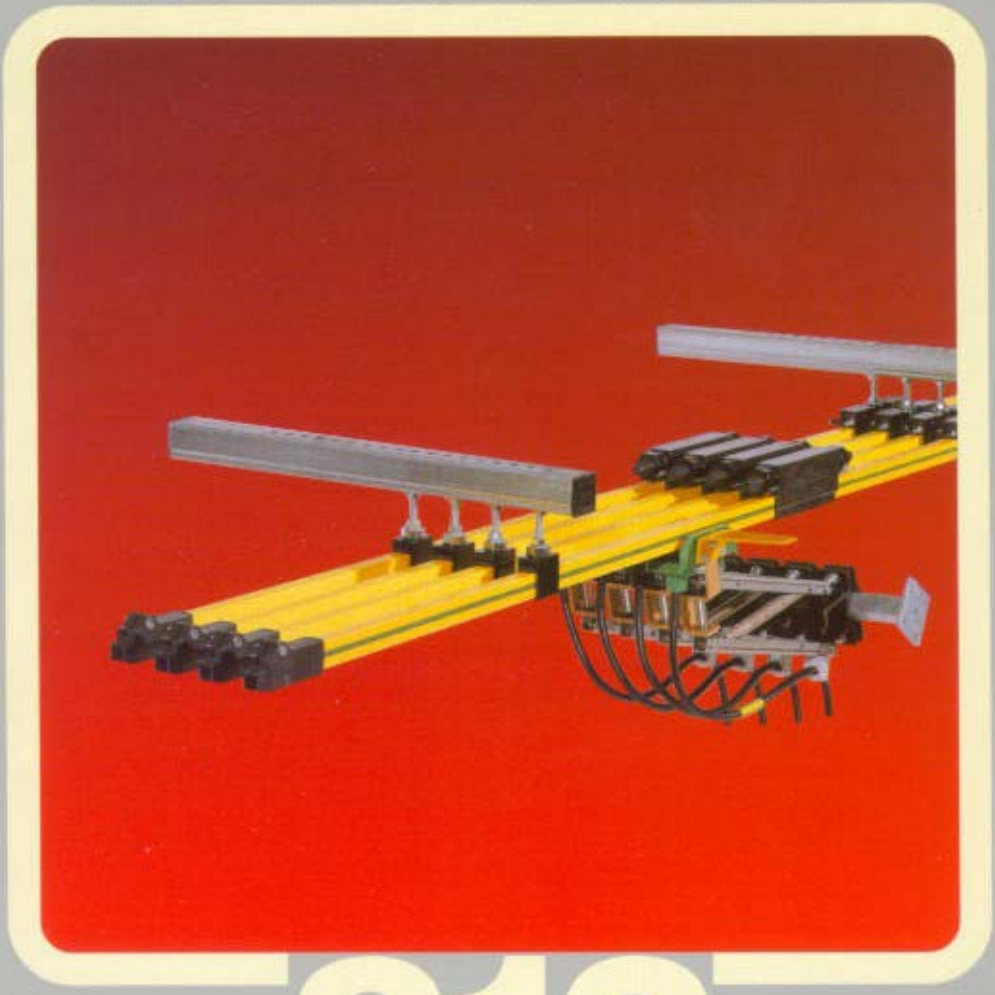
Energy Supply Systems

SINGLE POLE INSULATED CONDUCTOR RAIL



812

25 - 400 amps

wampfler

solutions for a moving world

KAT0812-0001b-E

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Coal loading crane in a steam power station in Stuttgart's Neckarhafen.

DESCRIPTION PROGRAMME 812

The **wampfler** conductor rail system, programme 812, is a modern power supply system using single-pole insulated conductor rails. It complies with the latest regulations and provides the electric energy supply for mobile consumers.

The usual applications of this conductor rail programme are travelling cranes, loading bridges, units for container traffic, people mover systems and special installations. The system 812 is used for installations with a medium energy consumption.

The conductor rail material is copper (250 Amps and 400 Amps nominal current), aluminium (200 Amps and 320 Amps nominal current), steel (80 Amps and 140 Amps nominal current) and stainless steel (25 Amps nominal current). The aluminium conductor rail is provided with a proven and patented stainless steel contact surface. Any numbers of poles can be installed vertically or horizontally, on straight or curved systems.

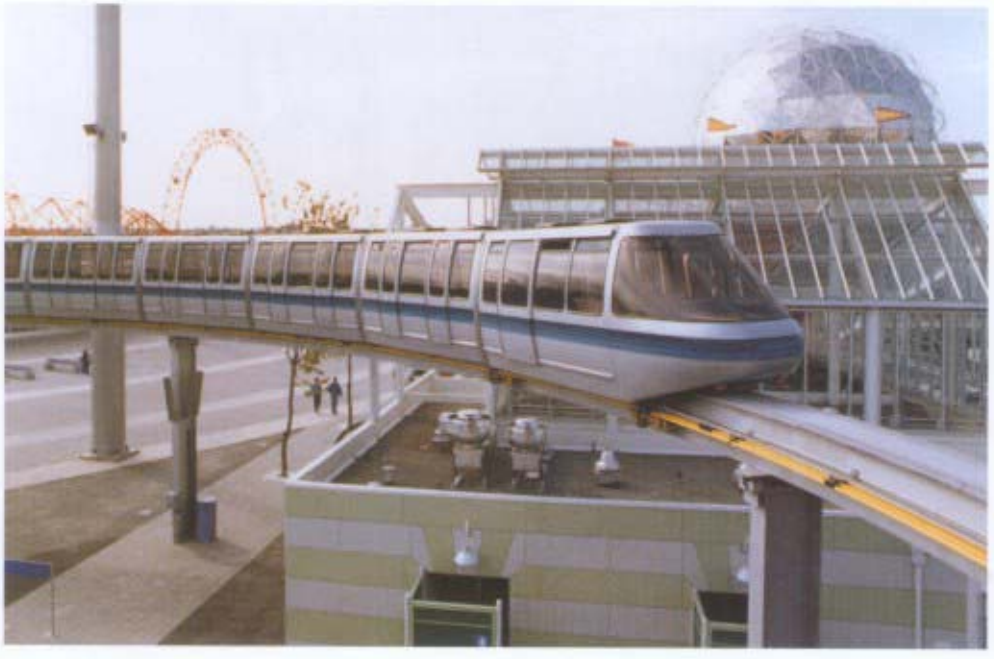
The conductor rail system can be installed indoor or outdoor. For extreme environmental conditions the system can be equipped with a heating system, mushroom insulators or stainless steel components.

Note: In aggressive environmental conditions e.g. galvanizing or pickling plants etc., please forward details so that we can make an offer.

For high temperature conditions, a high temperature insulation cover up to +85° C is available. Generally, the insulation cover is 80 mm shorter than the length of the rail.
The entire conductor rail system is insulated to current Safety Regulations, it is entirely protected against direct contact. The earth insulation cover is marked yellow-green on both sides over the entire length of the rail.

The spring operated insulated collectors can accomodate vertical/horizontal misalignment and are available in single or double versions. Collectors can be supplied for use in vertical or horizontal applications and for discontinous systems. The earth collector is colour identified and not interchangeable with a phase collector.

Installation of the conductor rail system is simple; maintenance is confined to a routine check of the collectors. Collector shoes can be changed quickly and safely.



People mover system operating during the World Fair in Vancouver.

Please answer complete by the questionary – in this catalogue – and attach it to your enquiry.

REGULATIONS

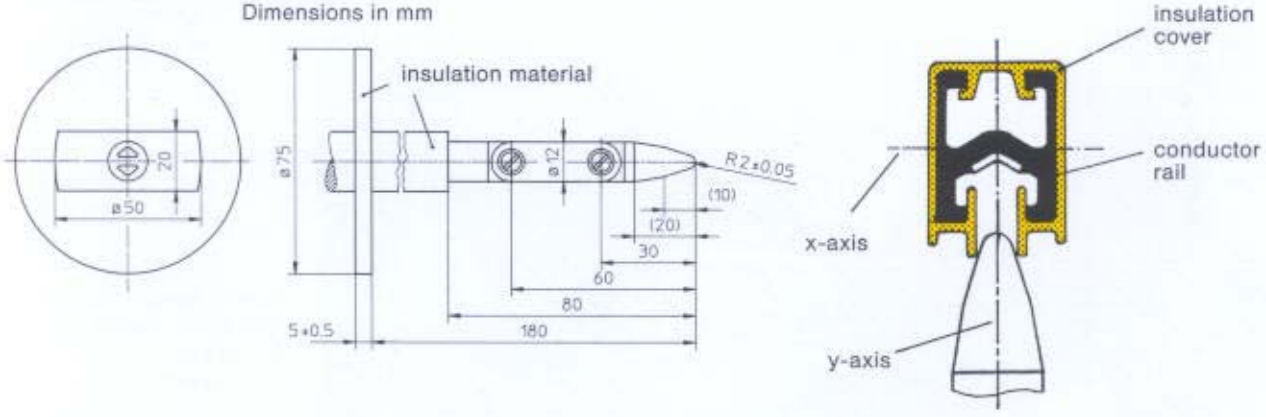
The design of the system is based on the following regulations:

1. Protection against direct contact to DIN 57470 part 1 / VDE 0470 part 1 (IEC-testfinger) and DIN 57100 part 410 5.2.1/5.3 / VDE 0100 part 410 (protection class IP 23 to IEC 529), also DIN/VDE 0100 part 726 / 4.2
2. Protection against accidental interchanging of phase and earth collector to VDE 0100 part 726/ 4.1
3. Current carrying capacity to DIN 43670 and DIN 43671 for coated conductors (insulated conductor rails)
4. Surface creepage distance to VDE 0100 part 726 / 4.4
5. Surface creepage distance VDE 0110 part 1 01.89 table 4

			Standard insulation	High temperature insulation
6.	Surface creepage resistance	DIN 53480/VDE 0303 T1	KC>600 V (CTI)	KC 500 V (CTI)
7.	Dielectric strength	DIN 53481	22,4 kV/mm	50 kV/mm
8.	Surface resistance	DIN 53482	$10^{13}\,\Omega$	$5{,}2 \times 10^{13}\,\Omega$
9.	Specific resistance	DIN 53482	dry $8 \times 10^{15}\,\Omega$ cm wet $2 \times 10^{15}\,\Omega$ cm	dry $1{,}4 \times 10^{14}\,\Omega$ cm
10.	Combustibility of insulation cover to UL 94 at 3 mm a. 1,5 mm thickness		V – 0	V – 0
11.	Chemical resistance	The materials of the conductor rail systems are weather-resisting and have a very good chemical resistance. For special applications please contact us. Use solvents and contact sprays with utmost caution.		

TEST INSTRUMENTS AND PROCEDURES TO DIN 57470 PART 1 / VDE 0470 PART 1

IEC-TESTFINGER



Test of protection against direct contact by IEC-testfinger

Similar or identical regulations are applicable in:

AUS: AS 1939

CH: SEV 3428
SN 411079

F: NF C 20-010
NF EN 60034-5
NF C 51-115

GB: BS 5490

I: CEI 05515 and 09414

NL: NEN 2438
NEN 10034-5

S: SS IEC 529

USA: UL inspection-no. E 99342

The **wampfler**-insulated conductor rail system is entirely safe to International Safety Regulations, even at maximum operating temperature.

TECHNICAL DATA PROGRAMME 812

Conductor rail system		PROGRAMME 812						
Conductor rail		Galvanized Steel		Stainless steel contact insert		Copper		Stainless Steel
Type		081211	081212	081213	081214	081215	081216	081217
Nominal current at 100 % DC and 35° C	[A]	80	140	200	320	250	400	25
D.C. resistance at +35° C	[Ω/m]	0,002184	0,00147	0,000358	0,000282	0,000298	0,000178	0,011636
at +20° C	[Ω/m]	0,002061	0,00138	0,000337	0,000267	0,000278	0,000168	0,011590
Impedance at 50 mm rail spacing and +35° C	[Ω/m]	0,002190	0,00149	0,000377	0,000306	0,000321	0,000217	0,011637
and +20° C	[Ω/m]	0,002060	0,00139	0,000361	0,000297	0,000307	0,000209	0,011600
Moment of Inertia	I_x [cm⁴]	0,232	0,340	0,232	0,307	0,232	0,340	0,232
	I_y [cm⁴]	0,251	0,390	0,281	0,281	0,251	0,390	0,251
Moment of resistance	W_x [cm³]	0,207	0,310	0,240	0,240	0,207	0,310	0,207
	W_y [cm³]	0,322	0,500	0,373	0,373	0,322	0,500	0,322
Voltage grade*	[V]	660 *						
Support spacing	[m]	1,5						
Rail length	[mm]	4000						
Outside dimensions	[mm]	18 x 26						
Travelling speed	[m/min]	600 max.						
Expansion joint		not required up to 200 m installation length						
Permissible ambient temperature		−30° C ... +55° C (Standard insulation) } other temperatures −30° C ... +85° C (high temperature insulation) } on request						
Protection against direct contact		DIN 57470 part 1 / VDE 0470 part 1 and DIN 57100 part 410 5.2.1/5.3 / VDE 0100 part 410 and DIN/VDE 0100 part 726 4.2						
Breakdown voltage		DIN 53481 20,16 kV (Standard insulation cover) 45,00 kV (high temperature insulation cover)						

* If installations are exposed to dirt, high humidity or conductive dust additional insulators have to be used.

Special insulators are available for installations over 1000 V. Please contact us.

Conductor rail system tested for short-circuit strength at the research institute of high voltage and high amperage technology in Mannheim. Test procedure shot with a high-speed camera (3000 pictures/sec.).

Test installation at SIEMENS for the transmission of data and telephone signals.

