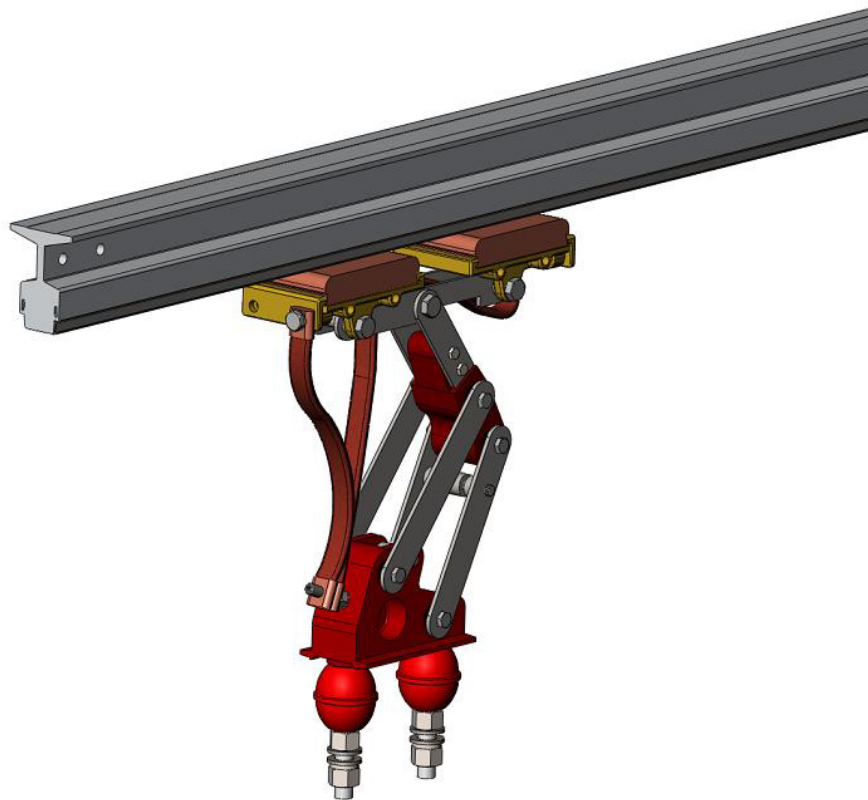


Heavy-Duty Conductor Rail

Barebar1



CONDUCTIX
wampfler

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Barebar1 Conductor Rail System

Heavy-Duty Conductor Rails



Aggressive environmental conditions and rough production processes require a durable and robust conductor rail system. The Conductix-Wampfler Barebar1 Conductor System is a tried and tested conductor bar system designed for heavy-duty applications in rough environments, such as steel mills or shipyards. Non-insulated conductor rail systems are preferred for applications with higher ambient temperatures or temporary radiation heat, where insulated safety conductor rails are not always applicable.

The Barebar1 Conductor System has several new design improvements compared to traditional Barebar1 rail systems, and is in line with international standards for conductor rails.The standard rail length of 6m reduces logistic cost and optimizes handling and installation. The improved joint technology and a production on an industrial level, supported by the Conductix-Wampfler quality assurance system, offer another customer benefit. Conductix-Wampfler as market leader in conductor rails and full line provider for energy and data supply systems is a proven partner for projects all over the world.

Aluminum extrusion with a base width of 35/44/70 mm is drawn through a special die, which is connected with the stainless-steel cap rigidly by crimping process. The Barebar1 Conductor Rails represent a neat and compact arrangement and have proven an outstanding success for safe power feeding ofvarious crane and transport applications. The Barebar1 Conductor Rails are available in different sizes to meet individual current requirement from 680 to 2900 Amps.

Some Advantages of Barebar1 Rail Systems



With Barebar1-System you eliminate all drawbacks inherent in the conventional design of trolley wires, steel angles and steel rails. Barebar1 rail ensure an efficient and continuous contact.

- Usable under higher ambient temperature conditions.
- Limited sparking effect by high contact performance.
- Easy maintenance by proven system design.
- Reduced down time
- Long collector life time. Negligible wear – nearly unlimited life of conductors.
- Lower resistance between stainless steel cap and copper-carbon collector shoe.

Main applications: steel mill, coking plant, gas work, cement industry, shipyard, and dockside

Stee Barebar1 Rails are preferably used for applications in corrosive atmospheres and in locations with high humidity. Rails are supplied in 6m standard length drilled at either end for splice joint. Shorter lengths are available to match with your runway lengths on special order. We produced a complete range of accessories, insulators and current collectors. Expansion and contraction of rail caused by variation in ambient temperature is absorbed by expansion joint. Sufficient amperage capacity must be provided to carry the expected electrical load: the total ampere load is determined from the nominal rated full load current reduced by the duty cycle and by a diversity factor for non-simultaneous operation.

Product Pre-Selection

Besides electrical parameters, environmental conditions and operating modes are important parameters for the product selection. The following overview will assist in the pre-selection. Further detailed information is listed under technical data.

Type	Non-specific environment	Corrosive environment	Highly corrosive environment	Higher product safety
Steel-Copper Rail (See Copperhead from ConductixWampfler)	++	++	+	+ ¹⁾
Barebar1 Aluminum-Stainless Steel Rail	++	++	-	+ ¹⁾

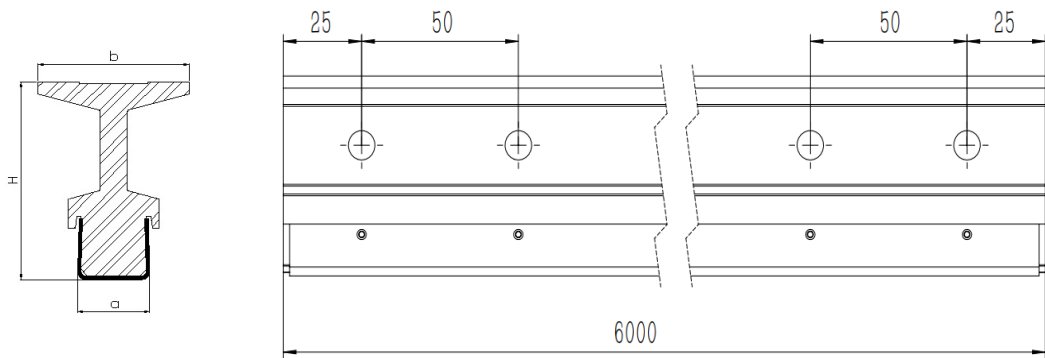
¹⁾ For non-insulated electrification systems, additional safety arrangements (installation height, distance, fences, etc.) according to local standards must be regarded.
+ suitable, - not suitable

