting brackets in galvanized or stainless steel with 30 mm rated dimensions.

Part No.	Number of poles	Phase spacing [mm]	Variant	Weight [kg]
081246-350	3	50	For C-rails	0.123
081246-351			For extension arms	0.087
081246-450	4		For C-rails	0.138
081246-451			For extension arms	0.102

**Note:** In contrast to self-aligning rotating single Hanger Clamps, Compact Hanger Clamps and their substructure must be aligned exactly 90° to the rail to ensure free slipping of the rails during expansion. Not suitable for aggressive environments.

## Anchor Clamps



The rails are fixed in one place with Anchor Clamps and can expand freely from that point out. The fixed point is mainly for single feed applications attached close to the power feed or in the center of the conductor rail system. If Expansion Units are installed, please refer location in accordance with diagram 3 on page 15. If multiple fixed points are planned, for example at intersections or curves (natural fixed point), the segment between the fixed points must be decoupled using Expansion Units. Clamps are fastened with a clamping cone on the rail insulator.

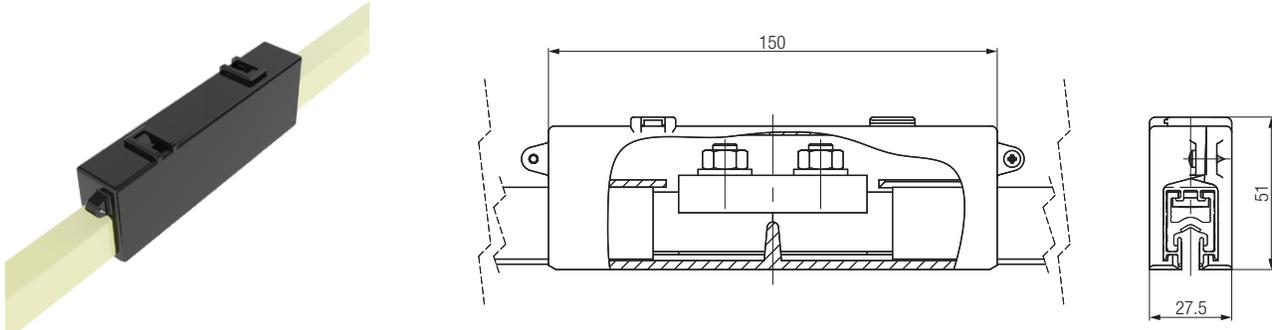
Part No.	Type	Weight [kg]
081231-2*	Anchor Clamp	0.050

- For each fixed point, order two Anchor Clamps per pole
- Not recommended for vertical applications

\* Standard range

# Rail Connectors and Power Feed Connectors

## Rail Connectors (Splice Joints)



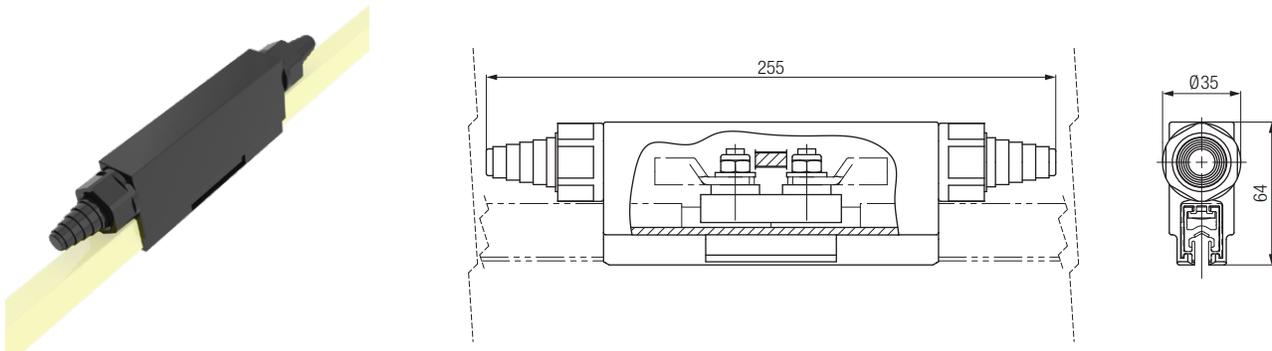
Rails are connected using compact screw connections. The rail connections must have exposed metal on all contact surfaces and be coated with a thin layer of contact grease (Part No. 080021) to protect against corrosion. When mounting clamping screws, use a torque wrench to achieve correct tightening torques.

Part No.	Designation		Weight [kg]
081221-2*	Connectors for aluminum / Copper <b>ECO III</b> rails	Galvanized	0.130
081221-3*	Connectors for copper rails		0.150
081221-4*	Connectors for aluminum / Copper <b>ECO III</b> rails	Stainless Steel	0.140
081221-5*	Connectors for copper rails		0.150
081221-6	Connectors for stainless steel rails		0.180
080021*	Contact grease, one 20 g tube (for approx. 200 connection points)		0.035

\* Standard range

The standard parts of the connectors are in stainless steel

## Power Feed Connectors



The power feed uses a power connector; these replace the normal Rail Connectors. Electrical connection is provided using projecting bolts and notch-type cable lugs (cable lugs not included; please order separately, see mounting accessories).

### Note:

- Tightening torque max. 9.75 Nm
- Max. outer cable diameter 17.5 mm
- Use contact grease 080021

Part No.	Designation		Weight [kg]
081251-4*	Connectors for aluminum / Copper <b>ECO III</b> rails	Stainless Steel	0.21
081251-5*	Power feed connector for copper rails		0.22
081251-6	Power feed connector for stainless steel rails		0.25

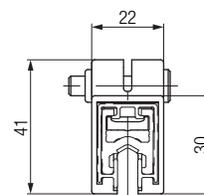
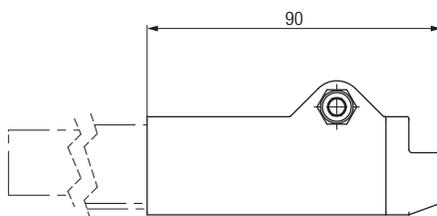
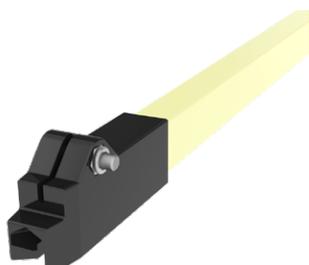
\* Standard range

The standard parts of the connectors are in stainless steel

**Notch-type Cable Lugs** see page 31

# End Caps and Air Gaps

## End Caps



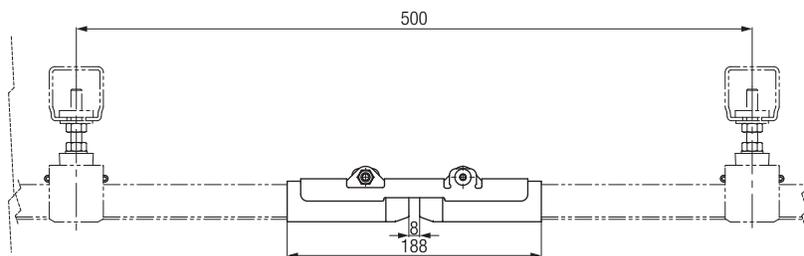
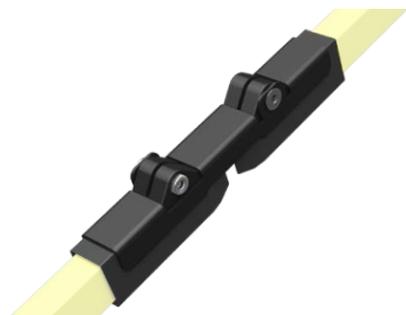
End Caps are used as a rail terminator and contact protection and are fastened to the rails using clamping screws.

Part No.	Designation		Weight [kg]
081271-2*	End Cap	Stainless Steel (DIN parts)	0.040

\* Standard range

To use End Caps in combination with accompanying heating / heating conductors: see assembly instructions

## Air Gaps



Air Gaps are used for the galvanic isolation of sections, such as maintenance segments that can be supplied with power and turned off separately.

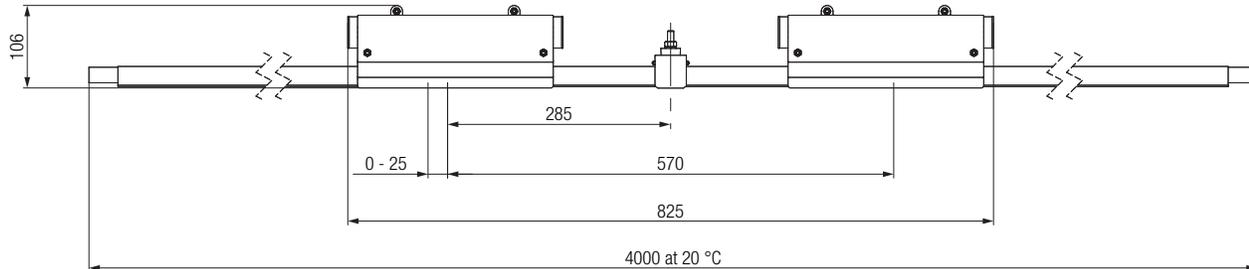
For each separation point, two Air Gaps must be mounted at a suitable distance to avoid power carryover through the Current Collectors.

Part No.	Designation		Weight [kg]
081294-2	Air Gap	Stainless Steel	0.040

**Please note:** Air Gaps are delivered as an assembly set (not pre-assembled).

# Expansion Units

## Expansion Units



To compensate for changes in length due to temperature for systems > 100 m or segments connected between two fixed points such as Pickup Guides on both ends of the segment, or in curves (natural fixed points), expansion elements are needed to absorb the change in length. The expansion element has two expansion points, each of which can absorb 25 mm of expansion. The expansion elements / expansion unit parts are, like the rails, designed as 4 m standard components.

**Note:** The middle part between the two expansion segments must be supported using hanger clamps (**not included – order separately**). When using expansion units, the use of dual Current Collectors is recommended.