LAYOUT AND SELECTION

1. NOMINAL CURRENTS AND STARTING CURRENTS OF MOTORS

Table 1

Motor nominal power		Direct current I_N				Three phase current[2]							
		115 V	230 V	400 V	660 V	230 V		400 V		550 V		660 V	
PS	kW	A	A	A	A	A		A		A		A	
						I_N	I_A[1]	I_N	I_A[1]	I_N	I_A[1]	I_N	I_A[1]
1	0,75	9,2	4,6	2,3	1,68	3,4	16,32	1,95	9,36	1,4	7,1	1,12	5,37
1,5	1,10	13,5	6,8	3,37	2,46	4,8	24,0	2,8	14,0	2,1	10,5	1,6	8,0
2	1,50	17,2	8,7	4,4	3,4	6,4	32,5	3,7	18,5	2,8	14,0	2,1	10,5
3	2,20	27,0	13,3	6,7	4,8	9,0	49,5	5,2	28,6	4,0	22,0	3,0	16,5
4	3,0	34	17	8,5	6,3	12,1	76,6	7,0	42,0	5,3	31,8	4,0	24,0
5,5	4,0	45	22	11,0	8,2	15,2	91,2	8,8	52,8	6,7	40,2	5,1	30,6
7,5	5,5	61	30	15,5	11,0	20,2	141,4	11,7	81,9	8,9	62,3	6,7	46,9
10	7,5	82	41	21,0	15,5	27,0	170,1	15,6	98,28	11,9	74,97	9,0	56,7
15	11	120	60	30	21,5	38	247	22	143,0	16,7	108,55	12,6	81,9
20	15	160	81	41	30	50	325	29	188,5	22,0	143,0	16,7	108,5
25	18,5	195	97	49	37	66	423	38	243,2	29,0	185,6	22,0	140,8
30	22	232	116	58	43	78	491	45	288	34	218	26	166,4
40	30	315	155	78	58	104	666	60	384	46	294	35	224,0
50	37	384	190	96	70	124	794	72	460	55	347	41	262,4
60	45	462	230	116	84	150	960	87	557	66	422	50	320
75	55	–	282	140	102	180	–	104	665	79	505	60	384
100	75	–	380	190	139	245	–	142	–	108	–	82	–
125	90	–	–	225	160	290	–	168	–	128	–	97	–
150	110	–	–	277	205	354	–	205	–	156	–	118	–
180	132	–	–	330	254	423	–	245	–	186	–	141	–

I_N = **nominal current** } without regard to the cos φ-values
I_A[1] = **starting current** }

[1] = the starting currents are for standard squirrel-cage motors 1500 r.p.m.
Starting currents for slip ring motors or special-cage motor take manufacturers data.

[2] = For nominal currents of motors with voltages not listed use the manufacturers data or increase/decrease the listed current figure accordingly.

2. CALCULATION OF CURRENT CARRYING CAPACITY OF CONDUCTOR RAILS

2.1 Determination of the total nominal current 'I_{NG}' for the selection of conductor rails

The amperages of the motors marked with 'x' from table 2 must be added to the output data of the installation to obtain the total nominal current 'I_{NG}'

$$\Sigma I_N = I_{NG}$$

Table 2

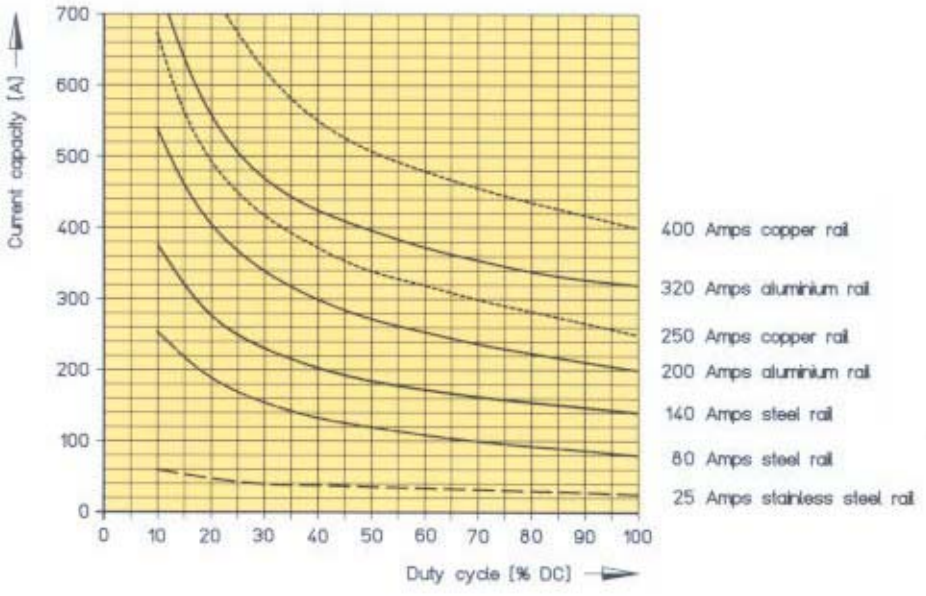
Number of cranes per System	I_N of the largest motor of all cranes I_N*	I_N of the second largest motor of all cranes I_N*	I_N of the third largest motor of all cranes I_N*	I_N of the fourth largest motor of all cranes I_N*
1	×	×		
2	×	×	×	
3	×	×	×	
4	×	×	×	×
5	×	×	×	×
Tandem operation of two cranes	×	×	×	×

* = on dual drives respective 2 · I_N

2.2 Conductor rating in relation to the duty cycle 'DC' at 35 °C ambient temperature

The total nominal current 'I_{NG}' is marked on in diagram 1 corresponding to the **required duty cycle.** The type of conductor rail is selected whose curve is at or above the point marked.
The admissible current capacity '$I_{rail\ perm.\ 35°}$' of the selected conductor rail is taken from diagram 1 and is reduced according to section 2.3 if the temperature is higher than +35° C.

Diagram 1



2.3 Reduction of current carrying capacity by increased ambient temperature

If the ambient temperature is higher than 35° C, the current carrying capacity of the selected conductor rail must be reduced by factor 'f_A' from table 3 to obtain the permissible current carrying capacity for the respective ambient temperature '$I_{rail\ \vartheta\ perm.}$'.

$$I_{rail\ \vartheta\ perm.} = I_{rail\ perm.\ 35°C} \cdot f_A$$

Table 3
Current capacity factors for 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
Standard insulation	Steel rail	f_A	1.0	0.97	0.94	0.91	0.88						
	Aluminium rail		1.0	0.92	0.81	0.76	0.68						
	Copper rail		1.0	0.93	0.87	0.82	0.78						
High temperature insulation	Steel rail	f_A					1.0	0.97	0.94	0.91	0.88	0.85	0.83
	Aluminium rail						1.0	0.92	0.81	0.76	0.68	0.63	0.59
	Copper rail						1.0	0.93	0.87	0.82	0.78	0.74	0.72

The selected conductor rail can be used if the permissible current capacity '$I_{rail\ \vartheta\ perm.}$' of the conductor rail is still equal or bigger than the total nominal current 'I_{NG}' in spite of the reduction by increased ambient temperature.

The selected conductor rail can be used if the following is applicable:

$$I_{rail\ \vartheta\ perm.} \geqq I_{NG}$$

3. DETERMINATION OF THE VOLTAGE DROP 'ΔU'

The voltage drop of the conductor rail is normally between 2,5 % and 5 % U_N. It must be calculated for every installation.

3.1 Determination of the total current 'I_G' for calculation of the voltage drop

To calculate the total current 'I_G' the single starting currents as well as the nominal currents must be added according to table 4.

$$\Sigma I_A \cdot \cos \varphi_A + \Sigma I_N \cdot \cos \varphi_N = I_G$$

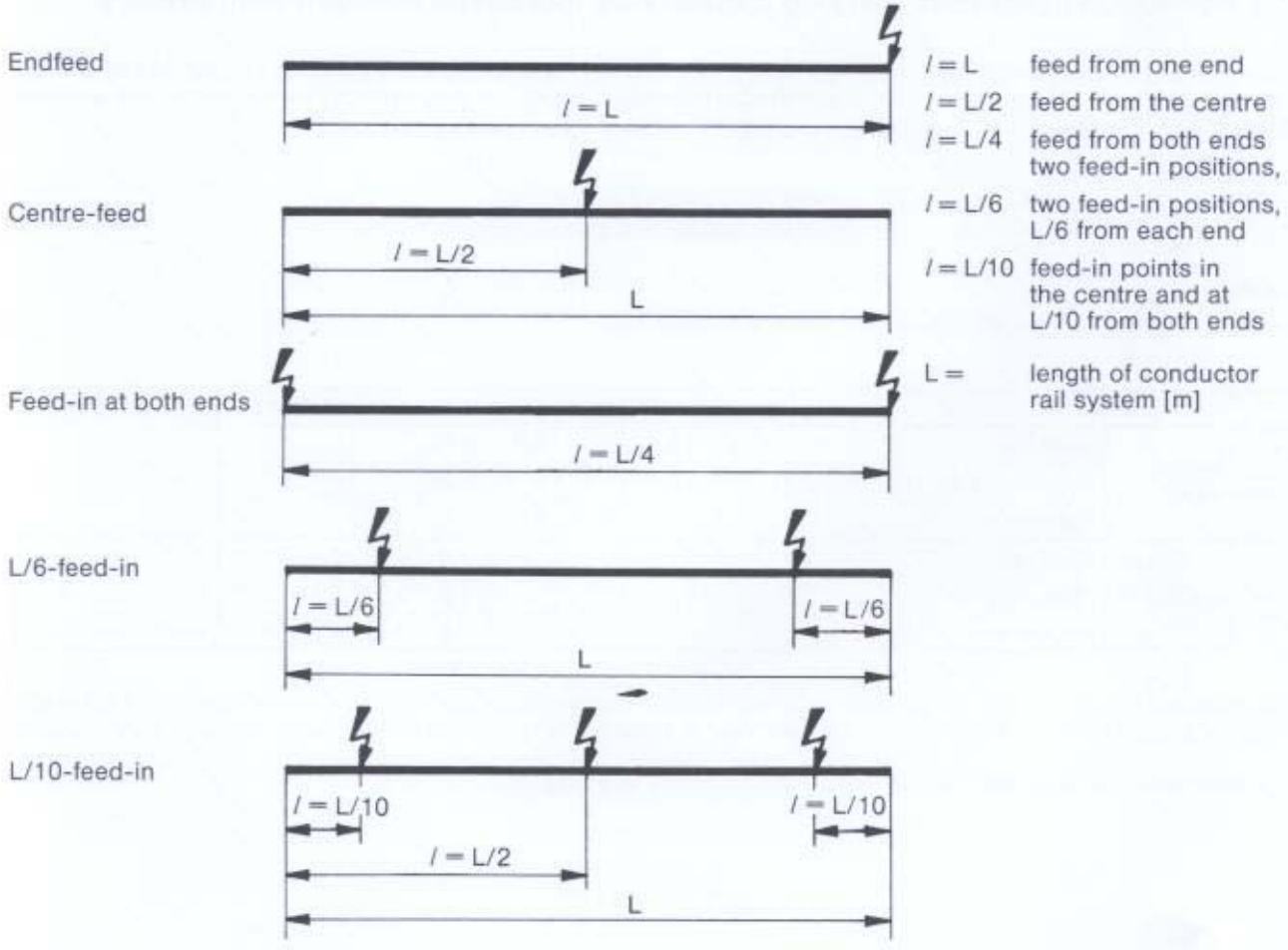
Table 4

Number of cranes	I_A of the largest motor of all cranes	I_A or I_N of the second largest motor of all cranes		I_N of the third largest motor of all cranes	I_N of the fourth largest motor of all cranes
	$I_A^* \cdot \cos \varphi_A$	$I_A^* \cdot \cos \varphi_A$	$I_N^* \cdot \cos \varphi_N$	$I_N^* \cdot \cos \varphi_N$	$I_N^* \cdot \cos \varphi_N$
1	×		×		
2	×		×	×	
3	×	×			
4	×	×		×	
5	×	×		×	×
Tandem operation of two cranes	×	×		×	×

× = this motor (drive) must be considered
* = on dual drives respective 2 · I_A or 2 · I_N

3.2 Selection of feed-in points

The feed-in point for every application must be selected because the length 'l' between power feed and conductor rail end is used for calculating the voltage drop. Following feed-in points can normally be used:



l = L feed from one end
l = L/2 feed from the centre
l = L/4 feed from both ends two feed-in positions,
l = L/6 two feed-in positions, L/6 from each end
l = L/10 feed-in points in the centre and at L/10 from both ends

L = length of conductor rail system [m]

3.3 Voltage drop formulas (ΔU)

If the total current 'I_G' and the length 'l' are determined the values of impedance and resistance can be taken from table 'Technical Data of Programme 812' for the conductor rail selected by calculating the current carrying capacity in section 2. This data is used in the following formulas.

For direct current: $\Delta U_{35°C} = 2 \cdot l \cdot I_G \cdot R$ [V]

For alternating current: $\Delta U_{35°C} = 2 \cdot l \cdot I_G \cdot Z$ [V]

For three phase current: $\Delta U_{35°C} = \sqrt{3} \cdot l \cdot I_G \cdot Z$ [V]

$\Delta U_{35°C}$ = Voltage drop at 35° C [V]
I_G = Total current [A]
R = Resistance of conductor [Ω/m]
Z = Impedance of conductor [Ω/m]
l = feeder length [m]
L = system length [m]

If the voltage drop is to be calculated at an ambient temperature of + 20° C the corresponding values of impedance and resistance can be taken from 'Technical Data Programme 812'.

3.4 Voltage drop rise '$\Delta U\vartheta$' at higher ambient temperature

If the average ambient temperature is higher than + 35° C the voltage drop is to be calculated using the following formulas:

$$\Delta U\vartheta = \frac{\Delta U_{35°C}}{f_v} \quad [V]$$

$$\Delta U\vartheta_{\%} = \frac{\Delta U\vartheta}{U_N} \cdot 100 \quad [\%]$$

$\Delta U\vartheta$ = voltage drop at higher ambient temperatures than + 35° C [V]
$\Delta U\vartheta_{\%}$ = voltage drop at higher ambient temperatures than + 35° C [%]
U_N = nominal voltage [V]
f_v = correction factor

To determine the factor 'f_v' first the operating temperature 'ϑ_{OT}' must be calculated.

$$\vartheta_{OT} = \vartheta_{AT} + \Delta\vartheta_{CH} \triangleq \vartheta_{AT} + 30 \ [°C]$$

ϑ_{OT} = operating temperature [°C]
ϑ_{AT} = ambient temperature [°C]
$\Delta\vartheta_{CH}$ = temperature increase by current heating [°C]
(is to be used constantly + 30° C)

The factor 'f_v' must be taken from table 5 according to the operating temperature and the selected conductor rail.