Barebar1 Conductor Rail System

Conductor Rail

Technical Data									
Rail Part Number	004010021	004010022	004010023	004010024	004010025	004010026	004010027	004010028	004010029
Currentload at 100% dutycycleand 20°C [A]	680	900	1100	1350	1600	2000	2300	2600	2900
Currentload at60% dutycycleand20°C [A]	878	1161	1419	1742	2064	2580	2967	2967	3354
Conductor cross section (Aluminum) [mm²]	480	666	832	986	1024	1573	1800	2110	2700
Conductor cross section (Stainless Steel) [mm²]	52	52	52	52	92	92	92	92	92
Base width “b” [mm]	35	44	44	44	44	44	44	70	70
Rail height“H” [mm]	46	50	55	58	65	80	80	90	93
Headwidth“a” [mm]	21	21	21	21	36	36	36	36	36
Rail weight [kg/m]	1.64	2.4	2.95	3.5	4.1	5.1	5.7	6.8	8.2
Rail length [mm]	6000								
DC resistance at 20°C [ohm/km]	0.0698	0.0505	0.0410	0.0328	0.0273	0.0218	0.0182	0.0149	0.0126
Impedance at 50Hz [ohm/km]	0.217	0.197	0.183	0.172	0.161	0.153	0.144	0.136	0.128
Nominal Voltage [V]	1000V, 7000V, Depending on insulator type, rail spacing and local regulations.								
Rated rail spacing* [mm]	≥200								
Nominal suspension spacing [mm]	2000								
System length	Unlimited (see expansion system)								
Expansion system	Segmented expansion unit (see expansion section)								
Environment	Indoor and outdoor outdoor applications								
Protection class	IP 00								
Temperature range	-40 ... + 200°C								
Storage temperature	-20°C ... +40°C / -4°F ... 104°F (dry to prevent oxidation, no condensation)								

*Standard range dimensions. For rails with higher amperage rates, please contact Conductix-Wampfler Sales Support.



Crane Electrification according to IEC60204-32 Standard(2009 extract)



WARNING!

Danger
to life from
high voltage!

These European regulations are valid for electrical installations and electrical equipment in Europe and similar to several national standards in America, Australia and Asia. Electrical installations, such as conductor rail applications must be designed to avoid direct contact with live parts.The preferred solution is an insulated and monitored system. If this is not possible, e.g.high ambient temperature where insulation material is not usable, the system must be installed that in operation and other situation it can be used without risk to any person. Regarding how to realize the needed safety require-ments, please refer the valid regulations on-site and contact the local authority.

The operation of non-insulated conductor rails and other electrical equipment above 48VAC/60VDC without additional protection regarding local safety standards is not allowed. Electrical energy carries a high danger to life.

Barebar1 Conductor Rail System

Powerfeed Location

Voltage Drop Calculation

The maximum length between feeding points is limited by the voltage drop and is depending on the system current.
The voltage drop must be less than 5% as per customer specification. If the voltage drop exceeds, the rail cross section must be increased or the power feed position and/or quantity must be adapted.

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.

Example of Voltage drop calculation:

Assumption:

3-phase AC system

System voltage = U (volt)

System current = Itotal (Amp)

System length = L (meter)

Feed length = l (meter)

Impedance of conductor rail = Z (ohm / m)

Voltage drop = 1.732 x Itotal x l x Z / U x 100%

Barebar1 Conductor Rail System

Powerfeed Location

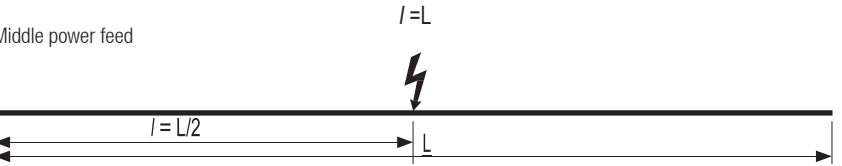
Possible Power Feed Locations

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. Following power feed options are normally used.