Rails/ rated current	Part No.				Weight [kg]
	PH (Phase)		PE (Potential Earth)		
	Standard variant	Heat-resistant variant	Standard variant	Heat-resistant variant	
For aluminum rails 200 and 320 A	081261-4X2121*	081261-4X2221	081261-4X2122*	081261-4X2222	2.9
For Copper <b>ECO III</b> 200 and 320 A	081261-4X21D1*	081261-4X22D1	081261-4X21D2*	081261-4X22D2	2.9
For copper rails 250 and 400 A	081261-4X2131*	081261-4X2231	081261-4X2132*	081261-4X2232	4.8
For stainless steel rails 25 A	081261-4X2141	081261-4X2241	081261-4X2142	081261-4X2242	3.6

Design: Fastening and DIN parts in stainless steel – rated length 4000 mm (13.12 feet). Hanger Clamps in the middle segment not included – please order separately!  
Delivery: completely pre-assembled at the factory. Adjustment of the two expansion gaps according to the table on page 15, depending on temperature values.

\* Standard range

### Layout notes

Changes in ambient temperature and intrinsic heating cause the conductor rails and the insulation to expand differently. The SinglePowerLine 0812 conductor rail system has a partial thermal expansion system. The difference in thermal expansion between the insulation and the rails is compensated for in each individual rail. For this reason, the insulation profile is specified shorter than the rail and the compensation takes place in the area of the connector caps without influencing the contact guard.

By using self-aligning, rotating Hanger Clamps, the rail line can expand without friction and thus be laid out up to a length of 200 m without additional Expansion Units. If the power feed is in the middle with a fixed point at the power feed, installations of up to 200 m can be laid out without expansion elements by allowing the segment to expand freely to each side for 100 m from the fixed point.

For installations of greater length, multiple fixed points such as Pickup Guides or curves that also have a fixed position due to a fixed point or mechanical attachment, expansion joints must be used to absorb the changes in length.

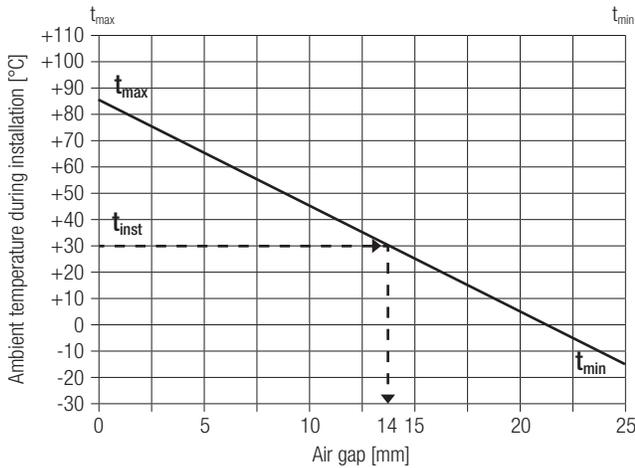
Pickup Guides are to be considered as fixing points.

### Mounting instruction

The distance between insulating caps and steel construction should be at least 10 mm.

# Expansion Units

## Expansion Units



### Legend:

- $t_{min}$  lowest temperature that occurs in the application
- $t_{max}$  highest possible working temperature in the application

  1. Draw a connecting line from  $t_{min}$  to  $t_{max}$ .
  2. Draw the ambient temperature during installation  $t_{inst}$  as a horizontal line.
  3. Draw a vertical line down from the point of intersection of these two lines, and read off the air gap to be used during installation.

### Example:

Temperature range: from -15 °C to +85 °C  
 Ambient temperature during installation: +30 °C  
 Air gap: 14 mm per expansion point = 2 x 14 mm for the expansion element

### Number of Expansion Units for systems over 100 m in length / 200 m with middle power feed

For rail conductor installations over 200 m in length, Expansion Units must be installed at specific intervals, as shown in Diagram 3. In complicated curves and other special installations, as well as for fixed point arrangements at the end of the system, special intervals must be used. Please contact us.

Number of Expansion Units	1			2			3			4			5			Intermediate length a			
	SS	Al*	Cu	SS	Al*	Cu	SS	Al*	Cu	SS	Al*	Cu	SS	Al*	Cu	SS	Al*	Cu	
<b>Total length of the conductor rail [m]</b>																			
$\Delta t_{ges}$	10	400	400	400	600	600	600	800	800	800	1000	1000	1000	1200	1200	1200	200	200	200
	20	400	304	347	600	408	494	800	512	641	1000	616	788	1200	720	935	200	104	147
	30	340	270	298	480	340	396	620	410	494	760	480	592	900	550	690	140	70	98
	40	304	252	274	408	304	348	512	356	422	616	408	496	720	460	570	104	53	74
	50	283	242	258	366	284	316	449	326	374	532	368	432	615	410	490	83	42	58
	60	270	235	249	340	270	298	410	305	347	480	340	396	550	375	445	70	35	49
	70	260	226	242	320	256	284	380	284	326	440	312	366	500	340	410	60	28	42
	80	252	226	236	304	252	272	356	278	308	408	304	344	460	330	380	52	26	36
	90	246	223	232	292	246	264	338	269	295	384	292	328	430	315	360	46	23	32
	100	242	220	229	284	242	258	326	263	287	368	284	316	410	305	345	42	22	29

SS = stainless steel, Al = aluminum, Cu = copper

\*expansion of Copper **ECO III** material comparable to Aluminum-stainless steel

$$\Delta t_{ges} = \Delta t_U + \Delta t_{sw}$$

$\Delta t_U$  = Temperature range of the ambient temperature

$\Delta t_{sw}$  = Temperature increase due to electric current (electrical thermal load)

Recommended values for  $\Delta t_{sw}$ :

10 °C up to 40% duty cycle

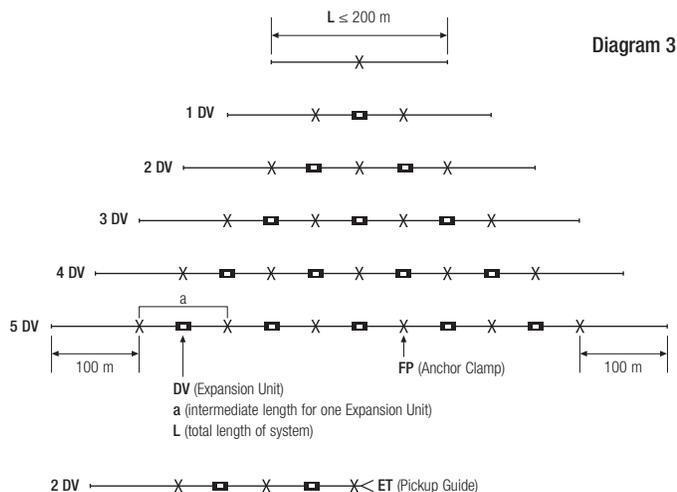
20 °C up to 65% duty cycle

30 °C up to 100% duty cycle

For longer systems than those in the table above, use:

$$\frac{L - 200}{a} = \text{number of Expansion Units}$$

**Note:** Intersection Pickup Guides and curves are fixed points, so these areas must also be taken into consideration when laying out the system.

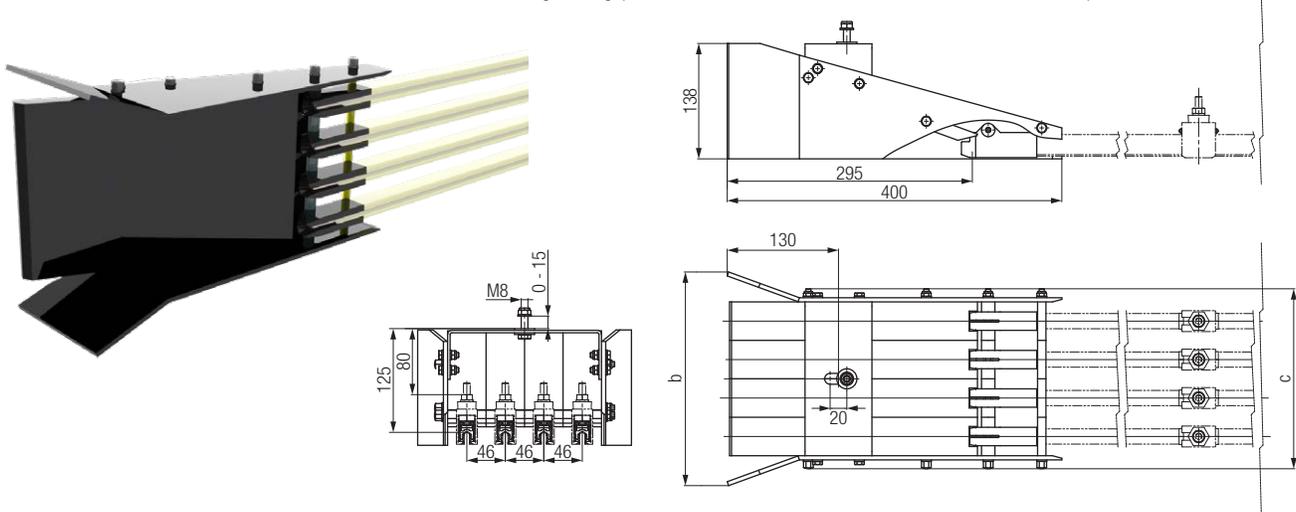


# Pickup Guides for Intersections

## Only for Current Collectors 081206... / 081208...

For areas in which the collector must be driven in or out of the conductor rail system, Pickup Guides are used in combination with Current Collectors provided for this purpose. The speed for Pickup Guide entry must not exceed 60 m/min and Pickup Guides must be considered wearing parts.

Installation tolerances must be taken into consideration. Simultaneous alignment gaps with maximum tolerances in the X and Y directions are not permitted.



Dimensions [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

- The Pickup Guide centers the Current Collector with a maximum lateral and vertical alignment tolerance of  $\pm 25$  mm.
- Settings of less than  $\pm 10$  mm are recommended.
- In installations with Pickup Guides, a corresponding number of Current Collectors must be available, and mounted in intervals that ensure that just the necessary number of Current Collectors needed for momentary power requirements are in use.