Table 5

Correction factors 'f_v' for the voltage drop 'ΔU' at different ambient temperatures

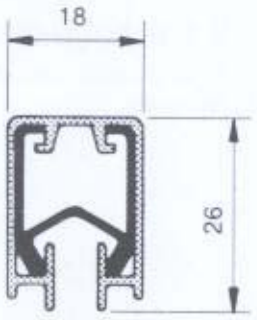
Ambient temperature				35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C	75°C	80°C	85°C
Operating temperature				65°C	70°C	75°C	80°C	85°C	90°C	95°C	100°C	105°C	110°C	115°C
Standard insulation	Steel rail	80 A	f_v	0.898	0.884	0.869	0.855	0.842						
	Steel rail	140 A		0.899	0.884	0.870	0.856	0.842						
	Aluminium rail	200 A		0.916	0.904	0.891	0.879	0.868						
	Aluminium rail	320 A		0.921	0.909	0.897	0.886	0.875						
	Copper rail	250 A		0.912	0.899	0.887	0.874	0.862						
	Copper rail	400 A		0.927	0.916	0.905	0.894	0.883						
	Stainless steel rail	25 A		0.993	0.991	0.990	0.989	0.988						
High temperature insulation	Steel rail	80 A	f_v					0.842	0.828	0.816	0.804	0.791	0.780	0.768
	Steel rail	140 A						0.842	0.829	0.817	0.805	0.793	0.781	0.770
	Aluminium rail	200 A						0.868	0.856	0.845	0.834	0.824	0.813	0.803
	Aluminium rail	320 A						0.875	0.864	0.853	0.843	0.833	0.822	0.813
	Copper rail	250 A						0.862	0.850	0.838	0.827	0.816	0.805	0.795
	Copper rail	400 A						0.883	0.873	0.863	0.853	0.843	0.833	0.824
	Stainless steel rail	25 A						0.988	0.986	0.986	0.985	0.984	0.982	0.981

If the voltage drop is too high the number of power feeds must be increased or a larger type of conductor rail must be selected.

PARTS OF THE CONDUCTOR RAIL SYSTEM

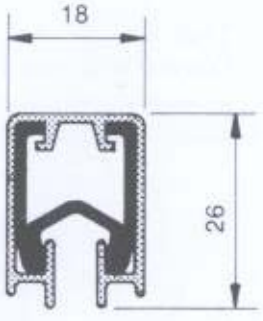
INSULATED CONDUCTOR RAILS

STEEL RAIL
zinc galvanized, with insulation cover
standard length 4 m
other lengths on request



Steel Rail 081211
80 Amps

Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Steel Rail with **standard insulation**	081211-4x11	081211-4x12	4	2,500
Steel Rail with **high temperature insulation**	081211-4x21	081211-4x22	4	2,500



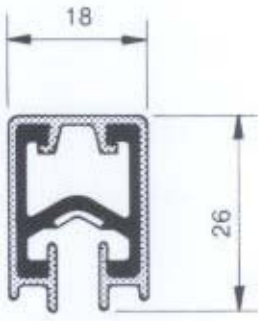
Steel Rail 081212
140 Amps

Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Steel Rail with **standard insulation**	081212-4x11	081212-4x12	4	3,750
Steel Rail with **high temperature insulation**	081212-4x21	081212-4x22	4	3,750

The earth insulation cover is marked **yellow-green** on both sides.

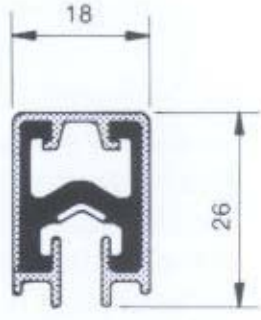
Standard insulation suitable from **−30° C to +55° C** ambient temperature } other temperatures
High temperature insulation suitable from **−30° C to +85° C** ambient temperature } on request

ALUMINIUM RAIL
sea water resistant, with stainless steel sliding strip and insulation cover
standard length 4 m
other lengths on request



Aluminium Rail 081213
200 Amps

Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Aluminium Rail with **standard insulation**	081213-4x11	081213-4x12	4	1,700
Aluminium Rail with **high temperature insulation**	081213-4x21	081213-4x22	4	1,700



Aluminium Rail 081214
320 Amps

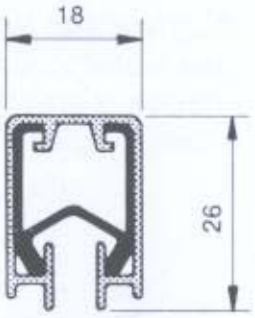
Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Aluminium Rail with **standard insulation**	081214-4x11	081214-4x12	4	1,800
Aluminium Rail with **high temperature insulation**	081214-4x21	081214-4x22	4	1,800

The earth insulation cover is marked **yellow-green** on both sides.

Standard insulation suitable from **−30° C to +55° C** ambient temperature } other temperatures
High temperature insulation suitable from **−30° C to +85° C** ambient temperature } on request

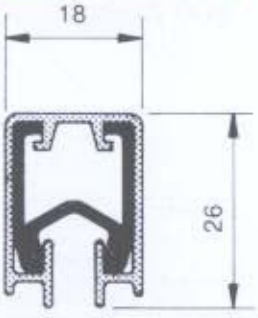
On long travel installations using aluminium rails for ship loaders or unloaders, grabbing cranes, handling bulk systems etc. or machinery which is operating for long periods in a stationary position under full load the current collector should be rated at 50% of the specified continuous current rating. Please ask for further information.

COPPER RAIL
with insulation cover
Standard length 4 m
other lengths on request



Copper Rail 081215
250 Amps

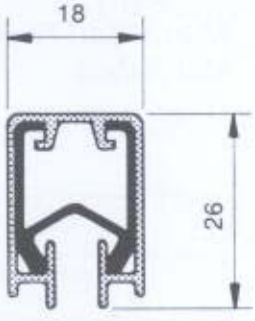
Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Copper Rail with **standard insulation**	081215 – 4 x 11	081215 – 4 x 12	4	2,700
Copper Rail with **high temperature insulation**	081215 – 4 x 21	081215 – 4 x 22	4	2,700



Copper Rail 081216
400 Amps

Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Copper Rail with **standard insulation**	081216 – 4 x 11	081216 – 4 x 12	4	4,100
Copper Rail with **high temperature insulation**	081216 – 4 x 21	081216 – 4 x 22	4	4,100

STAINLESS STEEL RAIL
with insulation cover
standard length 4 m
to be used in aggressive environmental conditions
e.g. galvanizing and pickling plants etc.



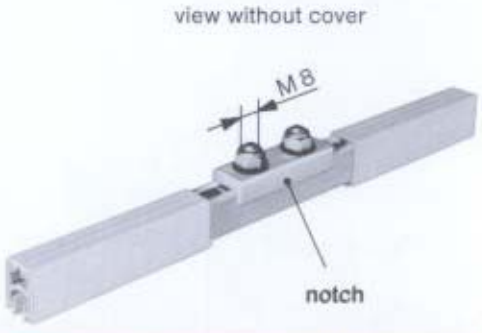
Stainless Steel Rail 081217
25 Amps

Type	Order-no phase conductor	Order-no earth conductor	Length [m]	Weight [kg]
Stainless Steel Rail with **standard insulation**	081217 – 4 x 11	081217 – 4 x 12	4	2,500
Stainless Steel Rail with **high temperature insulation**	081217 – 4 x 21	081217 – 4 x 22	4	2,500

The earth insulation cover is marked **yellow-green** on both sides.

Standard insulation suitable from **−30° C to +55° C** ambient temperature } other temperatures
High temperature insulation suitable from **−30° C to +85° C** ambient temperature } on request

RAIL CONNECTOR 081221



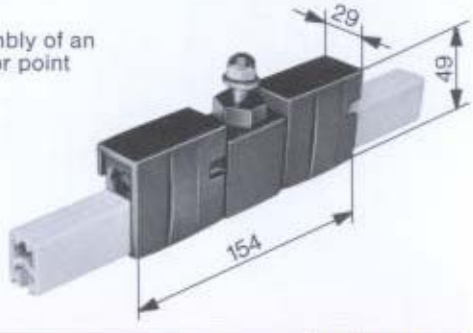
Type	Order-no hardware galvanized	Order-no hardware stainless steel	Weight [kg]
Rail Connector for steel and aluminium rail	081221 – 2	081221 – 4	0,140
Rail Connector for copper rail	081221 – 3	081221 – 5	0,150
Rail Connector for stainless steel rail	– – –	081221 – 6	0,180

Installation hint:

The rail connector joins adjacent conductor lengths. To guarantee proper current transfer at the joint all contact surfaces should be cleaned and covered with a thin layer of **wampfler** conductive grease. The conductor rails are pushed into the connector and centrally positioned using the notch in the connector. By tightening the screws both conductor rail sections are joined together **(screw tightening torque: hardware galvanized Md = max. 11.3 Nm / hardware stainless steel Md = max. 9.75 Nm).** Now the insulation covers which are always 80 mm shorter than the conductor rail profile are pushed towards the connector. Both halves of the connector cover are fitted to the rail and snapped together enclosing the rail joint. The joint is now protected against direct contact. Both halves of the connector cover can also be secured by self tapping screws through the external lugs.

ANCHOR CLAMP 081231

assembly of an anchor point



Type	Order-no hardware galvanized	Order-no hardware stainless steel	Weight [kg]
Anchor Clamp	081231 – 1	081231 – 2	0,050

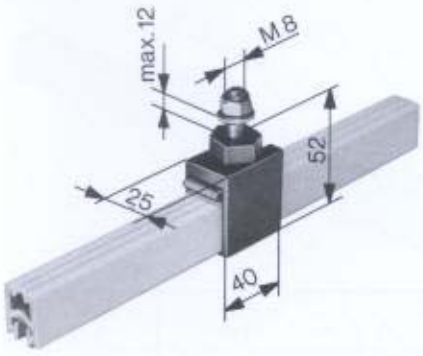
For each anchor point two anchor clamps have to be ordered!

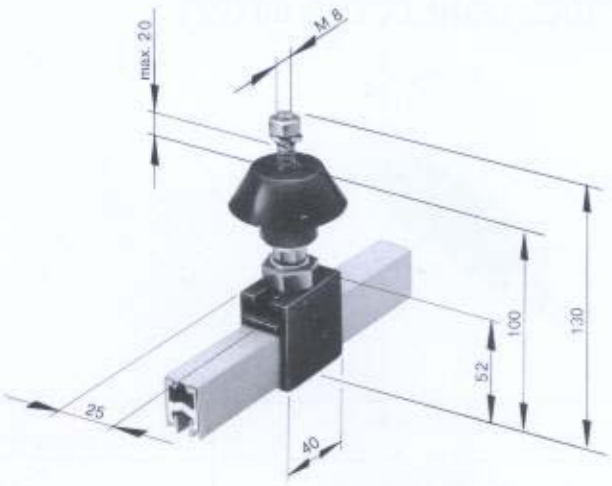
To guarantee the expansion of the rail in a predetermined direction the conductor rail must be fixed at one point. The anchor point should preferably be at the centre of the system. Installations of more than 200 m length have anchor points installed as diagram 3 (see section 'expansion joint').

Installation hint:

For each anchor point two anchor clamps must be fitted on either side of a hanger clamp. The anchor clamp is pushed on to the conductor rail section. By fully tightening the screws the anchor clamp is wedged onto the insulation cover and conductor rail. The fixing strips of the clamping wedges can be cut off after assembly.

HANGER CLAMP 081241
with steel nut



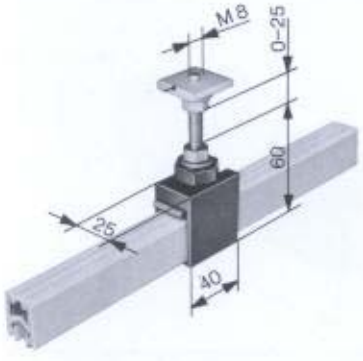


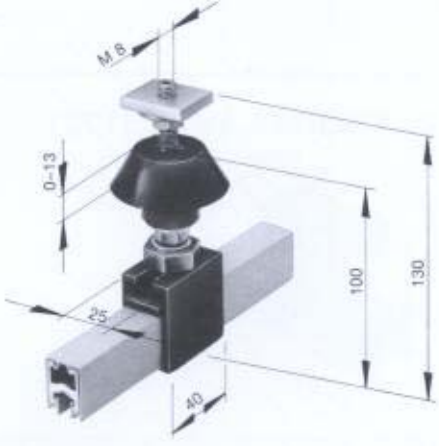
Type	Order-no hardware galvanized	Order-no hardware stainless steel	Weight [kg]
Insulated Hanger Clamp without insulator	081241 – 01	081241 – 02	0,050
Insulated Hanger Clamp with insulator*	081241 – 11	081241 – 12	0,115

* Please note the application conditions in chapter 'insulators'.

Installation hint:
The hanger clamps are fitted to **wampfler** or purpose made support brackets. Suspension distance 1.5 m. The nuts are tightened to a **torque of Md = max. 8 Nm**. Please note that the hanger clamp remains turnable. The conductor rails are clipped into the hanger clamps.