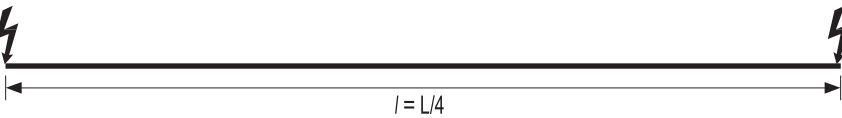
End power feed



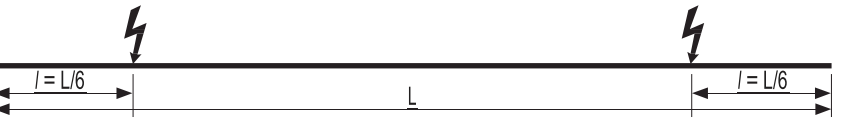
Middle power feed



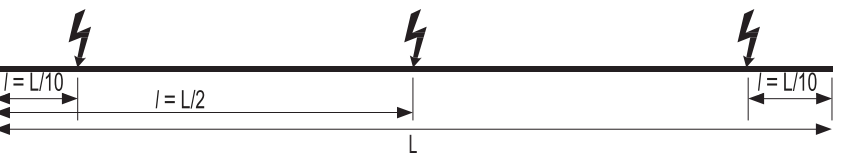
Power feed on both sides



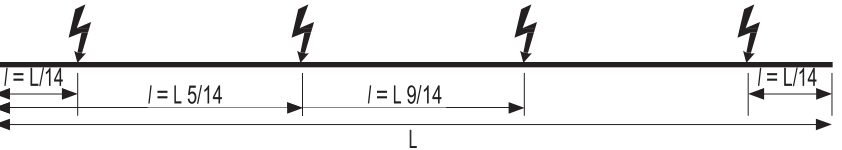
L/6 power feed



L/10 power feed



L/14 power feed



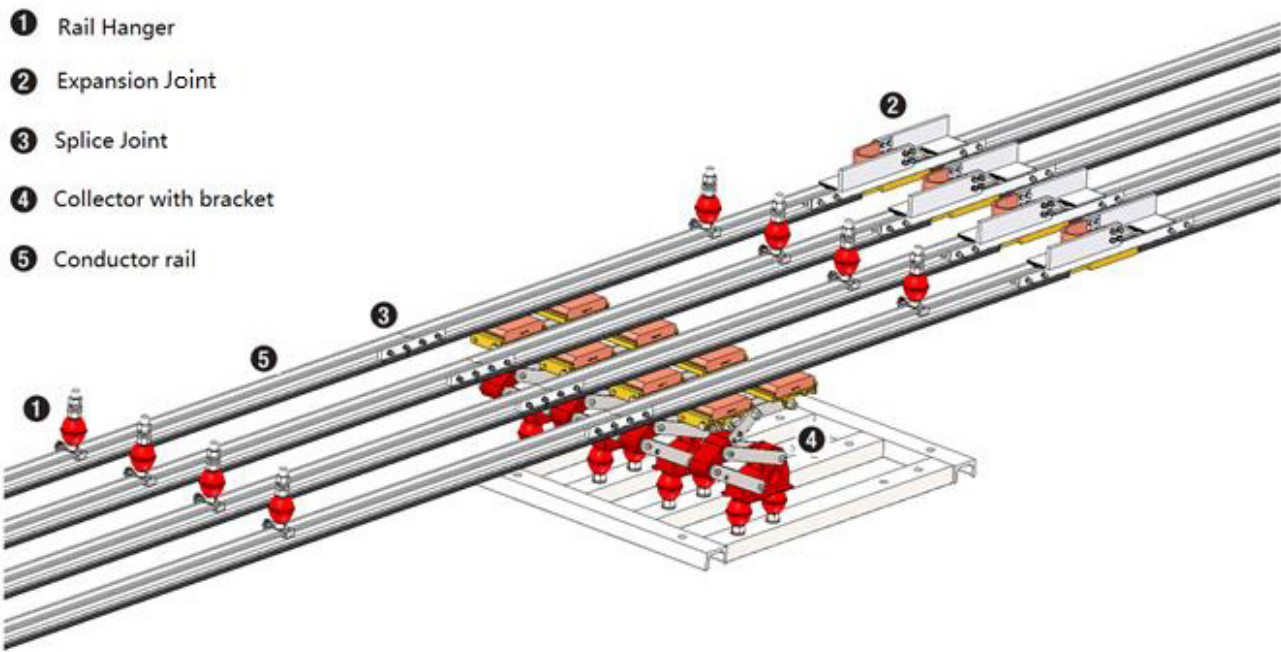
- $l=L$ With an end power feed
- $l=L/2$ With a middle power feed
- $l=L/4$ For two power feeds at both ends
- $l=L/6$ For two power feeds each L/6 from the ends
- $l=L/10$ For a power feed in the middle and L/10 from each end
- $l=L/14$ For four power feed points
- $L =$ Length of the conductor rail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



System Components

Barebar1 conductor rails are based on the combination of universally applicable standard components. Design, length and material are optimized to fulfill the requirements in logistic, installation, operation and maintenance of steel mills and similar tough crane indoor and outdoor applications.

- The components:
- * Barebar1 rails with aluminum base for tough environments where fully insulated rails reach their limits
 - * Easy to use splice joint
 - * Rail Hanger clamps with insulators to hold the rail in position and insulate it from the base steel structure
 - * Anchor clamps to mount the rail against movement to the structure
 - * Massive power feed elements with low resistance and solidly built for the cable connection on-site
 - * Expansion joints for length compensation under temperature change
 - * Air insulation elements for rail segmentation, e.g. maintenance zones



The Conductix-Wampfler Barebar1 conductor rail is aluminum-based and in accordance with the international standard design of non-insulated rail systems for crane applications. The efficiently sized 6 m rail reduces logistic cost and allows for easy installation and distribution of the system. This length is conforming to the international standard length for aluminum profiles and is compatible with handling/transport and storage equipment. Shorter rail segments can be easily cut on-site with standard equipment.

Individual rail lengths are available on request, subject to minimum order size.

System Arrangement and Interface to the Building/Crane Structure on-site

The interface to the structure on-site is a typical system integration engineering task and can be offered as engineering service from our local sales and service subsidiary or partners. Please contact your local Conductix-Wampfler sales and service (see www.conductix.com for contact information).

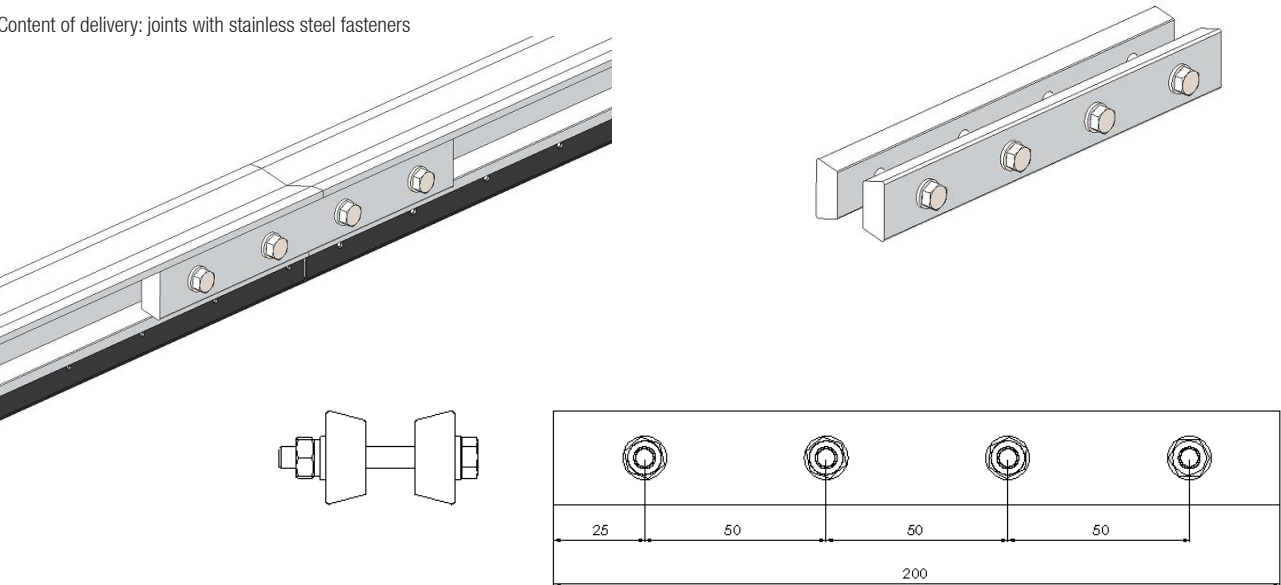
Hanger distance, type of insulator, installation height, access distance and other design aspects are depending on the supply voltage level and the local electrical and safety regulations. In addition to national regulations often end customer safety specifications must be observed.

Non-insulated rails carry a higher risk for material damage and danger to life and require additional on-site safety precautions. For details refer to local standards or to the responsible authority on-site.

Barebar1 Conductor Rail System Splice Joint

Splice Joint

Connect rails and expansion units
Material: Aluminum
Content of delivery: joints with stainless steel fasteners



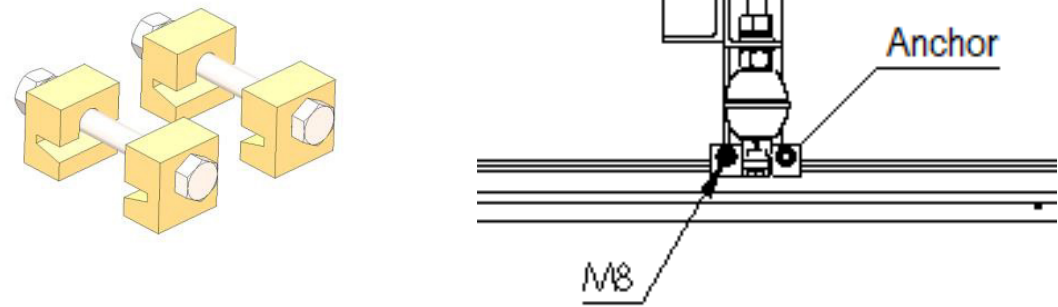
Part Number	Description	Matches Rail	Length	Approx. Weight [kg]
004030015	680A Joint	004010021	200 mm	0.30
004030017	900A Joint	004010022		0.34
004030005	1100A Joint	004010023		0.55
004030006	1350A Joint	004010024		0.50
004030007	1600A Joint	004010025		0.59
004030009	2000A Joint	004010026		0.82
004030038	2300A Joint	004010027		0.84
004030040	2600A Joint	004010028		0.93
004030034	2900A Joint	004010029		1.12