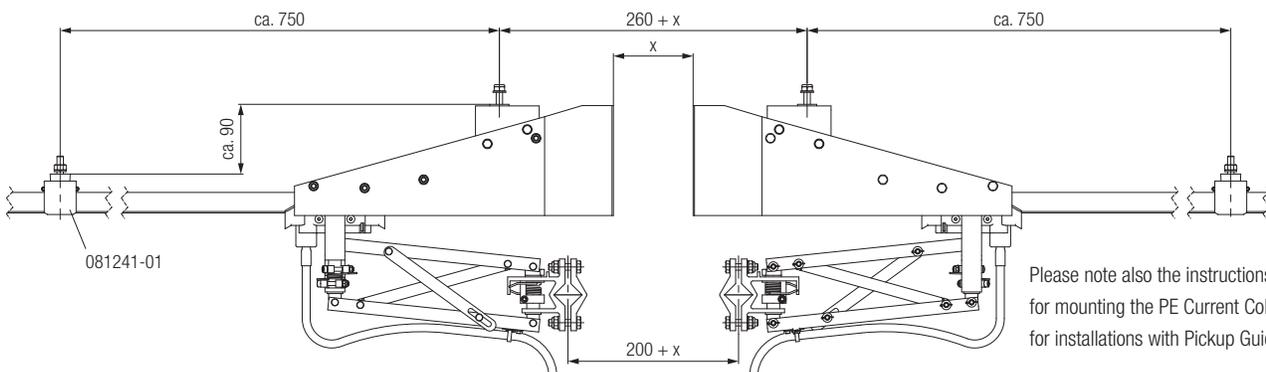
**The user must ensure that the Current Collectors between the Pickup Guides are disconnected from power or are protected against accidental contact.**

Part No.	Type of fastening elements: stainless steel	Weight [kg]
081281-12	1-pole Pickup Guide	0.850
081281-22	2-pole Pickup Guide	1.200
081281-32	3-pole Pickup Guide	1.550
081281-42	4-pole Pickup Guide	1.900
081281-52	5-pole Pickup Guide	2.100
081281-62	6-pole Pickup Guide	2.300

### Installation note

The middle distance between two conductors is 50 mm. This is reduced to 46 mm using the last Hanger Clamps before the Pickup Guide in order to ensure that the Current Collector enters the Pickup Guide precisely. The Pickup Guide is delivered complete with End Caps. The End Caps are pushed onto the rails with a soft-head hammer until they hit the end stops. The clamping screws are then tightened firmly. Keep distance of 750 mm between the Pickup Guide and the first Hanger Clamp.

### Hanger Clamp spacing for installations with Pickup Guides



Please note also the instructions for mounting the PE Current Collector for installations with Pickup Guides.

# Current Collectors 081209...

## Not suitable for Pickup Guides

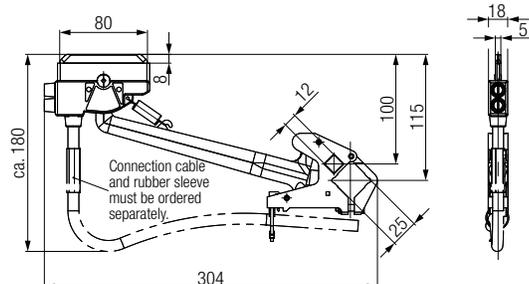
### Types of Construction

For the SinglePowerLine 0812 system there are two basic types of Current Collectors available. In addition to the smaller 081209-xxx variant in plastic, there is also a robust metal parallel arm type available that has proved useful for crane installations. Both types are available as single and dual Current Collectors and are fastened to a Towing Arm with clamps.

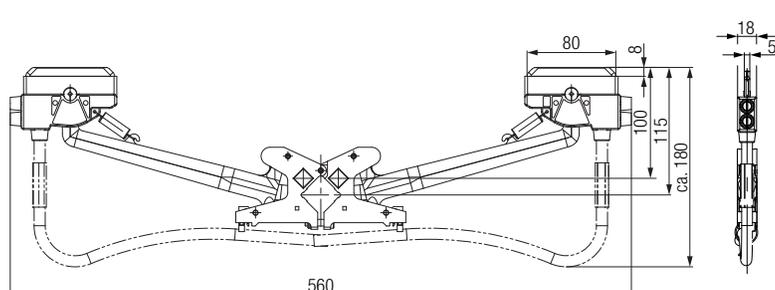
### Current Collectors (Plastic Arm Type)

Plastic collectors are used in warehouse systems, EOT cranes, and amusement park installations. For installations with one direction of movement, individual Current Collectors **are towed** to reduce wear. By changing the force introduced into the stabilization springs on the Current Collector head, the head is pretensioned and works against the slanted wear. In installations that move in both directions, such as crane runways or transfer cars, this compensation takes place automatically. Here, the variant for **reversible operation** is used.

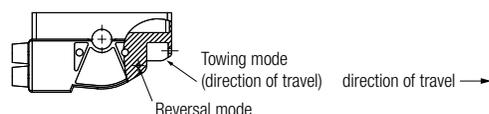
#### Single Current Collector set up for reversible operation



#### Dual Current Collector set up for reversible operation



#### Mounting of Tension Springs



**Note:** Leave sufficient room in the installation for free movement of the cables. When using horizontal insertion, the weight forces of the Current Collectors must be equipped with compensation springs (**For Towing Arms see page 30, for Accessories and Cables see page 31**).

#### Technical data

<b>Max. power capacity in straight and curved segments (radius &gt; 1800 mm)</b>	80 A (for aluminum rails in standstill mode at 100% duty cycle: 40 A)	160 A (for aluminum rails in standstill mode at 100% duty cycle: 80 A)
<b>Max. current capacity in curved segments (bending radius from 1000 mm - 1800 mm)</b>	40 A (with special carbon brush 081001-15) (for aluminum rails in standstill mode at 100% duty cycle: 20 A) <sup>1)</sup>	
<b>Max. travel speed</b>	600 m/min; higher travel speeds upon request (straight segment without Pickup Guides)	
<b>Pressing force</b>	10 N	
<b>Lateral deviation</b>	max. ± 50 mm	
<b>Working stroke in insertion direction</b>	max. ± 50 mm	
<b>Connection cable</b>	6, 10, or at most 16 mm <sup>2</sup> , 1.5 m long, high-flexibility; longer connection cable upon request; order separately (see page 31)	
<b>Distance between the Support arm axis and contact surface of the rail (rated installation dimensions)</b>	115 mm (see system schematic on page 25)	

#### Single Current Collector

#### Dual Current Collector

Variant	Operation: vertical	80 A		Weight [kg]	160 A		Weight [kg]
		PH (Phase)	PE (Potential Earth)		PH (Phase)	PE (Potential Earth)	
		Part No.			Part No.		
Fastening elements galvanized	Reversible operation	081209-012*	081209-022*	0.300	081209-2 × 012*	081209-2 × 022*	0.520
	Towing operation	081209-013*	081209-023*	0.300	081209-2 × 013*	081209-2 × 023*	0.520
Fastening elements in stainless steel	Reversible operation	081209-112	081209-122	0.300	081209-2 × 112	081209-2 × 122	0.520
	Towing operation	081209-113	081209-123	0.300	081209-2 × 113	081209-2 × 123	0.520

Connection cables not included – order separately from page 31

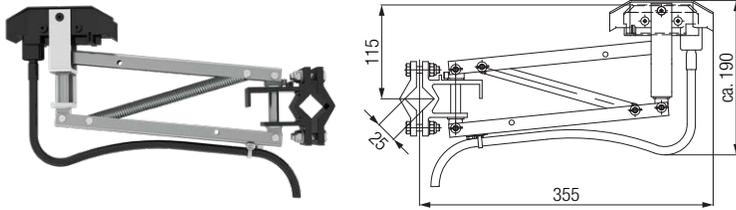
**Note:** The connection cables must be highly flexible to ensure free movement of the Current Collectors and be secured with the cable binder on the Current Collector in such a way that no tension or torsion forces are transmitted to the Current Collector head.

<sup>1)</sup> Max. Current load depending on the cable type, ambient temperature and installation method.

\* Standard range

# Current Collectors

## Current Collectors (Parallel Arm Metal Type)



Parallel arm type Current Collectors come in a fully metallic design and are available as single or dual Current Collectors. PE Current Collectors are color-marked with a green Current Collector head and provided with a deflector to prevent insertion into a phase rail.

**Horizontal insertion** = insertion into the rail from the side  
**Vertical insertion** = insertion into the rail from underneath

### Technical data

Max. current capacity in straight and curved segments (bending radius > 1800 mm)	100 A (for aluminum rails in standstill mode at 100% duty cycle: 50 A)
Max. current capacity in curved segments (bending radius from 1000 mm - 1800 mm)	40 A with radius brushes (upon request) (for aluminum rails in standstill mode at 100% duty cycle: 20 A) <sup>2</sup>
Max. travel speed	600 m/min (without rail breaks and curves); higher travel speeds upon request
Pressing force	20 N
Lateral deviation	max. ± 50 mm
Working stroke in insertion direction	max. ± 50 mm
Connection cable	16 mm <sup>2</sup> , 1.5 m long, high-flexibility; longer connection cable available upon request; avoid connection cables > 3 m and provide terminal boxes for service and replacement. (SAP CONFIG 3054705)
Distance between Support arm axis and contact surface of the rail (expected dimension)	115 mm

Towing Arms, see page 30

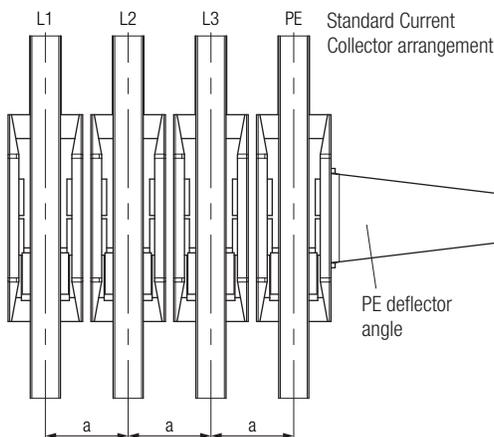
Type	Part No.				Weight [kg]
	PH (Phase)		PE (Potential Earth)		
	Fastening elements galvanized	Fastening elements in stainless steel	Fastening elements galvanized	Fastening elements in stainless steel	
Current Collector 100 A with <b>vertical</b> insertion	081205-01*	081205-11*	081205-02*	081205-12*	1.150
Current Collector 100 A with <b>vertical</b> insertion for intersection <sup>1)</sup> with Pickup Guides	081206-01*	081206-11*	081206-02*	081206-12*	1.260
Current Collector 100 A with <b>horizontal</b> insertion	081207-01	081207-11	081207-02	081207-12	1.185
Current Collector 100 A with <b>horizontal</b> insertion for intersection <sup>1)</sup> with Pickup Guides	081208-01	081208-11	081208-02	081208-12	1.265

<sup>1)</sup> Current Collectors for intersections are used if the path of the conductor rail installation is interrupted by branch tracks, crossing beams, etc. These Current Collectors are equipped with a middle centering device and are used with Pickup Guides.