HANGER CLAMP 081243
for C-rail support arm





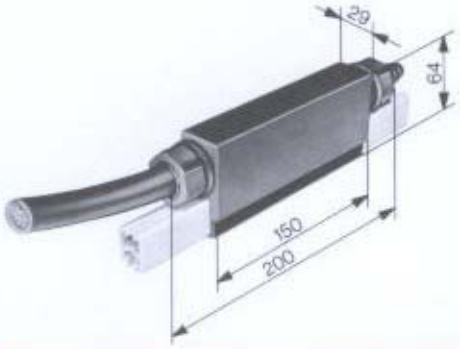
Type	Order-no hardware galvanized	Order-no hardware stainless steel	Weight [kg]
Insulated Hanger Clamp without insulator	081243 – 01	081243 – 02	0,095
Insulated Hanger Clamp with insulator*	081243 – 11	081243 – 12	0,160

* Please note the application conditions in chapter 'insulators'.

This hanger clamp is used for C-rail support arm installation. The hanger clamp can be adjusted in height and positioned at any point along the support arm.

Installation hint: see hanger clamp 081241

POWER FEED 081251



Cable lugs to be ordered separately

Max. cable diameter 17,5 mm.

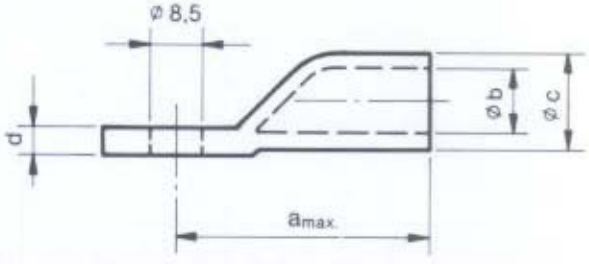
Type	Order-no hardware galvanized	hardware stainless steel	Weight [kg]
Power Feed for steel and aluminium rail	081251 – 2	081251 – 4	0,210
Power Feed for copper rail	081251 – 3	081251 – 5	0,220
Power Feed for stainless steel rail	– – –	081251 – 6	0,250

Installation hint:

The power supply is connected to the rail by the power feed. The power feed can be installed within a conductor rail section or at any rail joint. It should be installed as near as possible to the source of the incoming power. If a power feed is required within a conductor rail section, the insulation cover must be separated and 40 mm cut off on either side. Please note that a space of 200 mm must be available between power feed and hanger clamp for the expansion of the conductor rail due to temperature variation. To guarantee proper current transfer the contact surfaces should be cleaned and covered with a thin layer of **wampfler** conductive grease.
The power feed clamp is pushed into the rail. The supply cables are connected to the power feed clamp bolt and by tightening these bolts the power feed clamp is fastened to the rail electrically/mechanically **(torque: hardware galvanized Md = max. 11.3 Nm / hardware stainless steel Md = max. 9.75 Nm).** Both halves of the power feed cover are hooked to the rail in such a way that the internal snap lock of the cover is positioned between the bolts. The cover halves are clipped together and are joined with the cable sleeves and nuts already fitted on to the cables. If the power feed is used at a rail joint follow the procedure detailed for the rail connectors.

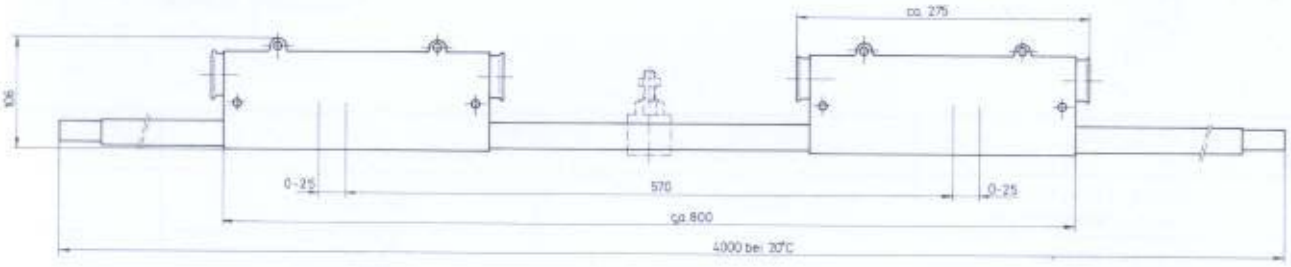
CABLE LUG 080051
for feeder cable

material: copper, tinned



Type	Order-no	Cross section [mm²]	a [mm]	b [mm]	c [mm]	d [mm]	Weight kg/1000
Cable Lug	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

EXPANSION JOINT 081261 4 m long
for conductor rail installations over 200 m length



On installations with expansion joints double current collectors should be used.

Expansion Joint with **standard insulation**	Order-no phase conductor hardware galvanized	phase conductor hardware stainless steel	earth conductor hardware galvanized	earth conductor hardware stainless steel	Weight [kg]
for steel rail 80 – 140 A	081261 – 4 x 1111	– – –	081261 – 4 x 1112	– – –	4,600
for aluminium rail 200 – 320 A	081261 – 4 x 1121	081261 – 4 x 2121	081261 – 4 x 1122	081261 – 4 x 2122	2,900
for copper rail 250 – 400 A	081261 – 4 x 1131	081261 – 4 x 2131	081261 – 4 x 1132	081261 – 4 x 2132	4,800
for stainless steel rail 25 A	081261 – 4 x 1141	081261 – 4 x 2141	081261 – 4 x 1142	081261 – 4 x 2142	3,600

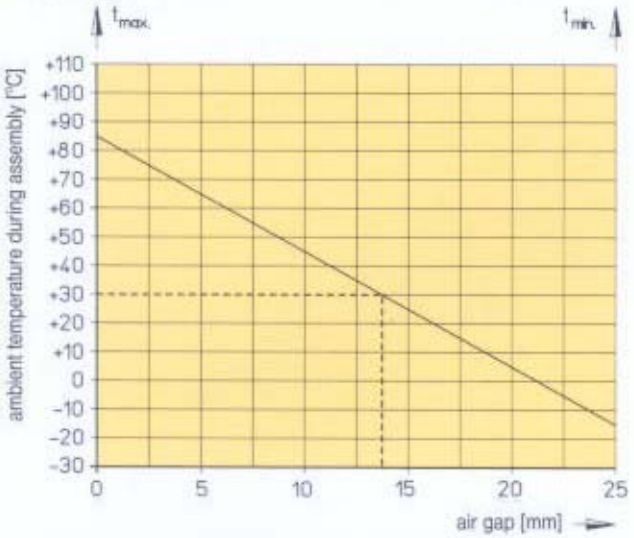
Expansion Joint with **high temperature insulation**	Order-no phase conductor hardware galvanized	phase conductor hardware stainless steel	earth conductor hardware galvanized	earth conductor hardware stainless steel	Weight [kg]
for steel rail 80 – 140 A	081261 – 4 x 1211	– – –	081261 – 4 x 1212	– – –	4,600
for aluminium rail 200 – 320 A	081261 – 4 x 1221	081261 – 4 x 2221	081261 – 4 x 1222	081261 – 4 x 2222	2,900
for copper rail 250 – 400 A	081261 – 4 x 1231	081261 – 4 x 2231	081261 – 4 x 1232	081261 – 4 x 2232	4,800
for stainless steel rail 25 A	081261 – 4 x 1241	081261 – 4 x 2241	081261 – 4 x 1242	081261 – 4 x 2242	3,600

Installation hint:
The expansion section unit is supplied fully assembled in a 4 m length. With the exception of the rail connector installation no extra work is required on site. Please note, however, that the two air gaps in the expansion joint must be adjusted as per diagram 2 corresponding to the ambient temperature during assembly. The air gaps must be rechecked after fitting the anchor clamps.

AIR GAP ALLOWANCE ON EXPANSION JOINTS

Both air gaps in an expansion joint must be identical

Diagram 2



Instructions:

t_{min} = lowest temperature that occurs in the application area.

t_{max} = highest operational temperature that occurs in the application area.

1. Draw a line from t_{min} to t_{max}.
2. Mark the ambient temperature during operation horizontally.
3. Draw a line from the intersection vertically down and read the air gap to be set.

Example:

Temperature range from −15° C to +85° C
Ambient temperature during assembly: +30° C
Air gap: 14 mm

NUMBER OF EXPANSION JOINTS ON INSTALLATIONS OVER 200 m LENGTH

Expansion joints are installed at certain distances on conductor rail installations over 200 m in length (see diagram 3). On complicated installations with curves, special systems and installations with anchor points at their ends, special distances must be used. Please consult factory.

Table 6

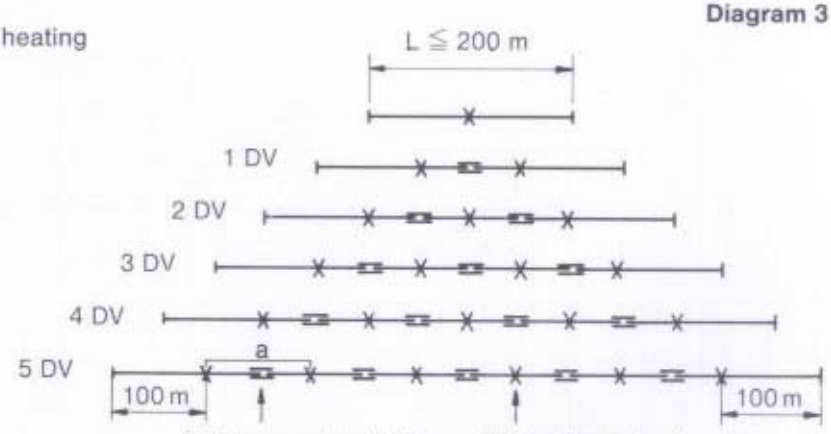
Number of expansion joints		1			2			3			4			5			Intermediate length a		
Material		St	Al	Cu	St	Al	Cu	St	Al	Cu	St	Al	Cu	St	Al	Cu	St	Al	Cu
		Total length of conductor rail installation [m]																	
$\Delta t_{ges.}$	10	400	400	400	600	600	600	800	800	800	1000	1000	1000	1200	1200	1200	200	200	200
	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	52	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	228	242	320	256	284	380	284	326	440	312	368	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	296	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

$\Delta t_{ges.} = \Delta tU + \Delta t_{sw}$

ΔtU = ambient temperature range
Δt_{sw} = temperature rise due to current heating

standard value for Δt_{sw}:
10° C up to 40 % duty cycle
20° C up to 65 % duty cycle
30° C up to 100 % duty cycle

Diagram 3



DV (expansion joint) FP (anchor clamp)
a (intermediate length for an expansion joint)
L (total length of conductor rail installation)

For longer installations than shown in our table:

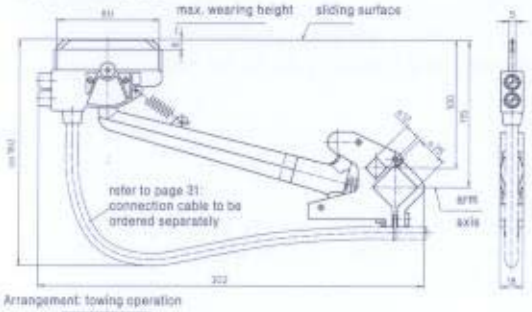
$\frac{L - 200}{a}$ = number of expansion joints

CURRENT COLLECTORS

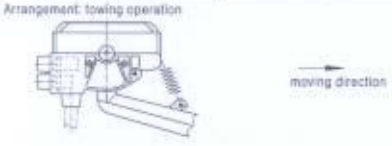
CURRENT COLLECTOR 80 AMPS

Arrangement: reversing operation
081209-012...081209-022
081209-013...081209-023
081209-112...081209-122
081209-113...081209-123

Arrangement: reversing operation



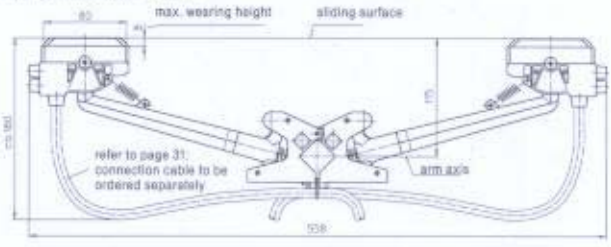
Arrangement: towing operation



DOUBLE CURRENT COLLECTOR 160 AMPS

Arrangement: reversing operation
081209-2x012...081209-2x022
081209-2x013...081209-2x023
081209-2x112...081209-2x122
081209-2x113...081209-2x123

Arrangement: reversing operation



For vertical operation only;
for horizontal operation on request.

TECHNICAL DATA:

Max. current load for straight and curved installations (bending radius > 1800 mm)	– 80 Amps (for aluminium rails in stationary position at 100 % DC: 40 Amps)	Max. current load for straight and curved installations (bending radius > 1800 mm)	– 160 Amps (for aluminium rails in stationary position at 100 % DC: 80 Amps)

Max. travelling speed	– 600 m/min; for higher speeds please consult factory
Contact pressure	– 10 N
Lateral movement	– ± 50 mm
Movement in direction of contact	– ± 50 mm
Connecting cable	– 6, 10 or 16 mm², 1,5 m long, highly flexible; longer cables on request (to be ordered separately; see page 31)
Distance between towing arm axis and conductor rail sliding surface	– 115 mm

Installation hint:

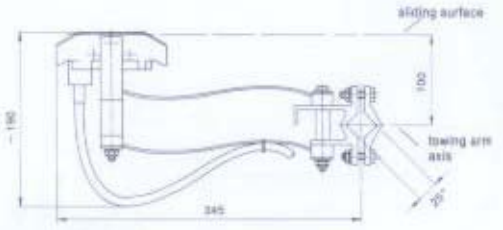
Please note that the centre line of the current collectors corresponds to the centre line of the conductor rail. The distance between towing arm and conductor rail must be set according to the dimensions shown (see installation examples).

The connecting cables must be highly flexible to guarantee full operational flexibility and must be fixed with the cable holder so that no tensional stress can be transmitted to the collector head.