Barebar1 Conductor Rail System

Anchor

Anchor

- Hold the rail in position under thermal expansion, installed on both sides of a hanger
- Material: Galvanized steel
- Content of delivery: Anchor with stainless steel fasteners



Part Number	Description	Matches Rail	Approx. Weight [kg]
004050003	35mm Anchor Clamp	004010021	0.065
004050004	44mm Anchor Clamp	004010022, 004010023, 004010024, 004010025, 004010026,004010027	0.072
004050005	70mm Anchor Clamp	004010028, 004010029	0.080

Barebar1 Conductor Rail System

Rail Hanger

Rail Hanger

Insulator material : BMC, Porcelain

Typical hanger distance: 2000mm±100mm

Max. insulator voltage: 1kV and 7kV

Temperature range:

1. -40° C (-40° F)... +130° C (266° F)

2. -40° C (-40° F)... +200° C (392° F)

Insulator for indoor installation

Fasteners included (galvanized)

For outdoor and seaside application, please contact us with specific requirement.



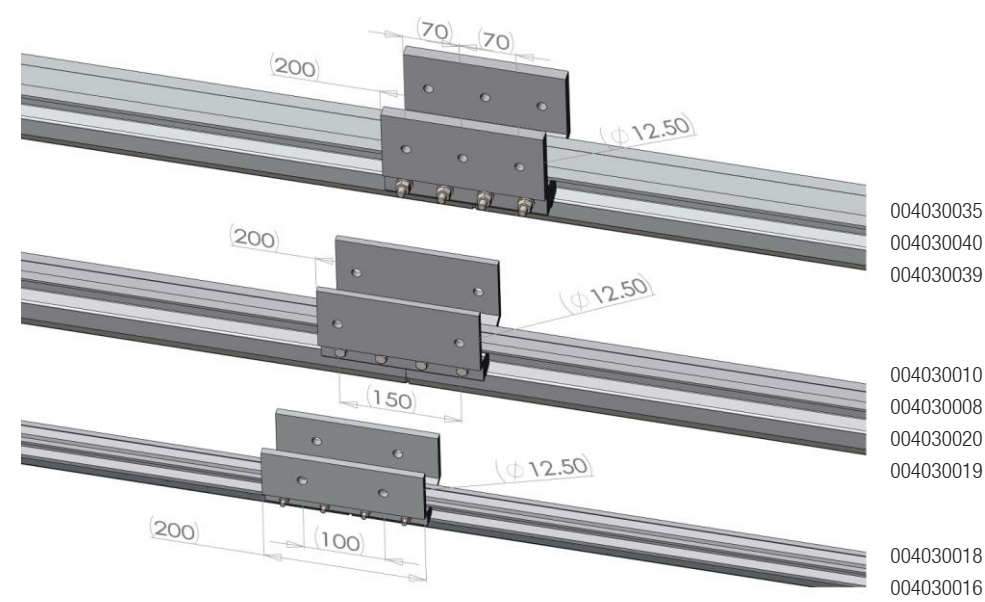
Part Number	Description	Matches Rail	Insulator Rated Voltage	Approx. Weight [kg]
004040006	35mm hanger clamp with 1000V insulator	004010021	1000V	0.56
004040007	44mm hanger clamp with 1000V insulator	004010022, 004010023, 004010024, 004010025, 004010026,004010027		0.70
004040008	70mm hanger clamp with 1000V insulator	004010028, 004010029		1.00
004040009	35mm hanger clamp with 7000V insulator	004010021	7000V	0.64
004040010	44mm hanger clamp with 7000V insulator	004010022, 004010023, 004010024, 004010025, 004010026,004010027		0.78
004040011	70mm hanger clamp with 7000V insulator	004010028, 004010029		1.10

Barebar1 Conductor Rail System

Powerfeed

Powerfeed

- For power feed cable connection
- Content of delivery: 2 pieces of powerfeed plates, joints and stainless steel fasteners



Part Number	Description	Matches Rail	Approx. Weight [kg]
004030016	680A Powerfeed	004010021	1.28
004030018	900A Powerfeed	004010022	1.28
004030019	1100A Powerfeed	004010023	1.72
004030020	1350A Powerfeed	004010024	1.69
004030008	1600A Powerfeed	004010025	1.76
004030010	2000A Powerfeed	004010026	1.93
004030039	2300A Powerfeed	004010027	3.21
004030041	2600A Powerfeed	004010028	3.48
004030035	2900A Powerfeed	004010029	3.50

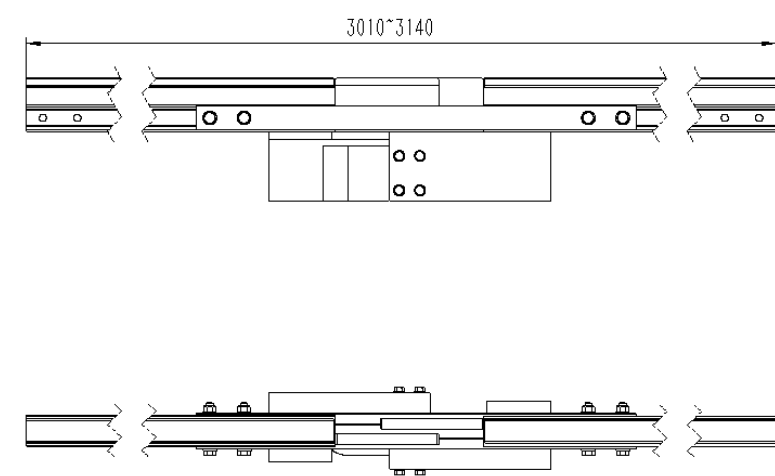
* All powerfeed plates come with Ø 12.5 factory pre drilled holes, 2300A~2900A powerfeed have 3 holes each plate, all others have 2 holes each plate, larger diameter enlarged on-site.