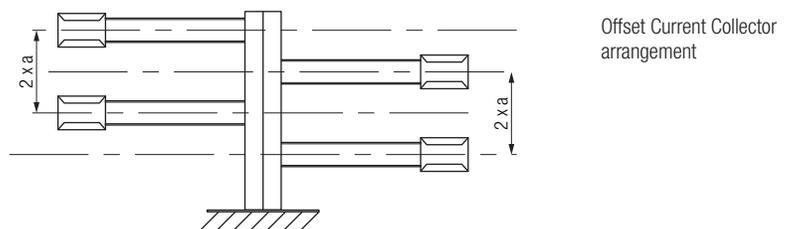
<sup>2)</sup> Max. Current load depending on the cable type, ambient temperature and installation method.

\* Standard range

## Installation spacing for Current Collectors

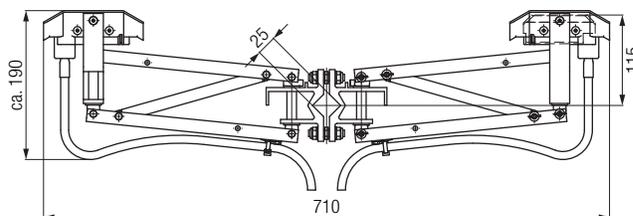


Center spacing a	[mm]
Standard Current Collector arrangement	50
Offset Current Collector arrangement	40
Current Collector arrangement when using Pickup Guides	50



# Current Collectors

## Dual Current Collectors (Parallel Arm Metal Type)



### Technical data

Max. current capacity in straight and curved segments (bending radius > 1800 mm)	200 A (for aluminum rails in standstill mode at 100% duty cycle: 100 A)
Max. current capacity in curved segments (bending radius from 1000 mm - 1800 mm)	40 A with radius brushes (upon request) (for aluminum rails in standstill mode at 100% duty cycle: 20 A)
Max. travel speed	600 m/min; higher travel speeds upon request (straight segment without Pickup Guides)
Pressing force	20 N
Lateral deviation	max. ± 50 mm
Working stroke in insertion direction	max. ± 50 mm
Connection line	16 mm <sup>2</sup> , 1.5 m long, high-flexibility; longer connection cable available upon request; avoid connection cables > 3 m and provide terminal boxes for service and replacement. <b>(SAP CONFIG 3054707)</b>
Distance between Support arm axis and contact surface of the rail (expected dimension)	115 mm

Towing Arms, see page 30

Type	Part No.				Weight [kg]
	PH (Phase)		PE (Potential Earth)		
	Fastening elements galvanized	Fastening elements in stainless steel	Fastening elements galvanized	Fastening elements in stainless steel	
Current Collector 200 A with <b>vertical</b> insertion	081205-2 × 01*	081205-2 × 11*	081205-2 × 02*	081205-2 × 12*	2.300
Current Collector 200 A with <b>vertical</b> insertion for intersection <sup>1)</sup>	081206-2 × 01*	081206-2 × 11*	081206-2 × 02*	081206-2 × 12*	2.520
Current Collector 200 A with <b>horizontal</b> insertion	081207-2 × 01	081207-2 × 11	081207-2 × 02	081207-2 × 12	2.370
Current Collector 200 A with <b>horizontal</b> insertion for intersection <sup>1)</sup>	081208-2 × 01	081208-2 × 11	081208-2 × 02	081208-2 × 12	2.530

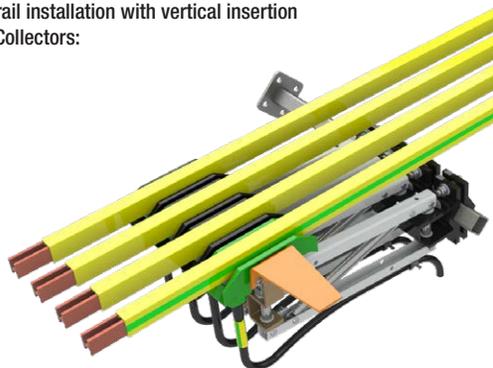
<sup>1)</sup> Current Collectors for intersections are used if the path of the conductor rail installation is interrupted by branch tracks, crossing beams, etc. These Current Collectors are equipped with a middle centering device and are used with Pickup Guides.

\* Standard range

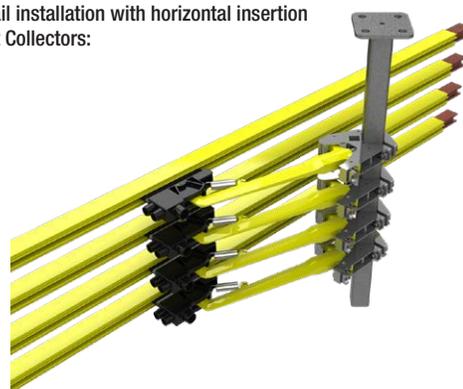
Order code for Current Collectors with custom cable length 08120x - 2 x P x L

x = Current Collector type (5,6,7, or 8) L = cable length in whole meters – example for 3 m connection cable: 081206 - 2 x P x 3

Horizontal rail installation with vertical insertion of Current Collectors:

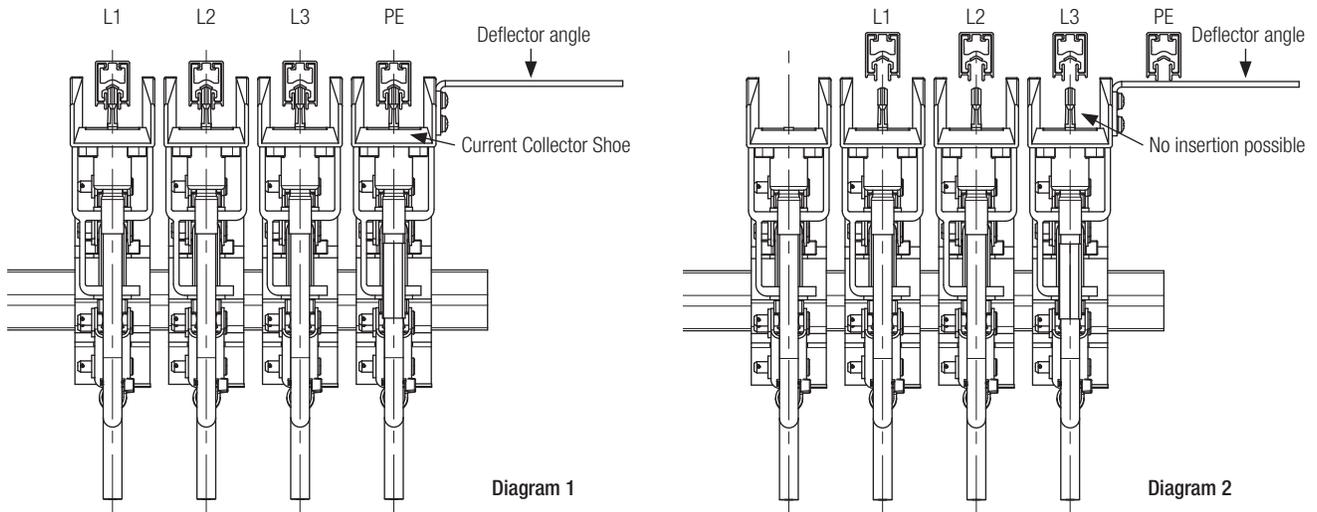


Vertical rail installation with horizontal insertion of Current Collectors:



# Current Collectors – Installation Instructions

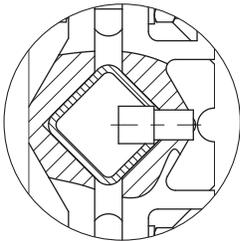
## Installation of the PE conductor Current Collector for installations without Pickup Guides



### Non-interchangeability of PE (Potential Earth) conductor Current Collectors

To comply with safety standards, Current Collectors for PE rails must be designed in such a way that they are not easily interchangeable with other Current Collectors. When determining the position of the PE conductor, you must take into consideration that the standard PE conductor Current Collector (with deflector angle) can only be mounted on the outside, since the deflector angle is fastened onto the exposed side of the PE conductor Current Collector Shoe. The deflector angle ensures that the PE conductor Current Collector can never come in contact with a phase line (see Diagram 2).

## Installation of the PE conductor Current Collector for installations with Pickup Guides



In installations with intersections, it is impossible to move the standard PE conductor Current Collector (with deflector angle) through the Pickup Guide. Thus the PE conductor Current Collector is used for intersections whose holders are equipped with a bolt for the Towing Arm. This fixes the position of the PE conductor Current Collector by being inserted into a hole drilled into the Towing Arm using the Drilling Jig listed below.

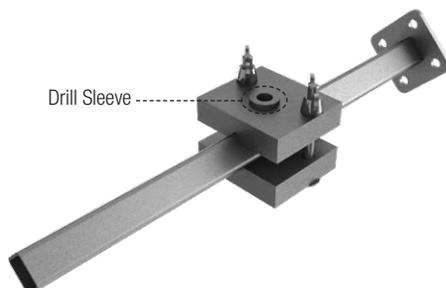
This ensures that the PE conductor Current Collector can only be mounted in the place provided for it.

### Drilling Jig 08-W100-0206

To comply with regulations and guidelines, installations with Pickup Guides must have a hole drilled into the Towing Arm 020195 using Drilling Jig 08-W100-0206, which is then used to hold the bolt on the PE conductor Current Collector.

#### Installation note:

The phase Current Collectors needed are lined up on the preassembled Towing Arm 020195 and adjusted to the conductor rails. The next-to-outside phase Current Collector is used as a stop for the Drilling Jig. The Drilling Jig must be attached so that the drill sleeves point outwards – see illustration below. In this position, the mounting spacing is 50 mm.



Type	Part No.	Weight [kg]
Drilling Jig	08-W100-0206	0.700



KSTR  
REHAG

FLORENS

HANGLLOYD

HANJIN

HANJIN

# Dimensioning and Layout of Conductor Rail System

The dimensioning and layout of a conductor rail system is done as follows:

- A: Determine the load current
- B: Select the rail type
- C: Check the voltage drop for the selected rail type
- D: Check of ambient conditions
- E: Select accessories and Current Collectors

## A. Determining the load current (total rated current $I_{NG}$ )

To determine the total expected load current, individual currents of the highest draw consumers that can operate simultaneously are added up. If the entire installed power is summed, the rail capacity will be over-specified. To avoid overdimensioning, the individual currents are evaluated for simultaneity. To optimize the system, it is always wise to consider individual consumers that cannot be operated simultaneously (e.g. a crane's slewing gear can only be operated when the crane trolley is stopped), and then only the consumer (the slewing gear or the trolley) with the higher current consumption is used.