Execution	Operation	Order-no. phase	earth	Weight [kg]	Order-no. phase	earth	Weight [kg]
		80 Amps			160 Amps		
Galvanized	Reversing	081209-012	081209-022	0,300	081209-2x012	081209-2x022	0,520
	Towing	081209-013	081209-023	0,300	081209-2x013	081209-2x023	0,520
Stainless steel	Reversing	081209-112	081209-122	0,300	081209-2x112	081209-2x122	0,520
	Towing	081209-113	081209-123	0,300	081209-2x113	081209-2x123	0,520

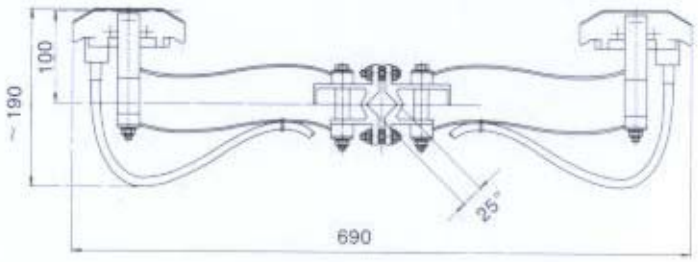
CURRENT COLLECTOR 100 AMPS

Spring arm typ
081201 – 01 ... 081204 – 01
081201 – 11 ... 081204 – 11
081201 – 02 ... 081204 – 02
081201 – 12 ... 081204 – 12



DOUBLE CURRENT COLLECTOR 200 AMPS

Spring arm type
081201 – 2x01 ... 081204 – 2x01
081201 – 2x11 ... 081204 – 2x11
081201 – 2x02 ... 081204 – 2x02
081201 – 2x12 ... 081204 – 2x12



TECHNICAL DATA:

Max. current load for straight and curved installations (bending radius > 1800 mm)	– 100 Amps (for aluminium rails in stationary position at 100 % DC: 50 Amps)	Max. current load for straight and curved installations (bending radius > 1800 mm)	– 200 Amps (for aluminium rails in stationary position at 100 % DC: 100 Amps)
Max. current load for curved installations (bending radius from 1000 mm – 1800 mm)	– 40 Amps; with special collector shoe 081001-15 (for aluminium rails in stationary position at 100 % DC: 20 Amps)	Max. current load for curved installations (bending radius from 1000 mm – 1800 mm)	– 80 Amps; with special collector shoe 081001-15 (for aluminium rails in stationary position at 100 % DC: 40 Amps)

Max. travelling speed	– 600 m/min; for higher speeds please consult factory
Contact pressure	– 20 N
Lateral movement	– ± 100 mm
Movement in direction of contact	– ± 25 mm
Connecting cable	– 16 mm², 1 m long, highly flexible; longer cables on request
Distance between towing arm axis and conductor rail sliding surface	– 100 mm

Installation hint:

Please note that the centre line of the current collectors corresponds to the centre line of the conductor rail. The distance between towing arm and conductor rail must be set according to the dimensions shown (see installation examples).

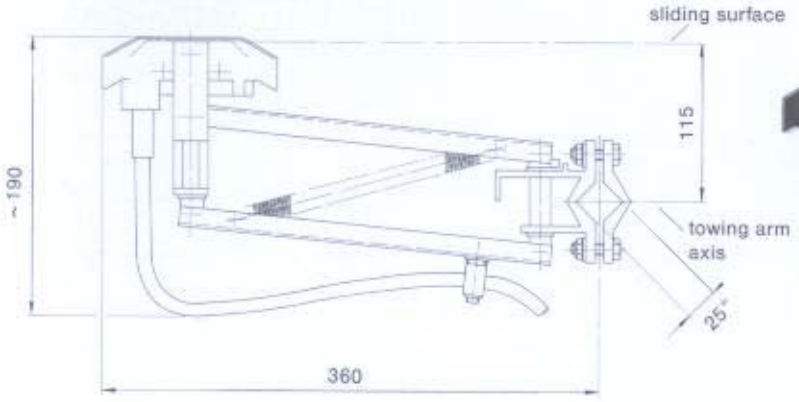
The connecting cables must be highly flexible to guarantee full operational flexibility and must be fixed with the cable holder so that no tensional stress can be transmitted to the collector head.

Type	Order-no.				Weight [kg]	Order-no.				Weight [kg]
	phase conductor		earth conductor			phase conductor		earth conductor		
	hardware galvanized	hardware stainless steel	hardware galvanized	hardware stainless steel		hardware galvanized	hardware stainless steel	hardware galvanized	hardware stainless steel	
	100 Amps					200 Amps				
Current collector vertical operation	081201-01	081201-11	081201-02	081201-12	0,800	081201-2x01	081201-2x11	81201-2x02	081201-2x12	1,600
Current collector vertical operation for transfer points*	081202-01	081202-11	081202-02	081202-12	0,850	081202-2x01	081202-2x11	81202-2x02	081202-2x12	1,700
Current collector horizontal operation	081203-01	081203-11	081203-02	081203-12	0,900	081203-2x01	081203-2x11	81203-2x02	081203-2x12	1,800
Current collector horizontal operation for transfer points*	081204-01	081204-11	081204-02	081204-12	0,950	081204-2x01	081204-2x11	81204-2x02	081204-2x12	1,900

* Current collectors for transfer points are used if the conductor rail system is separated by interlocks, crossing beams etc. These current collectors are equipped with a self-centering device. For these applications pick-up guides have to be used.

CURRENT COLLECTORS 100 AMPS
Parallel arm type

081205 – 01 ... 081208 – 01
081205 – 11 ... 081208 – 11
081205 – 02 ... 081208 – 02
081205 – 12 ... 081208 – 12



TECHNICAL DATA:

Max. current load for straight and curved installations (bending radius > 1800 mm)	– 100 Amps (for aluminium rails in staitionary position at 100 % DC: 50 Amps)
Max. current load for curved installations (bending radius from 1000 mm – 1800 mm)	– 40 Amps (with special collector shoe 081001 – 15) (for aluminium rails in stationary position at 100 % DC: 20 Amps)
Max. travelling speed	– 600 m/min; for higher speeds please consult factory
Contact pressure	– 20 N
Lateral movement	– ± 100 mm
Movement in direction of contact	– **± 50 mm**
Connecting cable	– 16 mm², 1 m long, highly flexible; longer cables on request
Distance between towing arm axis and conductor rail sliding surface	– **115 mm**

Installation hint:

Please note that the centre line of the current collectors corresponds to the centre line of the conductor rail. The distance between towing arm and conductor rail must be set according to the dimensions shown (see installation examples).

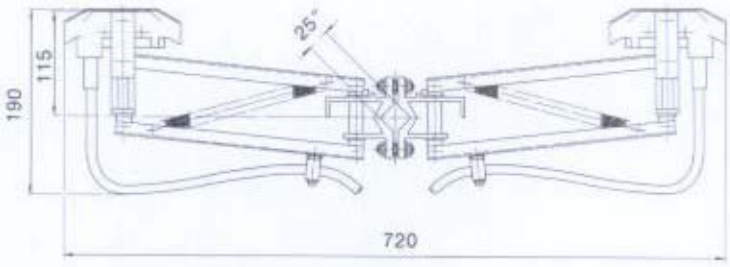
The connecting cables must be highly flexible to guarantee full operational flexibility and must be fixed with the cable clamp so that no tensional stress can be transmitted to the collector head.

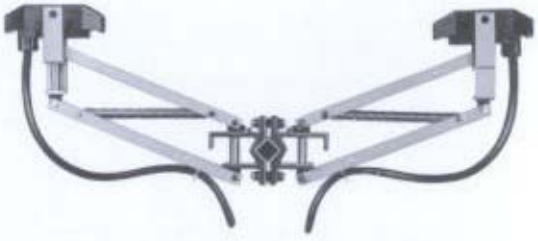
Type	Order-no phase conductor hardware galvanized	phase conductor hardware stainless steel	earth conductor hardware galvanized	earth conductor hardware stainless steel	Weight [kg]
Current Collector 100 Amps vertical operation	081205 – 01	081205 – 11	081205 – 02	081205 – 12	1,150
Current Collector 100 Amps vertical operation for transfer points*	081206 – 01	081206 – 11	081206 – 02	081206 – 12	1,260
Current Collector 100 Amps horizontal operation	081207 – 01	081207 – 11	081207 – 02	081207 – 12	1,185
Current Collector 100 Amps horizontal operation for transfer points*	081208 – 01	081208 – 11	081208 – 02	081208 – 12	1,265

* Current collectors for transfer points are used if the conductor rail system is separated by interlocks, crossing beams etc. These current collectors are equipped with a self-centering device. For these applications pick-up guides have to be used.

DOUBLE CURRENT COLLECTOR 200 AMPS
Parallel arm type

081205 – 2 x 01 ... 081208 – 2 x 01
081205 – 2 x 11 ... 081208 – 2 x 11
081205 – 2 x 02 ... 081208 – 2 x 02
081205 – 2 x 12 ... 081208 – 2 x 12





TECHNICAL DATA:

Max. current load for straight and curved installations (bending radius > 1800 mm)	– 200 Amps (for aluminium rails in stationary position at 100 % DC: 100 Amps)
Max. current load for curved installations (bending radius from 1000 mm – 1800 mm)	– 80 Amps (with special collector shoe 081001 – 15) (for aluminium rails in stationary position at 100 % DC: 40 Amps)
Max. travelling speed	– 600 m/min; for higher speeds please consult factory
Contact pressure	– 20 N
Lateral movement	– ± 100 mm
Movement in direction of contact	– **± 50 mm**
Connecting cable	– 16 mm², 1 m long, highly flexible; longer cables on request
Distance between towing arm axis and conductor rail sliding surface	– **115 mm**

Installation hint:

Please note that the centre line of the current collectors corresponds to the centre line of the conductor rail. The distance between towing arm and conductor rail must be set according to the dimensions shown (see installation examples).

The connecting cables must be highly flexible to guarantee full operational flexibility and must be fixed with the cable clamp so that no tensional stress can be transmitted to the collector head.

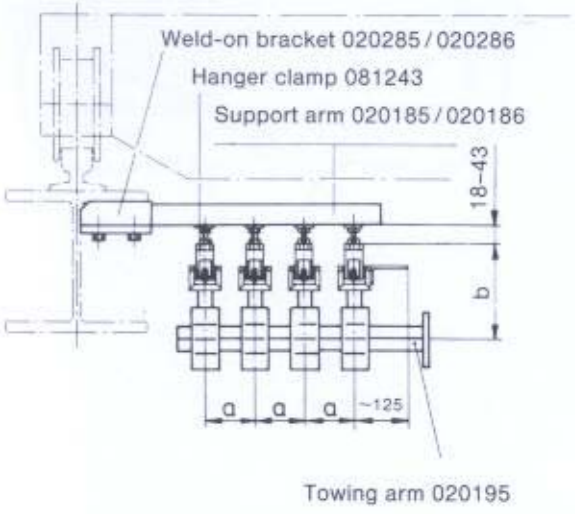
Type	Order-no phase conductor hardware galvanized	phase conductor hardware stainless steel	earth conductor hardware galvanized	earth conductor hardware stainless steel	Weight [kg]
Current Collector 200 Amps vertical operation	081205 – 2 x 01	081205 – 2 x 11	081205 – 2 x 02	081205 – 2 x 12	2,300
Current Collector 200 Amps vertical operation for transfer points*	081206 – 2 x 01	081206 – 2 x 11	081206 – 2 x 02	081206 – 2 x 12	2,520
Current Collector 200 Amps horizontal operation	081207 – 2 x 01	081207 – 2 x 11	081207 – 2 x 02	081207 – 2 x 12	2,370
Current Collector 200 Amps horizontal operation for transfer points*	081208 – 2 x 01	081208 – 2 x 11	081208 – 2 x 02	081208 – 2 x 12	2,530

* Current collectors for transfer points are used if the conductor rail system is separated by interlocks, crossing beams etc. These current collectors are equipped with a self-centering device. For these applications pick-up guides have to be used.

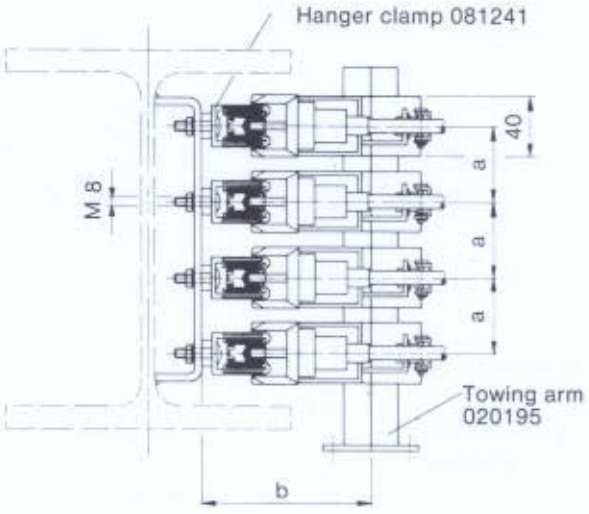
INSTALLATION EXAMPLES

STANDARD INSTALLATION OF CURRENT COLLECTORS

Vertical operation of current collectors

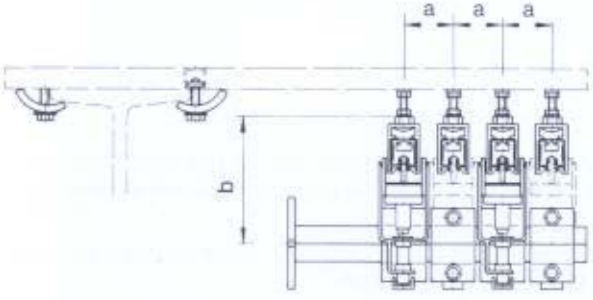


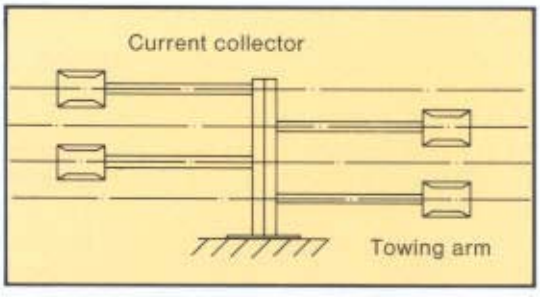
Horizontal operation of current collectors



STAGGERED INSTALLATION OF CURRENT COLLECTORS

Horizontal and vertical operation of current collectors





For installations **without transfer points** the current collectors for vertical and horizontal operation can be staggered. In this way the centre distance between two conductor rails is reduced by 10 mm. If current collectors are installed staggered please note that the minimum distance a = 40 mm must be followed at any point of the system and the current collectors are perfectly guided parallely to the conductor rails.