Barebar1 Conductor Rail System

Expansion Joint

Expansion Joint

- Length compensation element
- Material: aluminum+brass+copper
- The expansion joint is installed instead of a rail (with 3m length).
- Includes: expansion bar, expansion joint, copper strip, stainless steel fasteners



Part Number	Description	Matches Rail	Expansion Stroke [mm]	Approx. Weight [kg]
004020054	680A Expansion Joint	680A	130	7.43
004020055	900A Expansion Joint	900A		9.36
004020056	1100A Expansion Joint	1100A		12.60
004020057	1350A Expansion Joint	1350A		14.00
004020058	1600A Expansion Joint	1600A		17.66
004020059	2000A Expansion Joint	2000A		21.62
004020060	2300A Expansion Joint	2300A		24.81
004020061	2600A Expansion Joint	2600A		28.18
004020062	2900A Expansion Joint	2900A		33.12

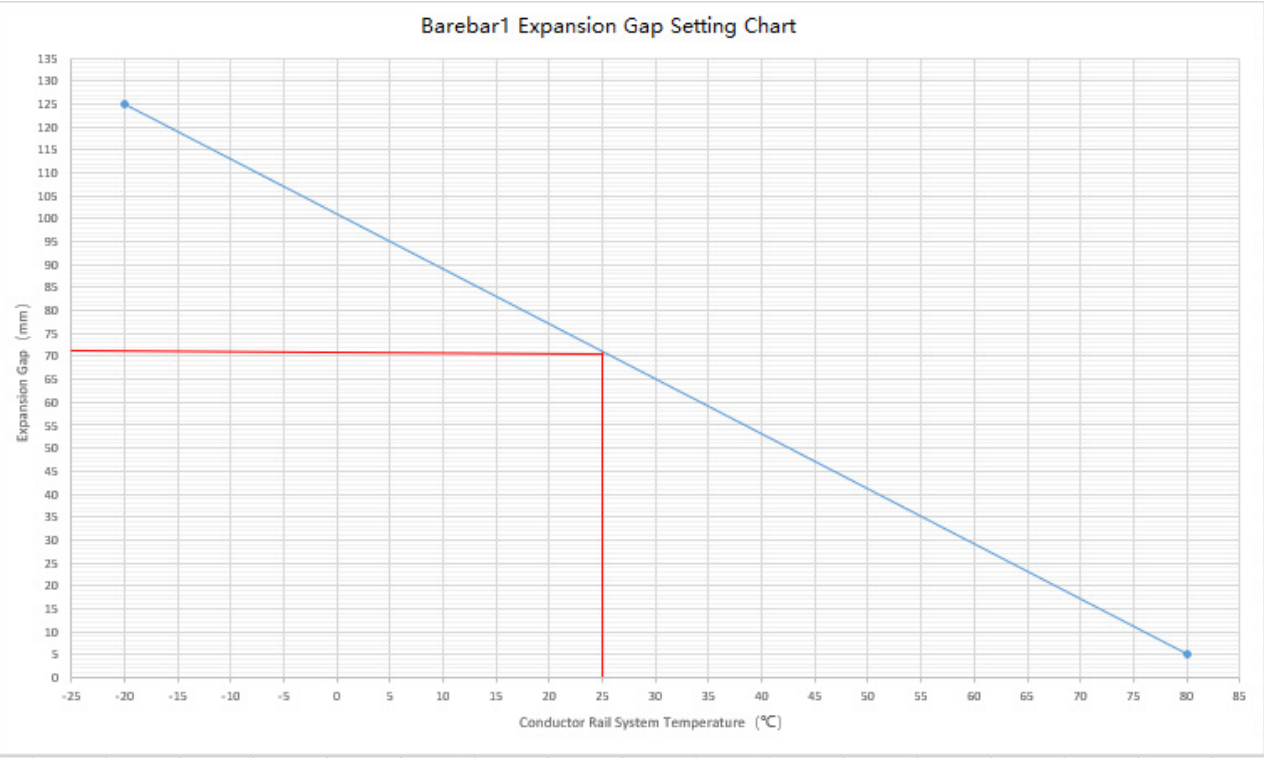
Barebar1 Conductor Rail System

Expansion Joint

Expansion Gap Calculation

For system longer than 100m, expansion units must be used.

Following chart shows the relation between expansion gap setting to conductor rail temperature. (NOT always equal to ambient temperature, especially when installing outdoors).



Conductor rail temperature change scope depends on two elements: $\Delta T = \Delta Ta + \Delta Te$

ΔTa = Ambient temperature range

ΔTe = Heat raise temperature caused by current flow

Continuous current flow: $\Delta Te = 35^{\circ}\text{C}$

Frequent current flow (for example, steel smeltery factory): $\Delta Te = 25^{\circ}\text{C}$

Noncontinuous current flow (for example, workshop or maintenance activity): $\Delta Te = 15^{\circ}\text{C}$

Example on steel smeltery factory, the ambient temperature scope is -20°C to 55°C , so $\Delta Ta = 75^{\circ}\text{C}$.

Steel smeltery belongs to frequent current flow application, so heat raise temperature is $\Delta Te = 25^{\circ}\text{C}$.

The two extreme temperature changes of conductor rail are:

Tmin: the min temperature of conductor rail is -20°C ;

Tmax: the max temperature of conductor rail is $T_{\text{max}} = T_{\text{min}} + \Delta Ta + \Delta Te = -20^{\circ}\text{C} + 75^{\circ}\text{C} + 25^{\circ}\text{C} = 80^{\circ}\text{C}$.

We generate expansion gap setting chart based on Tmin and Tmax, pls refer the above chart.

In above chart*:

1. Blue line represents conductor rail temperature range $-20 \sim +80^{\circ}\text{C}$
2. X-axis is temperature of conductor rail
3. Y-axis is gap of expansion joint

For example, when the rail temperature is 25°C on site, the gap of expansion joint should be set to 71mm, pls refer red line in this chart.

Barebar1 Conductor Rail System

Expansion Joint

Anchor Position

For system with more than one anchor, distance between two anchors (with one expansion joint in between) is limited by the total temperature range.

Total Conductor rail temperature range ^{(1) (2)} (Celsius degree)	Max distance between two anchors with one expansion unit in between (meter)
40	138
50	111
60	92
70	79
80	69
90	61
100	55

(1) Total conductor rail temperature range is the sum of ambient range plus the temperature rise due to current flow.

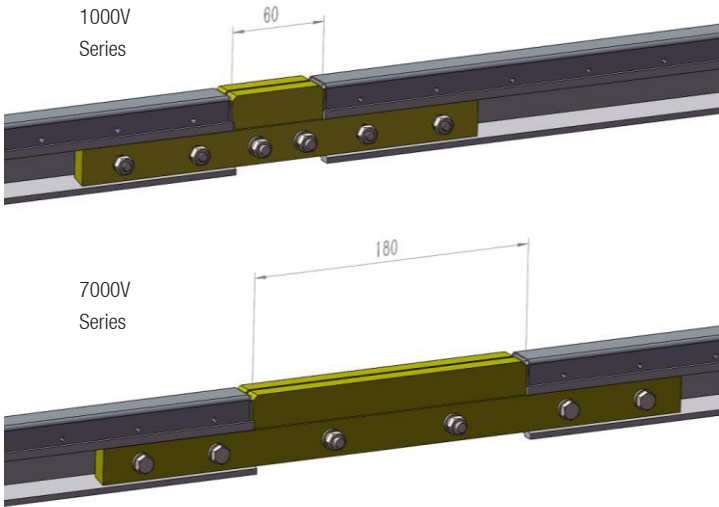
(2) For range within between, use the higher rank, for example if total temperature range is 45°C , then select 50°C .