If multiple units are installed on a single track, for example three cranes on one crane track, the probability of simultaneous operation in the same load should be used to calculate the current. In practice, the following simple table has proved useful in calculating the total rated current  $I_{NG}$  for multiple consumers:

### Selection help for standard EOT crane applications

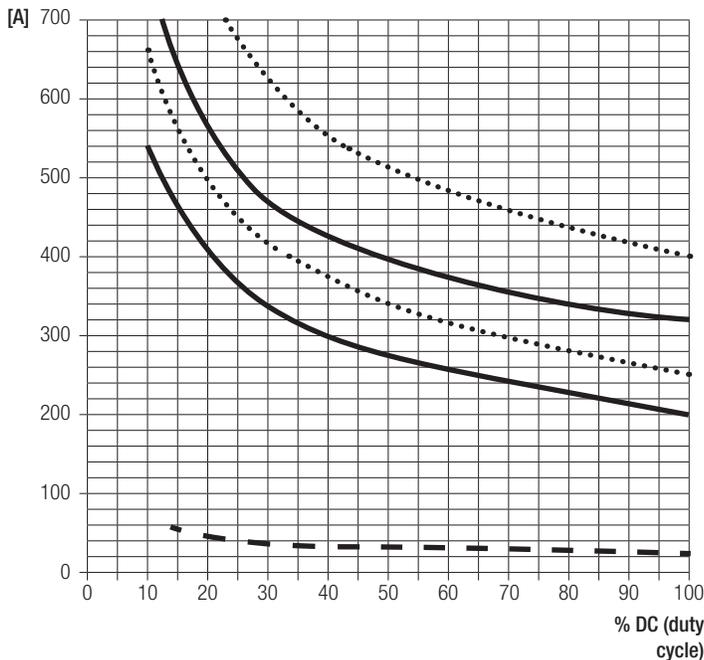
Number of cranes	$I_N$ of the most powerful motor of all the cranes $I_N^*$	$I_N$ of the second most powerful motor of all the cranes $I_N^*$	$I_N$ of the third most powerful motor of all the cranes $I_N^*$	$I_N$ of the fourth most powerful motor of all the cranes $I_N^*$
1	×	×		
2	×	×	×	
3	×	×	×	
4	×	×	×	×
5	×	×	×	×
According to work with 2 cranes	×	×	×	×

\* = For dual drives, use  $2 \cdot I_N$

## B. Rail current capacity depends on duty cycle and ambient temperature

The specified rated currents for the conductor rail are based on the definitions in European standards and are relative to an ambient temperature of 35 °C and a duty cycle (DC) of 100%. If the duty cycle is shorter, such as might be the case for a crane with finite movement, the rail can conduct higher current than the rated current.

Adjusting the rail rated current for shorter duty cycles



The load current of the conductor rail can be increased for shorter duty cycles. **Note:** When comparing the rated currents of rails from different manufacturers, always take into consideration the reference ambient temperature and the duty cycle! Consumptions with 100% duty cycle such as lighting, air conditioning or magnetic grippers must be taken into consideration. 100% DC  $\hat{=}$   $t \geq 10$  min. (according to EN standards)

- 400 A Copper rails
- 320 A Aluminum rails
- 250 A Copper rails
- 200 A Aluminum rails
- 25 A Stainless Steel rails

# Dimensioning and Layout

If the ambient temperatures differ from the standard value of 35 °C, the loads must be adjusted. At lower temperatures, the heat release (convection) is better and the rail can handle higher current loads. At higher temperatures, the release of thermal energy to the surrounding air is slower and the load must therefore be reduced.

Use with voltages under 230 V must be tested in each specific case. The minimum current should be 1A. The corresponding values  $f_A$  are taken from the following table:

Ambient temperature			35 °C	40 °C	45 °C	50 °C	55 °C	60 °C	65 °C	70 °C	75 °C	80 °C	85 °C
Standard insulation	Stainless steel rails	$f_A$	1.0	0.97	0.94	0.91	0.88						
	Aluminum rails*		1.0	0.92	0.81	0.76	0.68						
	Copper rails		1.0	0.93	0.87	0.82	0.78						
Heat-resistant insulation	Stainless steel rails	$f_A$					1.0	0.97	0.94	0.91	0.88	0.85	0.83
	Aluminum rails*						1.0	0.92	0.81	0.76	0.68	0.63	0.59
	Copper rails						1.0	0.93	0.87	0.82	0.78	0.74	0.72

\* The correction factors for Copper **ECO III** correspond to those for aluminum-stainless steel

$I_{SCHL\ G\ zul} = I_{SCHL\ G\ zul\ 35\ ^\circ C} \cdot f_A$   $I_{SCHL}$  = rated current of the conductor rail for the specific ambient temperature

## C. Calculating the voltage drop

After selecting the rail type based on the calculated total current depending on duty cycle and ambient temperature, the voltage drop must be checked. The calculated voltage drop must be under the value specified by the customer. Typical values here are 2-5%, or 10% in exceptional cases. If the voltage drop is too high, the voltage might be too low for all the drives to start.

The following formulas are used for the calculation:

For direct current	$\Delta U_{35\ ^\circ C} = 2 \cdot I \cdot I_6 \cdot R$	[V]	$\Delta U_{35\ ^\circ C}$ = voltage drop at 35 °C	[V]
			$I_6$ = total current	[A]
			R = resistance of the conductor rail	[Ω/m]
For alternating current	$\Delta U_{35\ ^\circ C} = 2 \cdot I \cdot I_6 \cdot Z$	[V]	Z = impedance of the conductor rail	[Ω/m]
			l = feed length	[m] <sup>1)</sup>
For three-phase power	$\Delta U_{35\ ^\circ C} = \sqrt{3} \cdot I \cdot I_6 \cdot Z$	[V]	L = conductor rail length	[m]

**Note:**  $I_6$  here is the portion of the load current "drawn" during start-up.

<sup>1)</sup> see feed variants

This consists of the basic load, like lighting and air conditioners, and the start-up currents of the drives  $I_A$ .

For start-up current, the following applies:	Three-phase asynchronous drive in direct start	$I_A = I_N \times 5$ to 6 (up to max. 21 kW permitted)	$I_N$ = Nominal current
	Slip ring rotor motor	$I_A = I_N \times 2$ to 3	$I_A$ = Total current consumption when starting
	Frequency converter	$I_A = I_N \times 1.4$ to 1.8	

The length l is the distance between the power feed and end position of the conductor rail segment on which the consumer is located when starting.

If the average ambient temperature is significantly over 35 °C, the voltage drop must be calculated using the following formulas:

$\Delta U\sigma = \frac{\Delta U_{35\ ^\circ C}}{f_V}$	[V]	$\Delta U\sigma$ = voltage drop at higher ambient temperature than 35 °C	[V]
$\Delta U\sigma \% = \frac{\Delta U\sigma}{U_N} \cdot 100$	[%]	$\Delta U\sigma$ % = voltage drop at higher ambient temperature than 35 °C	[%]
		$U_N$ = rated voltage	[V]
		$f_V$ = reduction factor	

To calculate the value  $f_V$ , the working temperature must first be calculated.

$\sigma_{AT} = \sigma_{UT} + \Delta \sigma_{SW} = \sigma_{UT} + 30$	[°C]	$\sigma_{AT}$ = working temperature	[°C]
		$\sigma_{UT}$ = ambient temperature	[°C]
		$\Delta \sigma_{SW}$ = temperature increase due to current heating	[°C]
		(use a constant +30 °C)	

The value  $f_V$  is based on the working temperature and the conductor rail selected and should be taken from the table "Correction factors for the voltage drop  $\Delta U$  for different ambient temperatures" on page 24.

# Dimensioning and Layout

Correction factors for the voltage drop  $\Delta U$  at different ambient temperatures

Ambient temperature		35 °C	40 °C	45 °C	50 °C	55 °C	60 °C	65 °C	70 °C	75 °C	80 °C	85 °C	
Working temperature / conductor temperature		65 °C	70 °C	75 °C	80 °C	85 °C	90 °C	95 °C	100 °C	105 °C	110 °C	115 °C	
Standard insulation	Aluminum rails 200 A*	f <sub>v</sub>	0.916	0.904	0.891	0.879	0.868						
	Aluminum rails 320 A*		0.921	0.909	0.897	0.886	0.875						
	Copper rails 250 A		0.912	0.899	0.887	0.874	0.862						
	Copper rails 400 A		0.927	0.916	0.905	0.894	0.883						
	Stainless steel rails 25 A		0.993	0.991	0.990	0.989	0.988						
Heat-resistant insulation	Aluminum rails 200 A*	f <sub>v</sub>					0.868	0.856	0.845	0.834	0.824	0.813	0.803
	Aluminum rails 320 A*						0.875	0.864	0.853	0.843	0.833	0.822	0.813
	Copper rails 250 A						0.862	0.850	0.838	0.827	0.816	0.805	0.795
	Copper rails 400 A						0.883	0.873	0.863	0.853	0.843	0.833	0.824
	Stainless steel rails 25 A						0.988	0.986	0.986	0.985	0.984	0.982	0.981

If the voltage drop is too high, then either the number of power feeds must be increased or a larger conductor rail must be selected. Additional power feeds are usually a better technical and commercial alternative than larger conductor rails or costly copper rails.