Centre distance between two conductor rails	Standard spacing of current collectors	Staggered spacing of current collectors	Spacing of current collectors for systems with pick-up guides multipole*
Minimum distance a [mm]	50	40	50

Current collector	b [mm]	Movement in direction of contact [mm]
Spring arm type	135	± 25
Parallel arm type	150	± 50

* see installation hint for pick-up guides

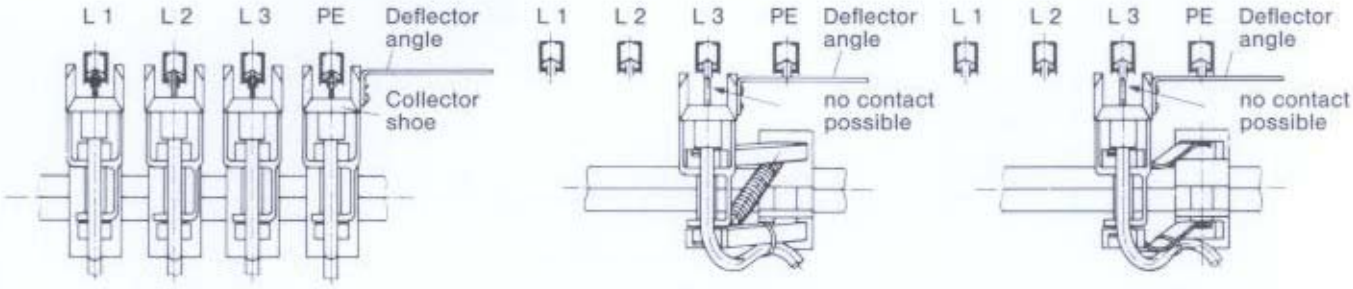
Installation hint:

Please note that the centre line of the current collector is mounted to the centre line of the conductor rail. The distance between towing arm and conductor rail must be set according to the dimension indicated in above table and sketches.

NON-INTERCHANGEABILITY OF EARTH COLLECTOR

To comply with some specifications earth collectors must be protected against accidental interchanging with phase collectors.

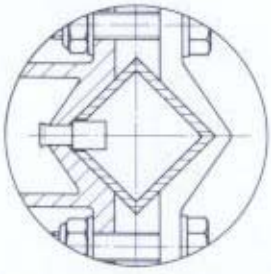
MOUNTING OF EARTH COLLECTOR FOR SYSTEMS WITHOUT PICK-UP GUIDES



sketch 1 sketch 2 sketch 3

The earth conductor (with deflector angle) can only be mounted on the outside. The deflector plate prevents the earth collector being fitted onto a phase conductor.

MOUNTING OF EARTH COLLECTOR FOR SYSTEMS WITH PICK-UP GUIDES



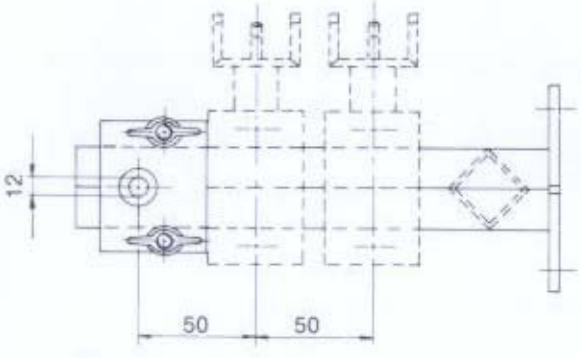
On systems with pick-up guides it is impossible to pass through the pick-up guides with a standard earth collector fitted with deflector angle. Therefore an earth collector for transfer points with a weld-on plug on its mounting bracket is used. The position of the earth collector is fixed by fitting the weld-on plug in a hole which is drilled in the towing arm using the drilling device.

DRILLING DEVICE 08 – W100 – 0206

On systems with pick-up guides a hole has to be drilled in the towing arm 020195 with the drilling device 08 – W100 – 0206 to hold the weld-on plug.

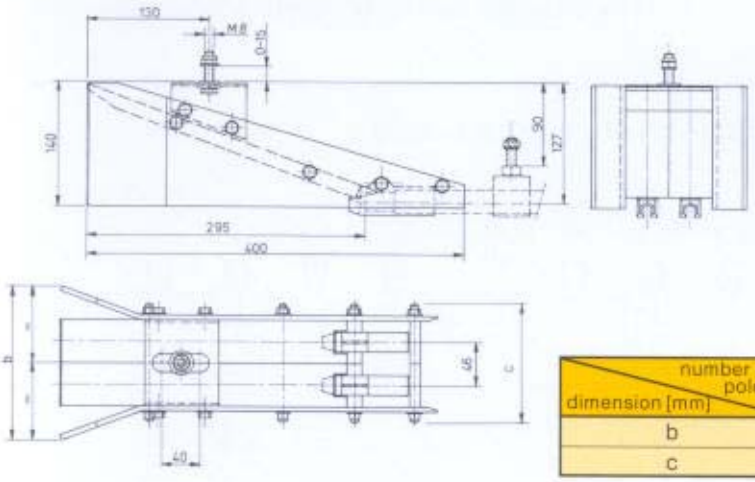
Installation hint:

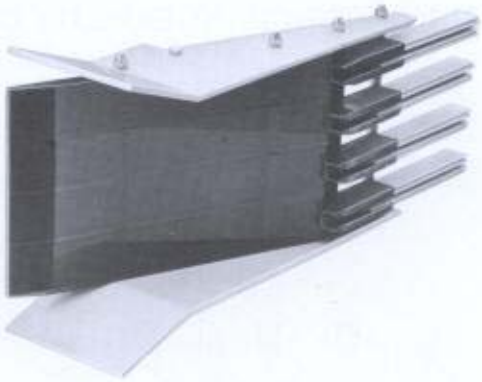
The required phase collectors are lined up on the towing arm 020195. The centre line of the current collectors corresponds to the centre line of the conductor rails. The outer phase collector is the stop for the drilling device. The bushes of the drilling device must point outwards. In this position the centre distance is 50 mm.



Type	Order-no	Weight [kg]
Drilling Device	08 – W100 – 0206	0,700

PICK-UP GUIDE 081281 for transfer points





dimension [mm] \ number of poles	1	2	3	4	5	6	8
b	120	166	212	258	304	350	442
c	78	124	170	216	262	308	400

The pick-up guide compensates for ± 25 mm vertical / horizontal misalignment.

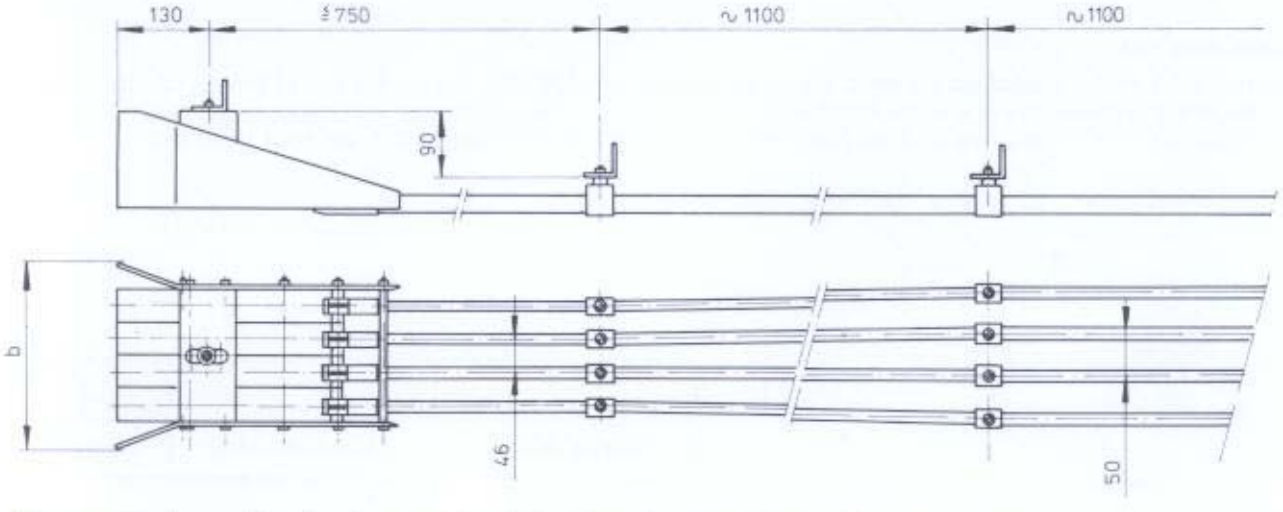
For systems with pick-up guides a respective number of current collectors must be installed at a distance which guarantees that sufficient collectors are engaged for the respective current requirement.
The user has to ensure that the current collectors which are disengaged between pick-up guides must be de-energised and protected against accidental contact.

Type	Order-no hardware galvanized	Order-no hardware stainless steel	Weight [kg]
Pick-up Guide 1-pole	081281 - 11	081281 - 12	0,850
Pick-up Guide 2-pole	081281 - 21	081281 - 22	1,200
Pick-up Guide 3-pole	081281 - 31	081281 - 32	1,550
Pick-up Guide 4-pole	081281 - 41	081281 - 42	1,900
Pick-up Guide 5-pole	081281 - 51	081281 - 52	2,250
Pick-up Guide 6-pole	081281 - 61	081281 - 62	2,600
Pick-up Guide 8-pole	081281 - 81	–	2,950

Installation hint:

The centre to centre distance between two conductor rails is normally 50 mm. It must be reduced to 46 mm by the hanger clamps next to the pick-up guide to guarantee a proper engagement of the current collectors. The pick-up guide is supplied with end caps. The end caps are pushed on the conductor rails to their end stop with gentle hammer blows. Then the clamping screw is tightened.

SUPPORT SPACING FOR INSTALLATIONS WITH PICK-UP GUIDES

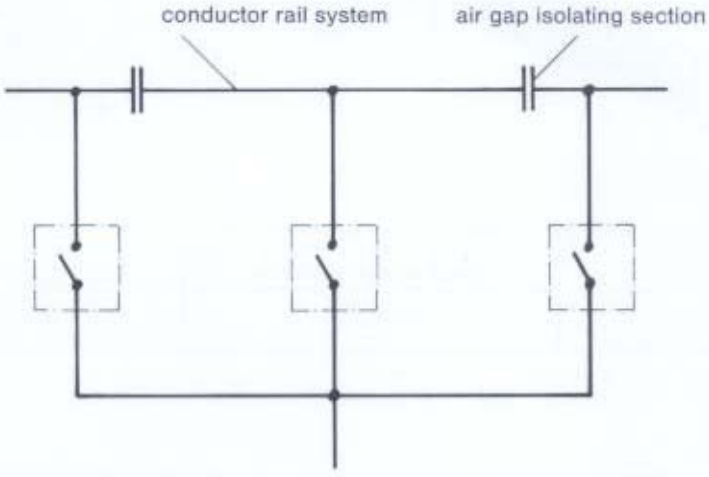


Please note: the earth collector mounting instructions for installations with pick-up guides.

AIR GAP ISOLATING SECTION
for isolation of conductor rails

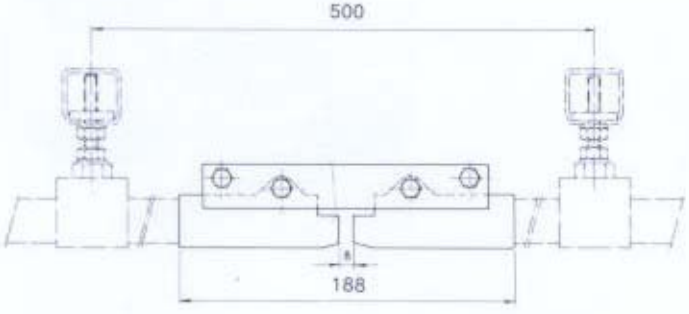
Air gap isolating sections are required if parts of the system or individual rails are to be de-energized within a conductor rail system. To prevent a voltage bridging by current collectors two air gap isolating sections should be installed.

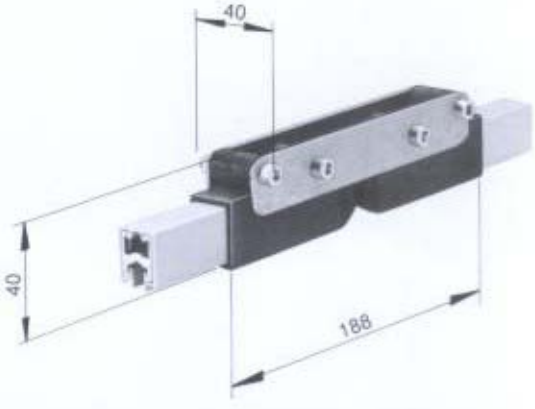
Example:



On installations with air gap isolating sections double current collectors should be used.

AIR GAP ISOLATING SECTION 081294





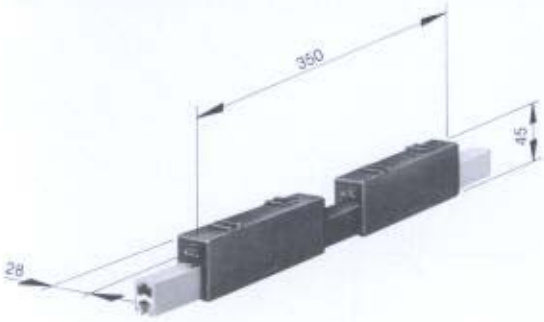
Type	Order-no		Weight [kg]
	hardware galvanized	hardware stainless steel	
Air Gap Isolating Section	081294 - 1	081294 - 2	0,500

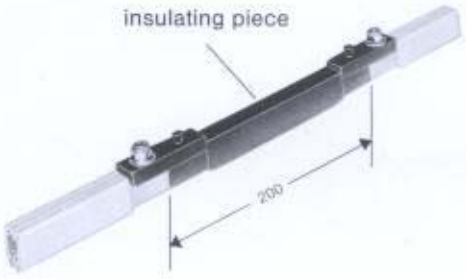
Installation hint:

To guarantee proper current transfer by the current collectors the rail ends must be aligned. The end caps of the air gap isolating section are pushed on the conductor rails to their end stops by gentle hammer blows. The lateral support plates are screwed together with the end caps so that they are braced with the rail at the same time. Two additional hanger clamps (see sketch) should be installed for each air gap isolating section. These are ordered separately.