Barebar1 Conductor Rail System

Insulation Joint

Insulation Joint

Rail insulation joint to separate the rail track in segments
Max. Voltage: 1000V/7000V
Insulation distance: 60/180 mm
Content of delivery: insulation elements, stainless fasteners



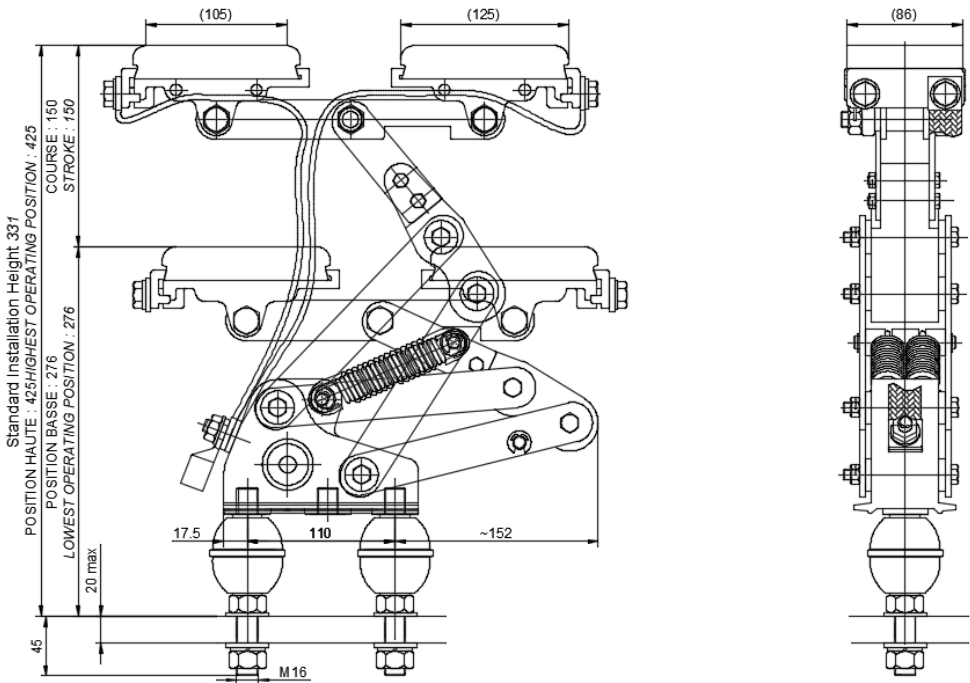
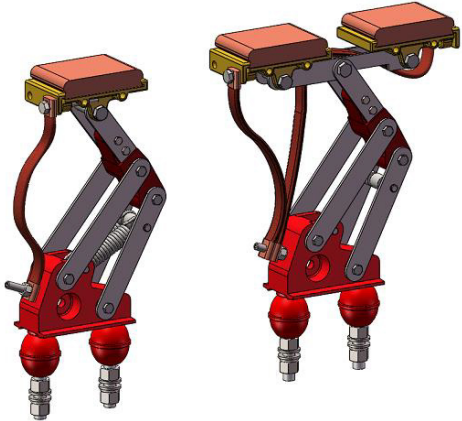
Part Number of 1000V	Approx. Weight [kg]	Spacing	Part Number of 7000V	Approx. Weight [kg]	Spacing	Matches Rail
004060038	0.28	60mm	004060037	0.5	180mm	004010021
004060054	0.32		004060039	0.5		004010022
004060041	0.56		004060040	0.8		004010023
004060043	0.60		004060042	0.7		004010024
004060045	0.66		004060044	0.9		004010025
004060047	0.72		004060046	1.1		004010026
004060049	0.78		004060048	1.2		004010027
004060051	0.91		004060050	1.4		004010028
004060053	0.96		004060052	1.4		004010029

Barebar1 Conductor Rail System

Collector

Collector

- Current collector: max. 450 A / 900 A
- Withstand voltage: 1 kV and 7kV (*higher voltage on request)
- Temperature range:
 1. -40° C (-40° F)... +130° C (266° F)
 2. -40° C (-40° F)... +200° C (392° F)
- Material: steel, copper, plastic
- Collector brush: carbon-bronze
- Content of delivery: collectors, frame, copper braid, insulator, fasteners



Type	Order No.	Description	System Voltage [V]	Standard Operation Height [mm]	Nom. Current [A]	Approx. Weight [kg]
Single	004070028	Single shoe collector with insulated socket + insulator 1000V	≤ 1000	331	450	6.4
Single	004070029	Single shoe collector with insulated socket + insulator 7000V	≤7000	351	450	6.6
Double	004070031	Double shoe collector with insulated socket + 1000V insulator	≤ 1000	331	900	11.0
Double	004070032	Double shoe collector with insulated socket + 7000V insulator	≤7000	351	900	11.2

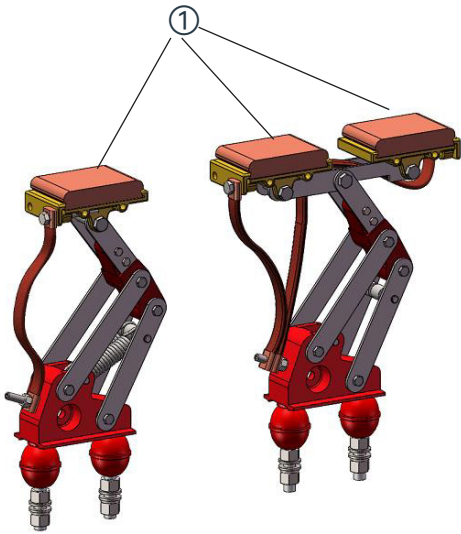
Bracket

Item	Type	Order No.	Description	Surface Finish	Phase Distance **	Unit	Approx. Weight [kg]
1	Hanger Bracket	005070001	Standard Rail Hanger Bracket (Rail arranged vertically)	Hot dip galvanized	200mm	Pcs.	6.35
2		004070025	Standard Rail Hanger Bracket (Rail arranged horizontally)			Pcs.	8.37
3	Collector Bracket	005070006	BB1-Copperhead Collector Bracket			Pcs.	31.5