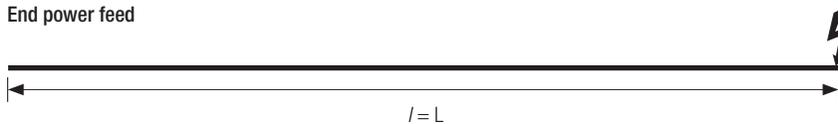
\* The correction factors for Copper **ECO III** correspond to those for aluminum-stainless steel

Working temperature: permanent rail temperature occurring at rated current (ambient temperature + electrical thermal heating)

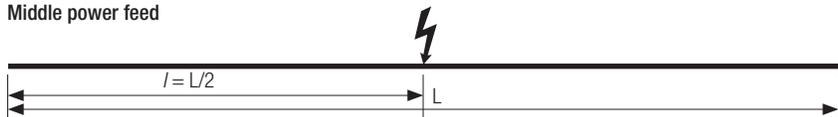
Max. working temperature: short-term (t < 30 sec) 125 °C (in heat-resistant variant)

**Possible power feed locations:** The power feed arrangement must be appropriate for the specific case, since the voltage drop is calculated with the feed length "l" that falls between the power feed and the end of the conductor rail. The following power feed options are normally used:

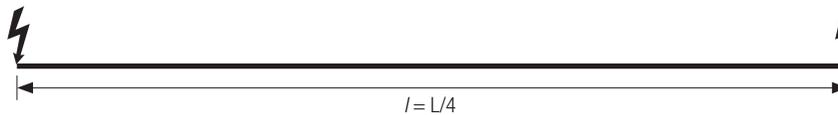
## End power feed



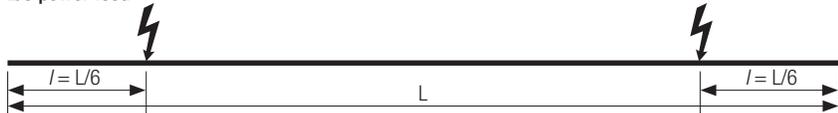
## Middle power feed



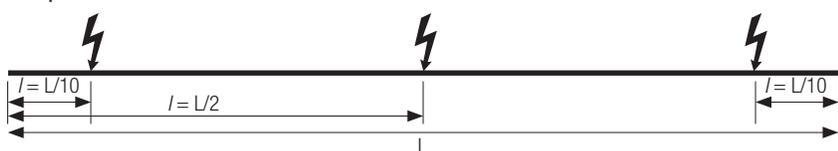
## Power feed on both sides



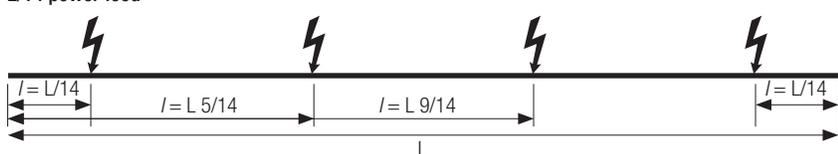
## L/6 power feed



## L/10 power feed



## L/14 power feed



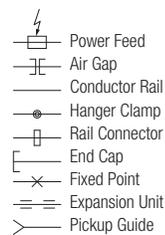
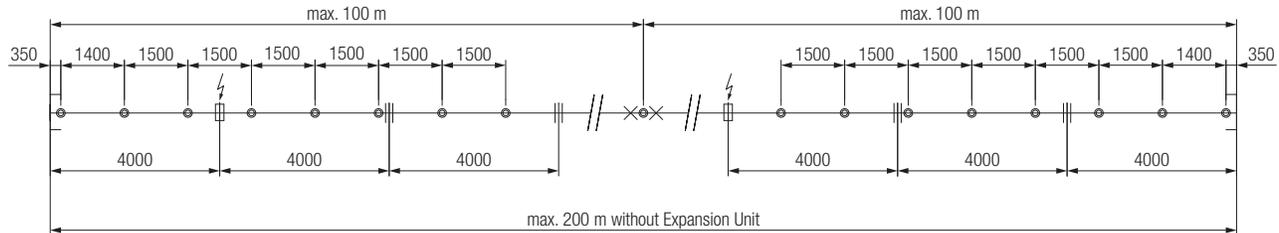
- $l = L$  With an end power feed
- $l = L/2$  With a middle power feed
- $l = L/4$  For power feeds at both ends
- $l = L/6$  For two power feeds each  $L/6$  from the ends
- $l = L/10$  For a power feed in the middle and  $L/10$  from each end
- $l = L/14$  For four power feed points

$L =$  length of the conductor rail [m]



# System Layout

## Layout Schematic and Component Overview



Middle distance between two conductors	Standard Current Collector arrangement	Offset Current Collector arrangement	Current Collector arrangement for installations with multi-poled Pickup Guides*
Minimum distance a [mm]	50	40	50

\* See mounting instructions for Pickup Guides. Minimum distance between Hanger Clamps, Joints, Pickup Guides, Air Gaps, etc. is 250 mm! Minimum distance for Power Feeds is 350 mm.

## Example Material Overview / Example Order

Here is a typical crane conductor rail system that is 52 m in total length, with 4 poles, 320 A, with all accessories, Current Collectors and Support Arms. The required Bill of Materials is listed below. The order quantity should be increased by an assembly reserve for the parts marked with an (x).

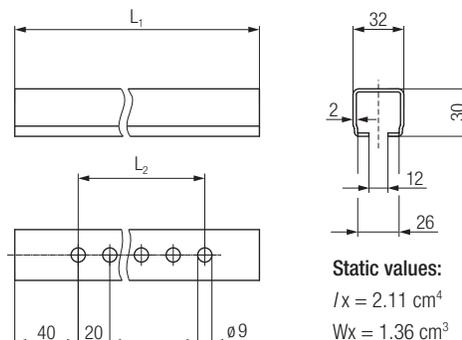
Part Description	Part No.	Quantity Needed
Conductor Rail "Phase" 4 m long	0812-4 x 11	39
Conductor Rail "PE" 4 m long	0812-4 x 12	13
Hanger Clamp (x)	081243-01	152
Anchor Clamp	081231-1	8
Rail Connector (x)	081221-2	52
Power Feed	081251-2	4
Notch-type Cable Lug 16 mm <sup>2</sup> (x)	080051-16	4
End Cap (x)	081271-1	8
Current Collector "Phase"	081205-01	3
Current Collector "PE"	081205-02	1 (Recommendation: 2 units or dual Current Collector)
Support Arm	020195-400	1
Support Arm	020185-0500	38
Girder Clip	020180-08	76
Mounting Comb	081045	1
Conductix-Wampfler Contact Grease (x)	080021	1
Copper Graphite Shoe (replacement part) (x)	081001-11	4

### Note:

To avoid strand breakage due to external force on the Current Collector, the connection cable should be fine-stranded and highly flexible. The transition to the customer-provided fixed cabling should be directly behind the Current Collector in a terminal box provided by the customer. Long connection cables to Current Collectors should be avoided to reduce maintenance problems.

# Mounting Accessories

## Support Arms 30 x 32 x 2 mm – also suitable for Compact Hanger Clamps

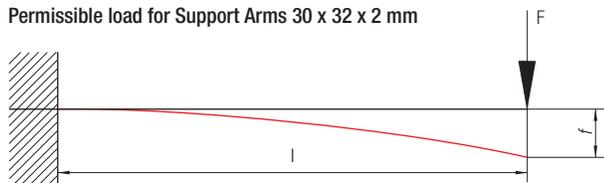


**Static values:**  
 $I_x = 2.11 \text{ cm}^4$   
 $W_x = 1.36 \text{ cm}^3$

Part No.	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	Material	Weight [kg]
020185-0250	250	200	Galvanized steel	0.390
020185-0315	315	260		0.500
020185-0400	400	340		0.625
020185-0500	500	340		0.780
020185-0630*	630	340		0.980

\* Standard range

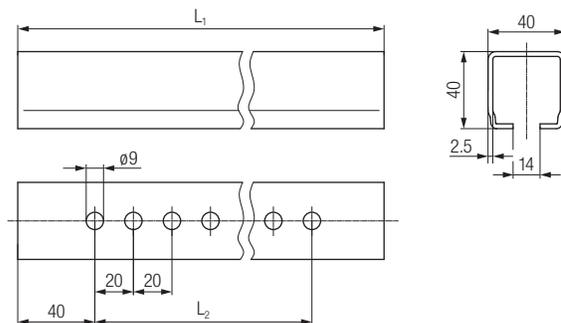
### Permissible load for Support Arms 30 x 32 x 2 mm



	l [m]							
	0.25	0.32	0.40	0.50	0.63	0.80	1.00	1.25
F [daN]*	76.0	59.5	47.5	38.0	30.0	24.0	19.0	15.2
f [cm]	0.08	0.13	0.20	0.32	0.50	0.80	1.25	2.23

\* Calculated with  $\sigma = 140 \text{ N/mm}^2$  voltage  $f =$  associated max. deflection

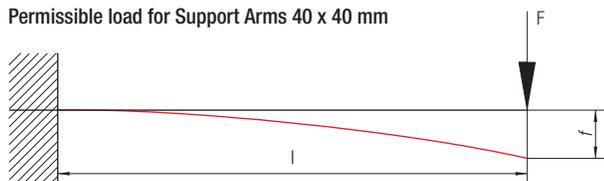
## Support Arms 40 x 40 x 2.5 mm – not suitable for Compact Hanger Clamps



Part No.	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	Material	Weight [kg]
020186-0250	250	200	Galvanized steel	0.625
020186-0315	315	260		0.785
020186-0400*	400	340		1.000
020186-0500	500	340		1.250
020186-0630*	630	340		1.575
020186-0800	800	340		2.000

\* Standard range

### Permissible load for Support Arms 40 x 40 mm

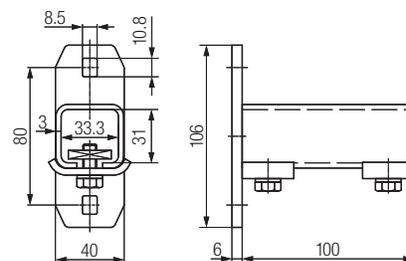


	l [m]							
	0.25	0.32	0.40	0.50	0.63	0.80	1.00	1.25
F [daN]*	164.5	128.5	103.0	82.5	65.5	51.3	41.0	32.9
f [cm]	0.06	0.10	0.16	0.25	0.40	0.63	1.07	1.68

\* Calculated with  $\sigma = 140 \text{ N/mm}^2$  voltage  $f =$  associated max. deflection

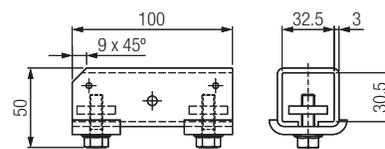
# Mounting Accessories

## Holder for Support Arms 30 × 30 × 2 for screw mounting with 2-holed connector plate



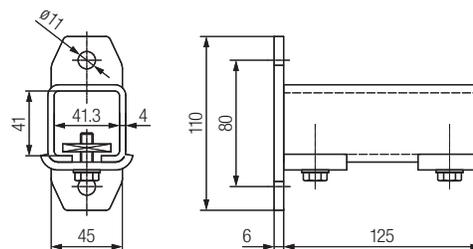
Part No.	Description	Suitable for Support Arm	Weight [kg]
020280	Galvanized steel	020185, 020275	0.700