INSULATING SECTION 081296

view without cover



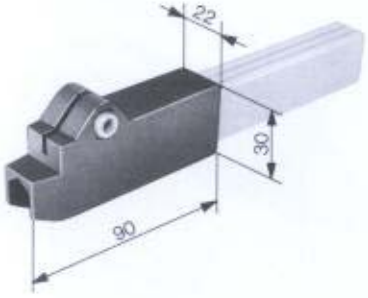


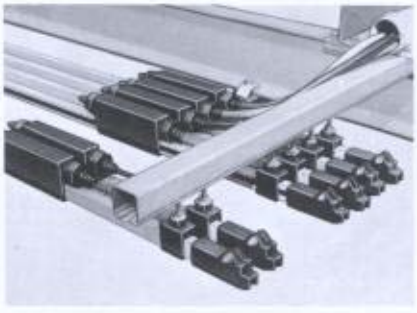
Type	Order-no hardware galvanized	hardware stainless steel	Weight [kg]
Insulating Section	081296 – 1	081296 – 2	0,300

Installation hint:

The insulating section is fitted to the conductor rail system to interrupt the electric circuit and form dead zones. Insulating sections can be installed instead of rail connectors or at any point within the rail section. The rail ends are clamped by the insulating piece and the joint covers are mounted as described in section 'rail connector 081221'.

END CAP 081271





The end caps are used for the protection of rail ends, as transfer caps for systems running through switches, for interlocks and on air gap separating points.

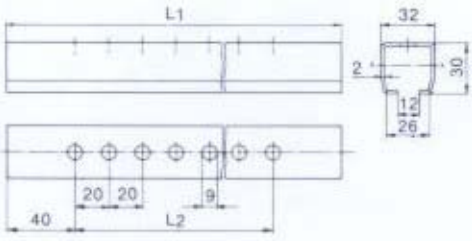
Type	Order-no hardware galvanized	hardware stainless steel	Weight [kg]
End Cap	081271 – 1	081271 – 2	0,040

Installation hint:

Before mounting the end cap the rail end has to be deburred. The end cap is pushed on to the conductor rail to its end stop with gentle hammer blows. The clamping screw is tightened until the plastic pieces meet. Please note that on transfer points the lateral and vertical misalignment between the end caps is less than 2 mm and the air gap between adjacent end caps is smaller than 10 mm.

ACCESSORIES

SUPPORT ARM 020185



PERMISSIBLE LOADING

Static values:
$I_x = 2{,}11\ cm^4$
$W_x = 1{,}36\ cm^3$

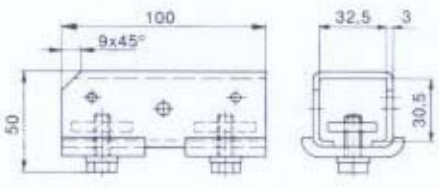
	l [m]							
	0,25	0,32	0,40	0,50	0,63	0,80	1,00	1,25
F [daN]*	76,0	59,5	47,5	38,0	30,0	24,0	19,0	15,2
f [cm]	0,08	0,13	0,20	0,32	0,50	0,80	1,25	2,23

* Calculated with $\sigma = 140\ N/mm^2$ tension
f = corresponding max. deflection

Type	Order-no	L_1 [mm]	L_2 [mm]	Weight [kg]
Support Arm	020185 – 0250	250	200	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
	020185 – 0800	800	340	1,245
	020185 – 1000	1000	340	1,550
	020185 – 1250	1250	340	1,945

Material:
steel, zinc galvanized

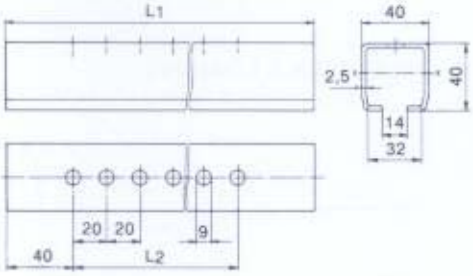
WELD-ON BRACKET 020285
for support arm 020185



Type	Order-no	Weight [kg]
Weld-on Bracket	020285	0,420

Material: bracket – steel, plain
counter plate – steel, galv.
hardware – steel, galv.

SUPPORT ARM 020186



PERMISSIBLE LOADING

Static values:
$I_x = 6{,}05\ cm^4$
$W_x = 2{,}94\ cm^3$

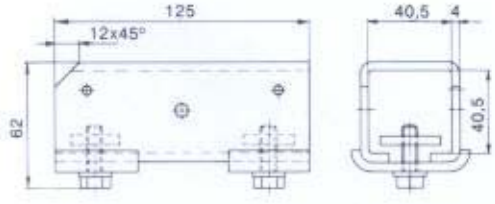
	l [m]							
	0,25	0,32	0,40	0,50	0,63	0,80	1,00	1,25
F [daN] *	164,5	128,5	103,0	82,5	65,5	51,3	41,0	32,9
f [cm]	0,06	0,10	0,16	0,25	0,40	0,63	1,07	1,68

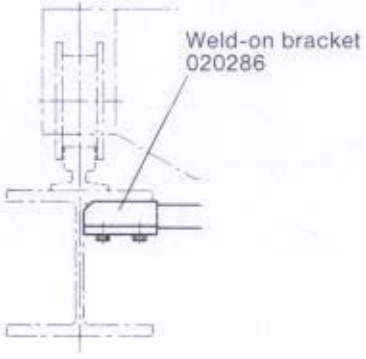
* Calculated with $\sigma = 140\ N/mm^2$ tension
f = corresponding max. deflection

Type	Order-no	L_1 [mm]	L_2 [mm]	Weight [kg]
Support Arm	020186 – 0250	250	200	0,625
	020186 – 0315	315	260	0,800
	020186 – 0400	400	340	1,000
	020186 – 0500	500	340	1,250
	020186 – 0630	630	340	1,575
	020186 – 0800	800	340	2,000
	020186 – 1000	1000	340	2,500
	020186 – 1250	1250	340	3,125

Material:
steel, zinc galvanized

WELD-ON BRACKET 020286
for support arm 020186

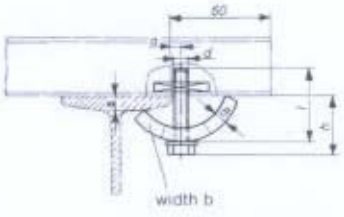




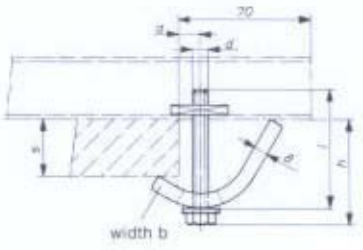
Type	Order-no	Weight [kg]
Weld-on Bracket	020286	0,730

Material: bracket – steel, plain
counter plate – steel, galv.
hardware – steel, galv.

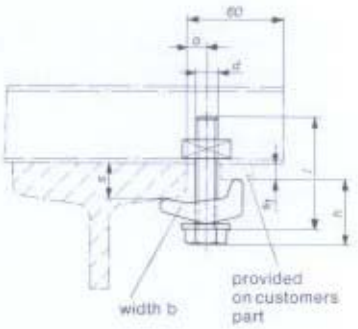
GIRDER CLIP 020180



020180 – 08



020180 – 08 x 36

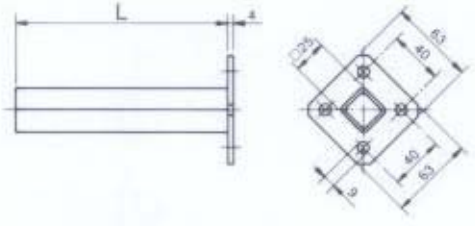


020180 – 10
020180 – 12

Type	Order-no	Clamping range range s [mm]	d	l [mm]	installation high h [mm]	b [mm]	a [mm]	s_1 [mm]	Weight [kg]
Girder Clip	020180 – 08	4 – 20	M 8	50	31 – 40	30	6	–	0,150
	020180 – 08 x 36	18 – 36	M 8	65	42 – 60	30	6	–	0,220
	020180 – 10	6 – 11 11 – 16 16 – 21	M 10	50	35 – 41 41 – 46 46 – 51	32	8	– 5 10	0,170
	020180 – 12	6 – 14 14 – 22 22 – 30	M 12	60	39 – 47 47 – 55 55 – 63	38	10	– 8 16	0,240

Material: steel, galvanized

TOWING ARM 020195
for current collector



Material: steel, zinc galvanized

Type	Order-no	L [mm]	Weight [kg]
Towing Arm	020195 – 400	400	0,600
	020195 – 630	630	1,000

INSULATORS

INSULATORS FOR VOLTAGES UP TO 1000 V
for indoor and outdoor installations

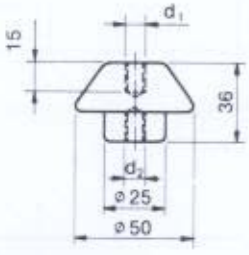
Surface leakage path	62 mm
Surface leakage resistance	KC: 575 V (CTI)
Breaking strength	> 350 daN
Ambient temperature	– 30° C up to + 85° C

Application

These insulators are used for installations with operating voltages up to 1000 V ⎓, in salt laden atmospheres and in extremely dirty conditions, where there is high humidity or conductive dust.

Please consult us for special types used under extreme chemical, higher temperatures or different mounting conditions as well as for voltages over 1000 V.

INSULATOR 080401
with threaded inserts on both sides



Type	Order-no	d_1	d_2	Weight [kg/1000]
Insulator	080401 – 08 x 08	M 8	M 8	90,000

INSULATOR 080402 and 080403
with one stud and one threaded insert

Type	Order-no		d_1	d_2	l_1 [mm]	Weight [kg/1000]
	hardware galvanized	hardware stainless steel				
Insulator	080402 – 830 x 08	080403 – 830 x 08	M 8	M 8	30	98,000

BENDING DEVICE 081010

front side
with bending unit

back side
with cutting unit

Type	Order-no	Weight [kg]
Bending Device	081010	20,000

All the conductor rails of programme 812 can be bent vertically / horizontally by the bending device 081010 to a minimum bending radius of 2000 mm.

To fabricate bends the bundle of spring steel strips is to fill the conductor rail profile.

When a bending device is ordered steel strips and instructions are supplied.

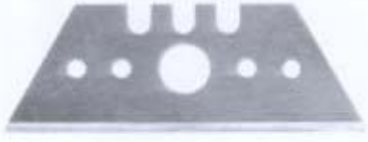
Reordering spring steel strips:

SPRING STEEL INSERT 081011 complete
for all conductor rails programme 812

Type	Order-no	Weight [kg]
Spring Steel Insert	081011	5,000

Reordering cutting blades:

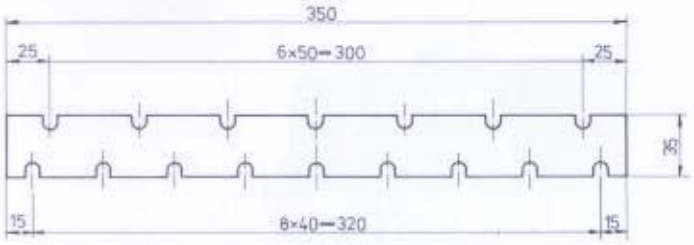
CUTTING BLADE 081012
for insulation cover



Type	Order-no	Number per unit	Weight [kg]
Cutting Blade	081012	10	0,025

MOUNTING JIG 081045

for setting up hanger clamps on support arm installation



2 mm thick

Type	Order-no	Weight [kg]
Mounting Jig	081045	0,190

CONDUCTIVE GREASE 080021

for aluminium rail connection joints

Type	Order-no	Weight [kg]
Conductive Grease	080021	0,035

Contents sufficient for approx. 500 connections.

Installation hint:

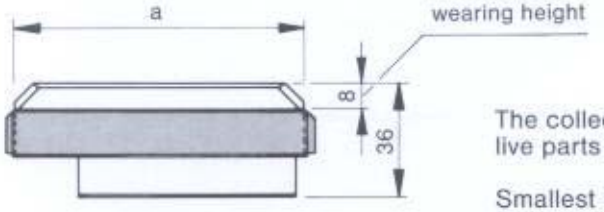
We recommend the use of conductive grease on the rail joint and power feed points to achieve a good current transfer. The connecting points are cleaned with a steel brush and then spread with a thin layer of **wampfler** conductive grease.

SPARE PARTS

collector brush with insulation

COLLECTOR SHOE 081001

with insulation shroud for 100 Amps, 40 Amps



The collector brush is protected by a plastic insulation so that no live parts can be touched by accidental contact.

Smallest bending radius for collector shoe 100 Amps = 1800 mm
Smallest bending radius for collector shoe 40 Amps = 1000 mm

Material:

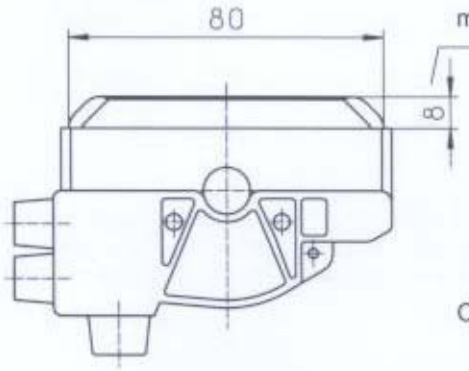
copper graphite

Type	Order-no	Amps [A]	a [mm]	Weight [kg]
Collector Shoe	081001 – 11	100	90	0,098
Collector Shoe	081001 – 15	40	63	0,058

Installation hint:

The collector shoe can be changed without demounting the collector because the collector shoe has a push-in contact (not a screwed connection).