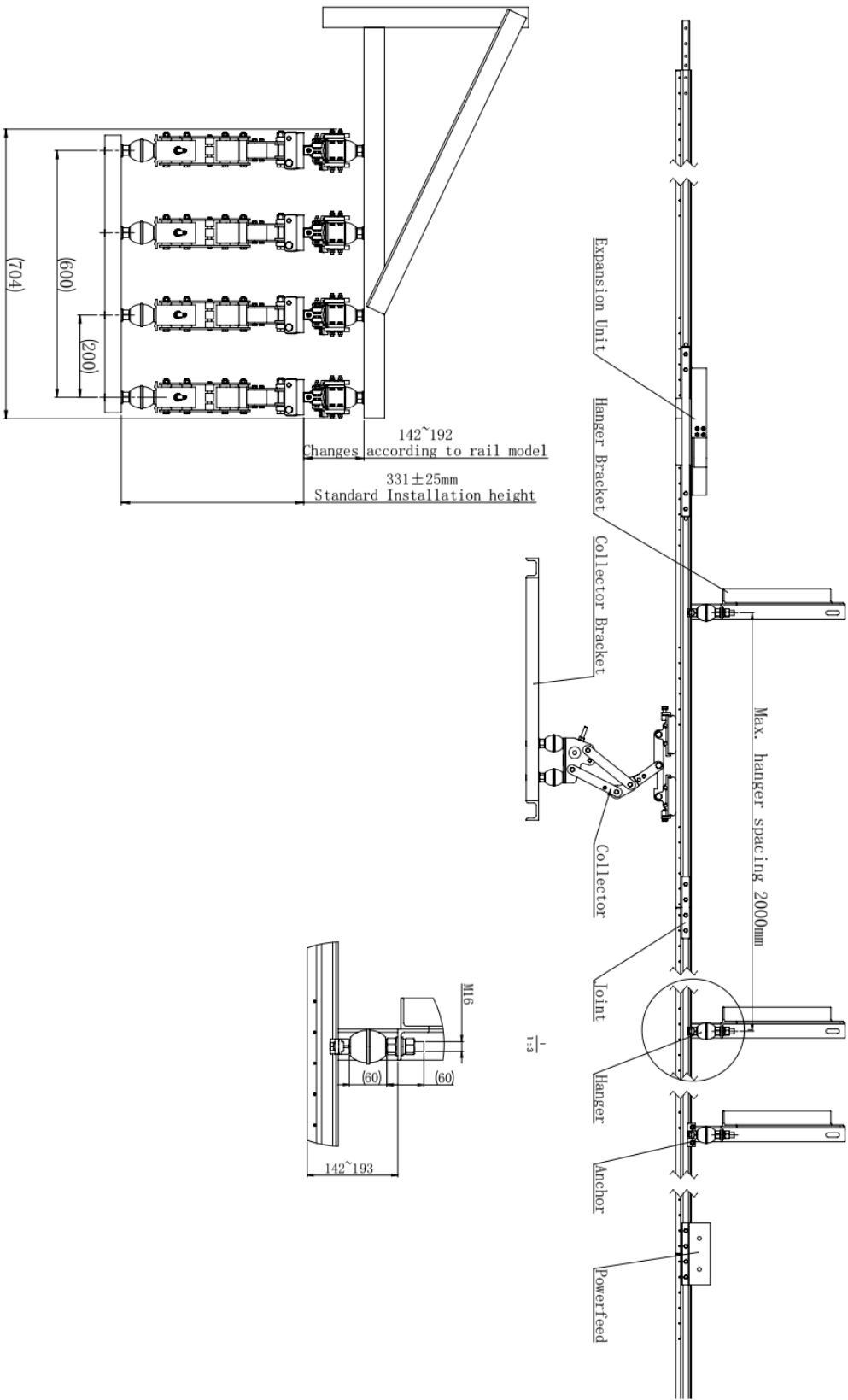
* Listed are standard brackets, customized design of brackets upon request.
** Standard phase, minimum clearance subject to local law and system environment. (indoor or outdoor, pollution degree, etc.)

Carbon Shoe / Collector Spare Parts

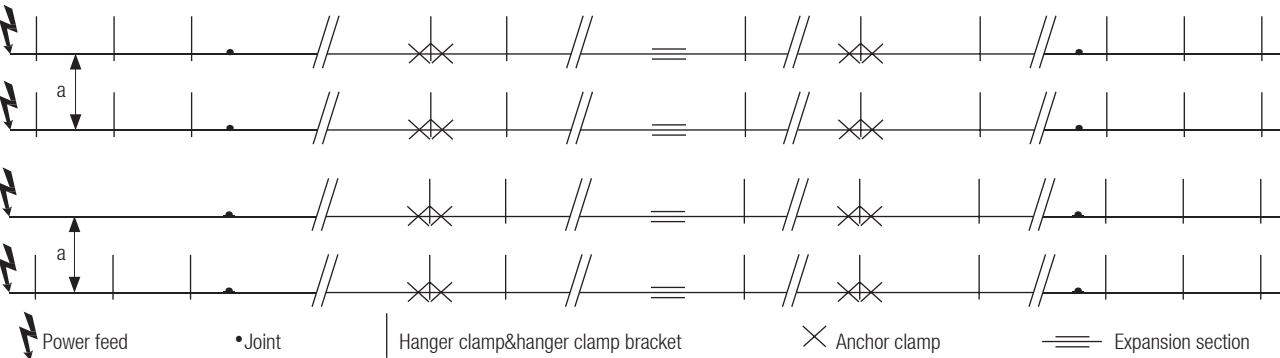
Item	Order No	Description	Unit	Approx. Weight [kg]
1	004070005	Collector Shoe	Pcs.	2.15



System Layout



Layout Schematic and Component Overview

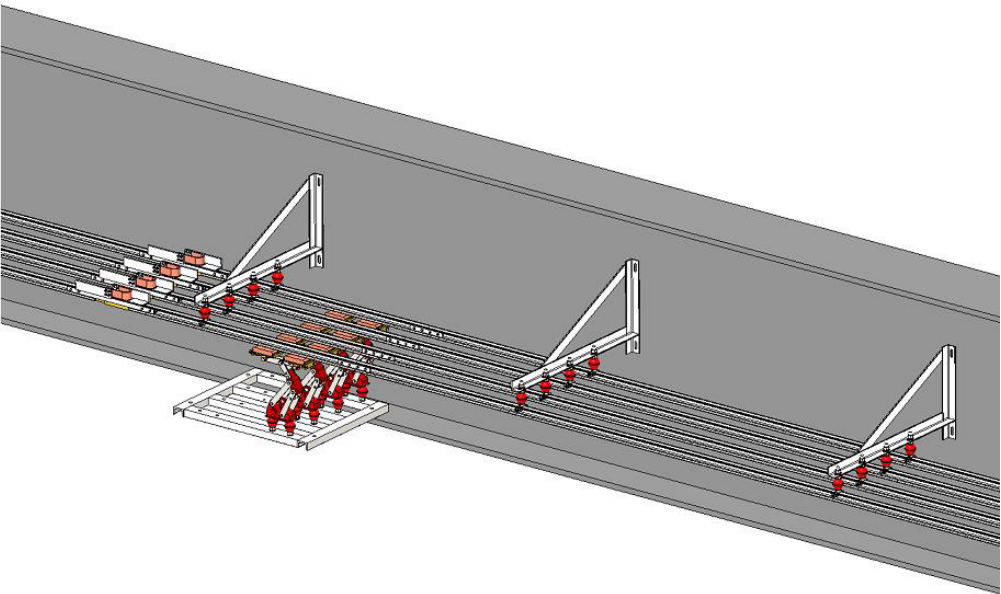


Distance between centers of two conductor rails	Standard voltage arrangement	High voltage arrangement
Minimum distance a [mm]	200	>250*