## Holder for Support Arms 30 × 30 × 2



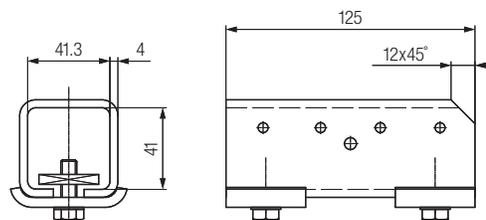
Part No.	Description	Suitable for Support Arm	Weight [kg]
020285	Unplated steel with galvanized hardware	020185, 020275	0.420

## Holder for Support Arms 40 × 40 × 2.5 for screw mounting with 2-holed connector plate



Part No.	Description	Suitable for Support Arm	Weight [kg]
020282	Galvanized steel	020186, 020276	1.000

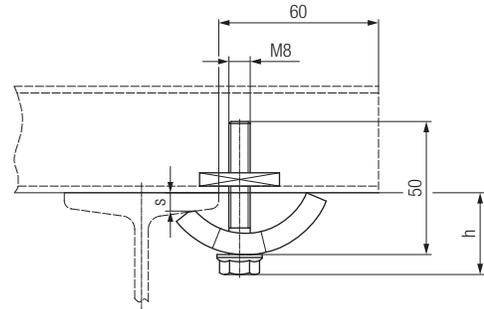
## Holder for Support Arms 40 × 40 × 2.5



Part No.	Description	Suitable for Support Arm	Weight [kg]
020286	Unplated steel with galvanized hardware	020186, 020276	0.730

# Mounting Accessories

## Girder Clips, clamping thickness 4 - 20 mm

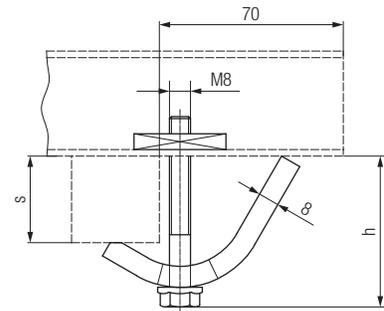


Part No.	Description	Weight [kg]
020180-08*	Galvanized steel	0.150
020480-08	Stainless steel (V4A)	0.150

\* Standard range

Clamping thickness s [mm]	4	6	8	10	12	16	20
Installation height h [mm]	31	32	33	34	35	37	40

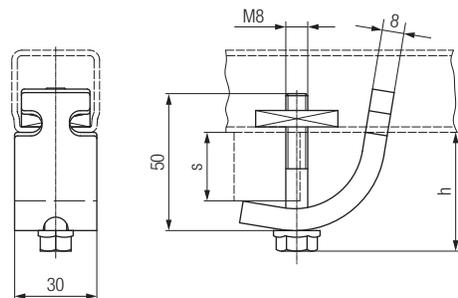
## Girder Clips, clamping thickness 18 - 36 mm



Part No.	Description	Weight [kg]
020180-08 × 36	Galvanized steel	0.220
020480-08 × 36	Stainless steel (V4A)	0.220

Clamping thickness s [mm]	18-20	20-24	24-28	28-32	32-36
Installation height h [mm]	42-44	44-48	48-52	52-56	56-60

## Girder Clips, non-twistable, clamping thickness 6 - 25 mm

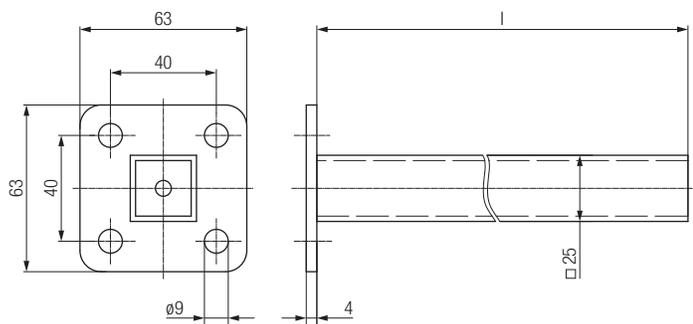


Part No.	Description	Weight [kg]
020181-08	Galvanized steel	0.190

Clamping thickness s [mm]	6-25
Installation height h [mm]	32-40

# Mounting Accessories

## Towing Arms

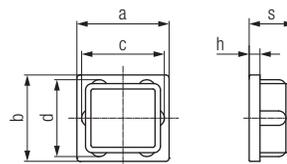


Part No.	Description	l [mm]	Weight [kg]
020195-630	Galvanized steel	630	1.000
020495-630	Stainless steel (V4A)	630	1.000

\* Standard range

Length adaptation on site

## End Caps

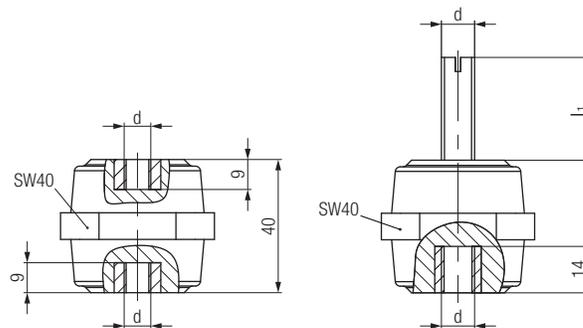
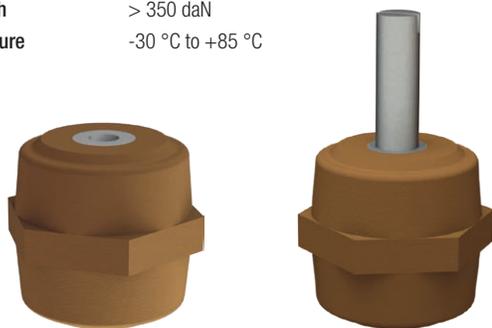


Part No.	For Support Arm	Description	a [mm]	b [mm]	c [mm]	d [mm]	s [mm]	h [mm]	Weight [kg]
020662-30	020185	Plastic	30	32	27	29	18	5	0.005
020662-40	020186		40	40	35	35	21	5	0.004

## Insulators

Insulators for indoor applications with high contamination and/or applications outdoors, up to 1000 V rated voltage

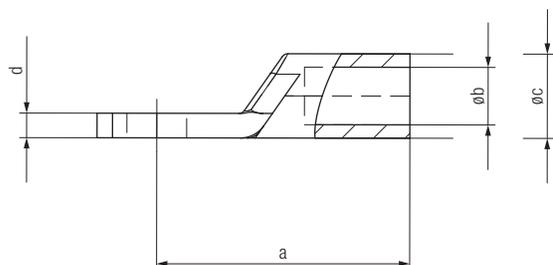
Creepage distance 62 mm  
 Cantilever strength > 350 daN  
 Ambient temperature -30 °C to +85 °C



Part No.	Hardware	d	l <sub>1</sub> [mm]	Weight [kg]
080401-08 × 08	Inner threading on both ends	M8 / M8	-	0.09
080402-830 × 08	Threaded bolts, galvanized	M8 / M8	30	0.98
080403-830 × 08	Threaded bolts, stainless steel	M8 / M8	30	0.98

# Mounting Accessories

## Notch-type Cable Lug for Power Feed Line



Part No.	Cross section [mm <sup>2</sup> ]	a [mm]	b [mm]	c [mm]	d [mm]	Weight [kg/1000]
080051-06*	6	23.5	3.5	6.6	1.5	6.000
080051-10*	10	26.8	4.5	7.0	1.5	7.000
080051-16*	16	32.0	5.5	8.5	2.2	11.000
080051-25*	25	32.5	7.0	10.0	2.6	14.000
080051-35*	35	34.0	8.5	12.0	3.5	20.000
080051-50*	50	40.0	10.0	14.0	3.9	32.000
080051-70*	70	47.0	12.0	16.6	4.6	51.000
080051-95*	95	51.0	13.5	18.0	4.6	60.000

Material: Copper, tin-plated      Order lot size 10 pcs. per size      \* Standard range

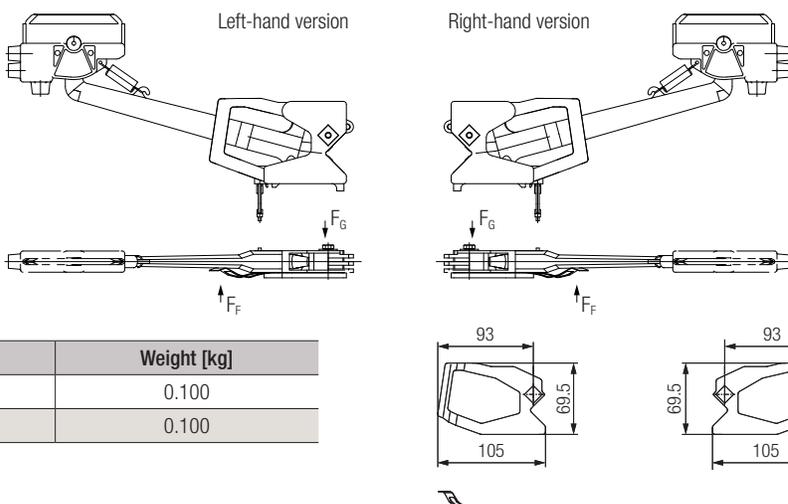
## Connector Cable for Current Collector Head 081209

Cross section [mm <sup>2</sup> ]	Part No.		Length* [m]	Cable diameter [mm]	Rated current [A]	Weight [kg]
	PH (Phase)	PE (Potential Earth)				
6	081209-1.5 × 06 × 81	081209-1.5 × 06 × 92	1.5	6	54	0.086
10	081209-1.5 × 10 × 91	081209-1.5 × 10 × 92	1.5	7	73	0.147
16	081209-1.5 × 16 × 81	081209-1.5 × 16 × 82	1.5	10	98	0.234

\* Custom lengths and bulk cables by request

**Note:** The connection cables are stressed by movement during operation and must be inspected along with the carbon collector shoes at regular intervals, then replaced after every five replacements of the carbon collector shoes. We recommend connecting the cables to a junction box, then installing fixed cabling from the junction box on.