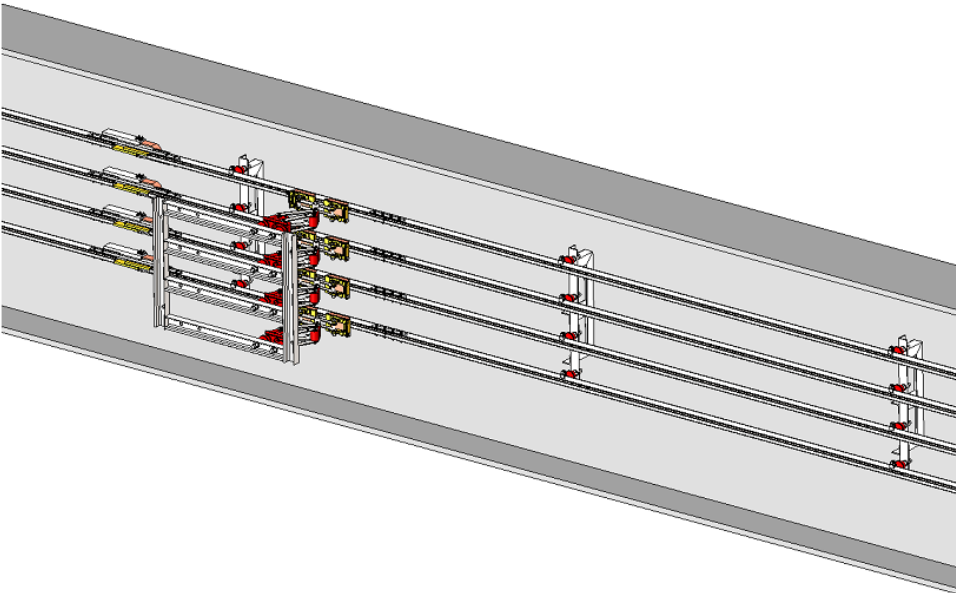
* Consider local regulations
 Example material overview
 Here is a typical crane conductor rail system that is 60 m in total length, with 4 poles, 600 A, with all accessories, current collectors and support arms. The required Bill of Materials is listed below.

Part Description	Order No.	Quantity Needed
Conductor rail 6 m long	004010021	40
Rail Hanger	004040006	124
Anchor	004050003	4
Powerfeed	004030016	4
Splice Joint	004030015	36
Double shoe collector	004070031	4
Hanger bracket	004070025	31
Collector frame	005070006	1

Conductor Rail Orientation

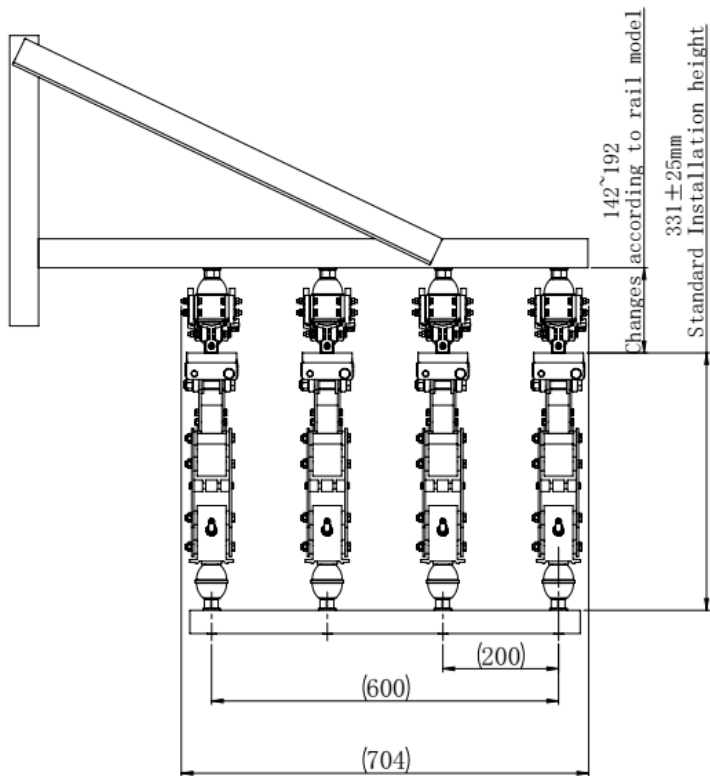


Horizontal installation of conductor rails. Current Collectors contact from the below.



Vertical installation of conductor rails. Current Collectors contact from side.

Current Collector Arrangement/Hanger Distance



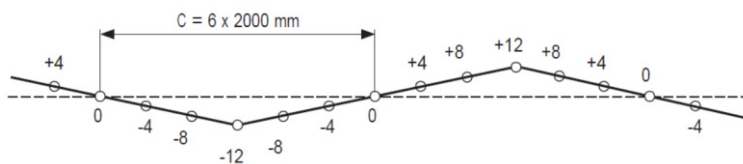
PE can be reduced up to 50% cross section.

Phase distances in accordance with local regulations and voltage levels on-site.

Please note that the center line of the current collector is aligned to the center line of the conductor rail. The distance between collector and conductor rail must be set according to above "standard installation height" and sketches. Please choose phase distances in accordance with local regulations and voltage levels on-site.

Zigzag Layout

We recommend installing the rails in a Zigzag manner to prevent irregular brush wear. Rail offset is ± 12 mm.



Questionnaire

If you would like us to make you an offer, please fill out the following information. If you have any questions, please do not hesitate to contact a sales representative.

System Information

1	Application(Overhead Crane/ AGV) Please be specific.	
2	System length of each phase (NOT total length of 3 phases + earth), please use Sheet 2 for system 2, etc.	
3	Environment (indoor/outdoor/...)/Ambient temperature range(°C)/Relative humidity%/Dusty/Corrosion/others	
4	System voltage(V) Frequency(Hz)	
5	Number of conductor phases	
6	Power feed point and quantity requirement (if not appointed, solution will be calculated based on Voltage drop of 3%)	
7	Power consuming appliance quantity & Power consuming Rated Ampere (A) or Power (kW). Please specify rated amperes or rated power for each appliances.	
8	Max travelling speed (m/min)	
9	Voltage drop requirement (%)	
10	System Continuity (duty %)	
11	Maintenance zone, required or not, if required, length and number of Maintenance Zone	
12	Installation orientation: 1) Rail arranged horizontally and collector contact from below; 2) Rail arranged vertically and collector contact from side; Other orientation, please describe in details.	
13	Curved rails or not	
14	Stationary feeding or not? Will the power consuming device be operating from a stationary position for more than 2 minutes? If so, please define the longest time and current.	
15	Other requirements	

Customer Data

Company:		Customer-No.
Address:		
Phone:		Fax:
E-Mail:		

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