## Spring Assembly (lateral insertion) for Current Collector Head 081209

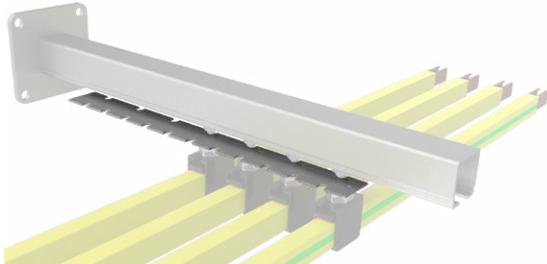


Spring assembly 081209	Part No.	Weight [kg]
Right-hand version	08-F030-0100	0.100
Left-hand version	08-F030-0101	0.100

# Tools and Assembly Accessories

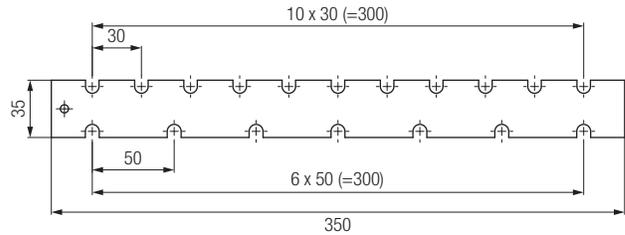
## Mounting Comb 081045

For setting the rail holder spacing while mounting the Support Arms



Part No.	Description	Weight [kg]
081045*	Mounting Comb	0.190

\* Standard range



## Bending Device



Part No.	Description	Weight [kg]
08-V015-0504*	Bending Device	18
08-V015-0506	Roller set 0812 for horizontal curves (incl. spring band)	3
08-V015-0361	Replacement spring band (only needed for 0812 horizontal curves)	1
08-V015-0505	Roller set 0812 for vertical curves	2
05-V015-0021	Roller set for ProfiDAT® compact vertical curves	2

\* Standard range

Horizontal and vertical curves for all conductor rails in the Program 812 can be bent using the Bending Device (see also Technical Information Sheet TI0812-0019-E).

When the Bending Device is ordered, a bending manual is included.

## Contact Grease for Connection Points



Part No.	Type	Weight [kg]
080021*	Contact Grease	0.030

\* Standard range

**Application:** Use contact grease to avoid corrosion at contact points.

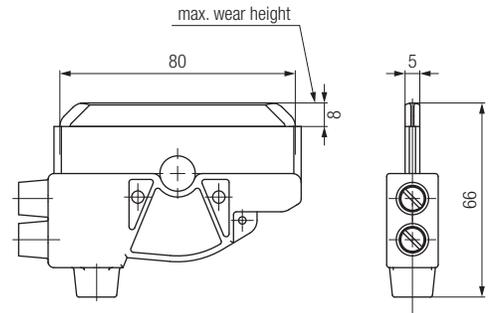
A thin film is applied with a spatula or brush.

One tube will last for about 200 connection points.

Observe the information on the safety data sheet.

# Replacement Parts

## Complete Current Collector Head for Current Collector 081209

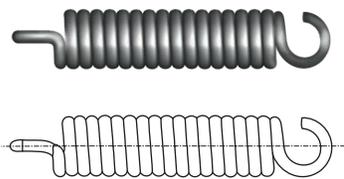


Description	Part No.		Weight [kg]
	PH (Phase)	PE (Potential Earth)	
Copper Graphite Shoe 812, 80 A, reversible operation	081001-12*	081001-22*	0.090
Copper Graphite Shoe 812, 80 A, towing operation	081001-32*	081001-42*	0.090

**Note:** The carbon brush and plastic insulation should always be replaced together.

\* Standard range

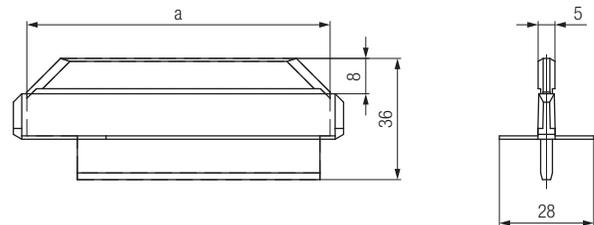
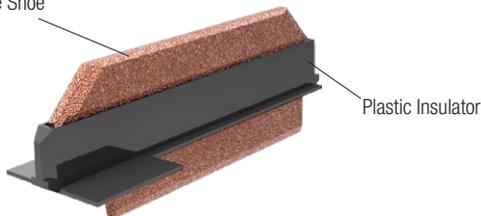
## Stabilization Springs for Current Collector Head 081209



Type	For Current Collectors	Operating type	Part No.
Stabilization spring	081209-	012	08-RZ-081GI
		022	
		112	
		122	
Stabilization spring	081209-	013	08-RZ-056I
		023	
		113	
		123	

## Replacement Copper Graphite Shoes with Insulators for Current Collector Head 081205... / 081206... / 081207... / 081208...

Copper Graphite Shoe



The copper graphite shoe is protected by a plastic insulator, so that accidental contact with live parts of the engaged Current Collector is not possible. Smallest bending radius for 100 A copper graphite shoe  $R = 1800$  mm – smallest bending radius for 40 A copper graphite shoe  $R = 1000$  mm

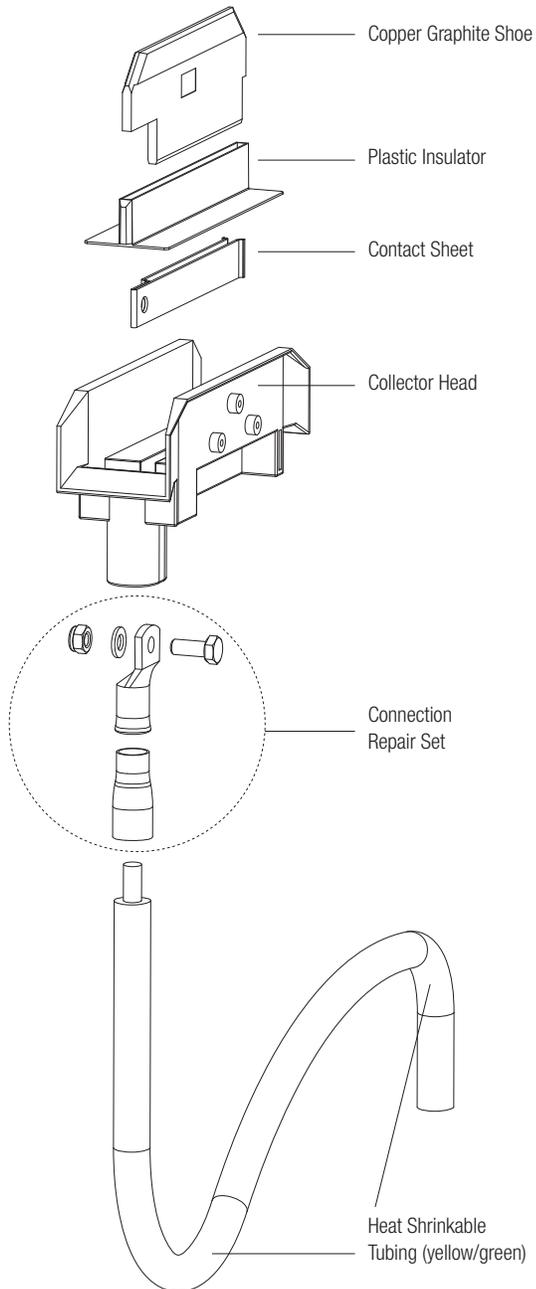
Part No.	Type	Amperes [A]	a [mm]	Weight [kg]
081001-11*	Copper graphite shoe	100	90	0.098
08-K154-0260	Copper graphite shoe for outdoor applications	100	90	0.098
081001-15	Copper graphite shoe	40	63	0.058

**Installation note:** When replacing the Copper graphite shoe, it is not necessary to remove the collector head because the shoe is designed as a plug-in contact (not a screw contact). Insulator is included.

\* Standard range

# Replacement Parts

## Replacement Parts for Current Collectors

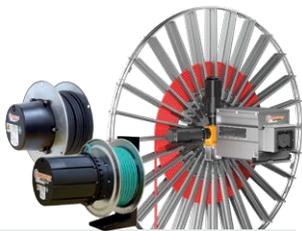


Part No.	Type	Weight [kg]
08-A150-0001-2*	Collector Head PE	0.1
08-A150-0001-1*	Collector Head PH	0.1
08-K154-0397*	Connection Repair Set, including: 1 × Contact Sheet 1 × Tubular Cable Lug 1 × Heat Shrinkable Tubing black, 55 mm 10 × Heat Shrinkable Tubing yellow/green, 50 mm 1 × Hexagonal Screw DIN933 M8 x 20 1 × Lock-nut DIN985-M08-A4 1 × Washer DIN125-A8, 4-A4	0.6
	Connecting Cable	
	Connecting Cable (pre-assembled) – on request	

\* Standard range

# Your Applications – our Solutions

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 Conductix-Wampfler for hands-on engineering support together with the optimum solution to safely meet your needs.



## Cable and Hose Reels

Motor driven and spring driven reels by Conductix-Wampfler provide energy, data and media over a variety of distances, in all directions, fast and safe.



## Festoon Systems

Conductix-Wampfler cable trolleys can be used in virtually every industrial application. They are reliable, robust and available in an enormous variety of dimensions and designs.



## Conductor Rails

Available as enclosed or multiple unipole systems, Conductix-Wampfler conductor rails reliably move people and material.



## Inductive Power Transfer

The no-contact system for transferring energy and data. For all tasks that depend on high speeds and absolute resistance to wear. Flexible installation when used with Automated Guided Vehicles.



## Non-insulated Conductor Rails

Robust, non-insulated aluminum conductor rails with stainless steel cap provide the ideal basis for power supply of people movers and transit networks.



## Radio Remote Controls

Safety remote control solutions customized to meet our customer needs with modern ergonomic design.



## Reels, Retractors and Balancers

Available for hoses and cables, as classical reels or high-precision positioning aids for tools, we offer a complete range of reels and spring balancers.



## Jib Booms

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



## 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!



## Mobile Control Systems

Mobile control solutions for your plant – whether straightforward or intricate. Control and communication systems from L&J have been tried and tested in the automotive industry for decades.



## ProfiDAT®

This data transfer system is a compact slotted waveguide and furthermore can be used as Grounding rail (PE) as well as positioning rail at the same time.



## Charging Solutions

Whether inductive or conductive, this bundle of products offers always the perfect solution for all industrial charging tasks including the matching battery with integrated battery management system.

# www.conductix.us

## 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.contact](http://www.conductix.contact)