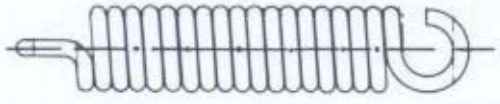
COLLECTOR SHOE 081001
for current collector 081209



Collector shoe material: copper graphite

Type	Order number Phase	Earth	Weight [kg]
Collector shoe 812 80 A Reversing operation	081001 – 12	081001 – 22	0,090
Collector shoe 812 80 A Towing operation	081001 – 32	081001 – 42	0,090
Collector shoe 812 80 A without insulation	08-K154-0116		0,045

STABILIZING SPRING for current collector head type 081209



Type	for Current collector	Operation	Order number
Stabilizing	081209–012 022 112 122	Reversing mode	RZ-081 GI
Spring	081209–013 023 113 123	Trailing mode	RZ-056 I

ACCESSORIES for current collector head type 081209

Connection cable 081209–1,5 x

Cross-section [mm²]	Order number Phase	Earth	Length* [m]	Cable Ø [mm]	Amps [A]	Weight [kg]
6	081209–1,5 x 06 x 81	081209–1,5 x 06 x 92	1,5	6	54	0,088
10	081209–1,5 x 10 x 91	081209–1,5 x 10 x 92	1,5	7	73	0,147
16	081209–1,5 x 16 x 81	081209–1,5 x 16 x 82	1,5	10	98	0,234

* other lengths and cross sections on request

DE-ICING SYSTEM

On conductor rail installations which are installed outdoor, icing up of the installation can occur depending on the climatic conditions. Icing up of the conductor rail system means possible breakdowns during operation and an increase in wear of the collector shoes and conductor rails.
In these cases we recommend to heating the conductor rail. Furthermore it may be necessary to install such a heating system in factories with very humid conditions.

SELECTION AND LAYOUT

The power requirement for heating the conductor rail is between 15 – 25 W/m. The corresponding wire type is selected from diagrams 4 and 5 depending on the conductor rail length and the required heating capacity.
If the required heating wire is longer than shown in diagrams 4 and 5 the system must be divided into several sections.
For conductor rail voltages exceeding 400 V please consult factory.

Diagram 4

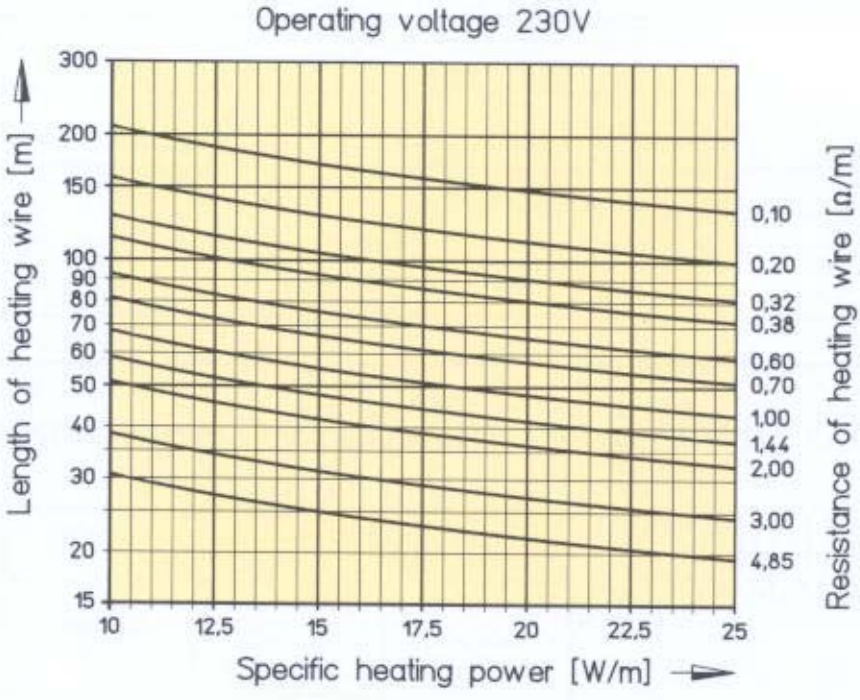
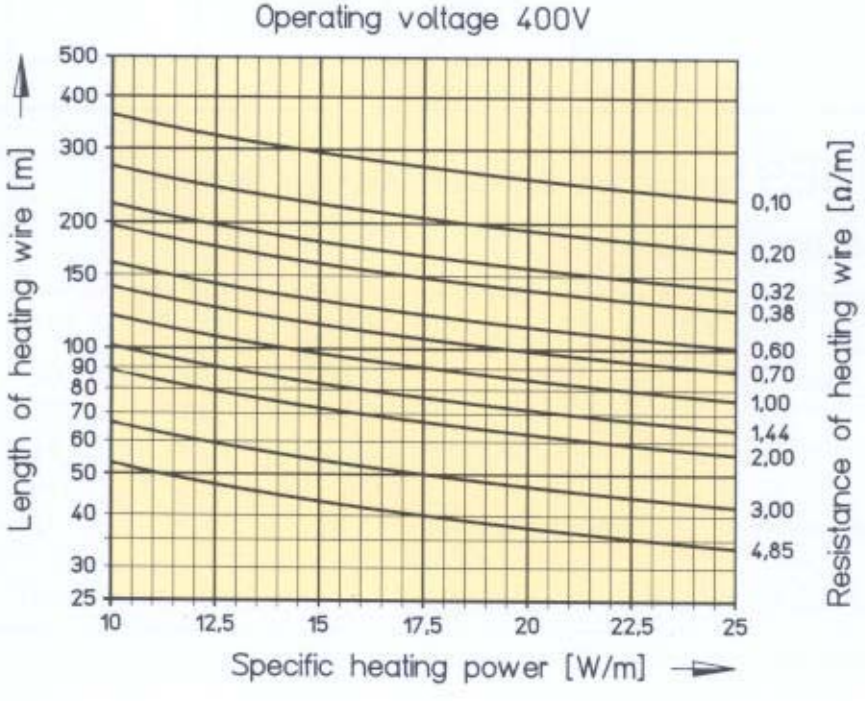


Diagram 5



TECHNICAL DATA OF HEATING WIRE

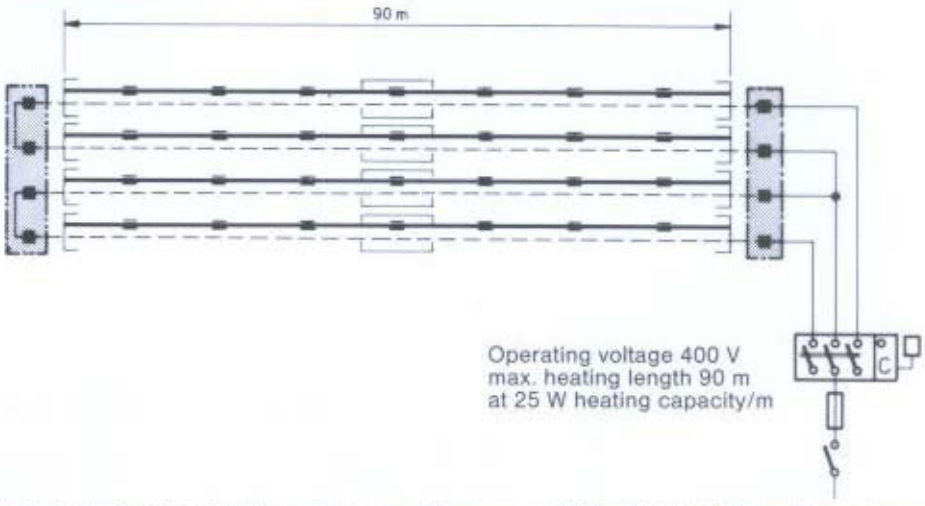
Nominal voltage:	max. 500 V phase to ground
Nominal temperature:	+ 120° C
Max. load:	max. 25 W/m in air
Insulation material:	PTFE
Min. temperature during installation:	– 20° C
Bending radius:	≧ 25 mm
Test voltage:	2000 V
Max. tensile load:	50 N
Resistance material:	high quality alloy

EXAMPLES

Example 1

A 90 m, 4 pole conductor rail system must be heated. Required heating capacity approx. 12,5 – 25 W/m. Operating voltage 400 V.
A heating wire with 0,3 Ω/m at 14,84 W/m heating capacity is selected from diagram 5. 360 m heating wire plus 0,5 m for each pole for connecting purposes is required for a 90 m, 4 pole system. The selected heating wire has 14,84 W/m heating capacity at a conductor rail length of 2 x 90 m. (see wiring diagram 1).
Heating capacity of installation = total length of heating wire x W/m
= 360 m x 14,84 W/m
= 5345,33 W
= 5,345 kW

Wiring diagram 1
single feed

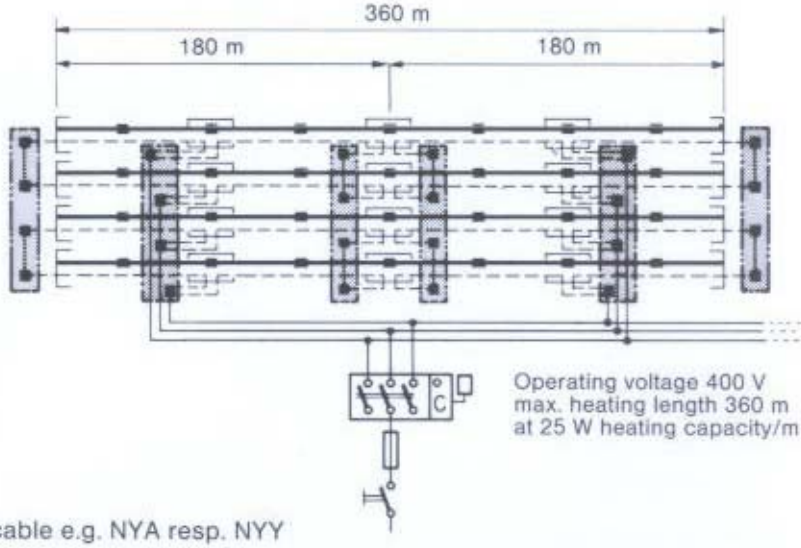


Example 2

A 360 m, 4 pole conductor rail system must be heated. Required capacity approx. 12,5 – 25 W/m. Operating voltage 400 V.
It is not possible to heat this length with the available wires, even if the minimum permissible heating capacity of 15 W/m is used. The system must therefore be divided in two sections of 180 m with centre feed. The result is a heating wire with 2 x 90 m length. A heating wire with 0,3 Ω/m at 15.15 W/m heating capacity is selected from diagram 5. 1440 m heating wire plus 8 m for connecting purposes is required for a 360 m, 4 pole system.
Heating capacity of installation = total length of heating wire x W/m
= 1440 m x 15,15 W/m
= 21816 W
= 21,816 kW

Because the system is divided in two sections 2 terminal boxes 080102 for power feed and 4 terminal boxes 080103 for joints are required.

Wiring diagram 2
multiple feed



Conductor rail 08121 ...

Heating wire 080106

Supply cable and connecting cable e.g. NYA resp. NYY

Terminal point

End cap 081272

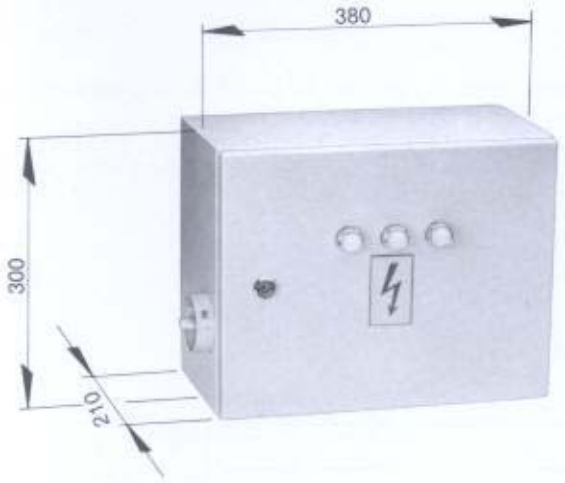
Terminal box for power feed 080102

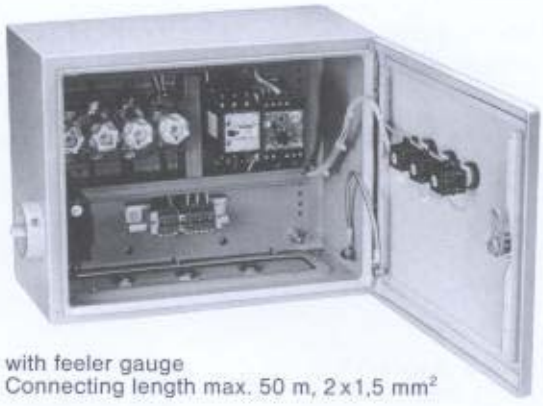
Power feed 081251

Rail connection

Terminal box for joints 080103

TEMPERATURE CONTROL UNIT 080101





with feeler gauge
Connecting length max. 50 m, 2x1,5 mm²

Protection grade IP 54 for indoor and outdoor installations. Nominal voltage 230 V / 400 V.
Temperature range – 20° C up to + 30° C.
Special types and voltages on request.

Type	Order-no	Number of poles	Max. heating capacity from 16 $^{2}/_{3}$ up to 200 Hz		Weight
			230 V [kW]	400 V [kW]	[kg]
Temperature Control Unit	080101 – 13 080101 – 23	3	7,0 14,5	12,5 25,0	9,000
	080101 – 14 080101 – 24	4	7,0 14,5	12,5 25,0	9,200
	080101 – 15 080101 – 25	5	7,0 14,5	12,5 25,0	9,400
	080101 – 16 080101 – 26	6	7,0 14,5	12,5 25,0	9,600

HEATING WIRE 080106

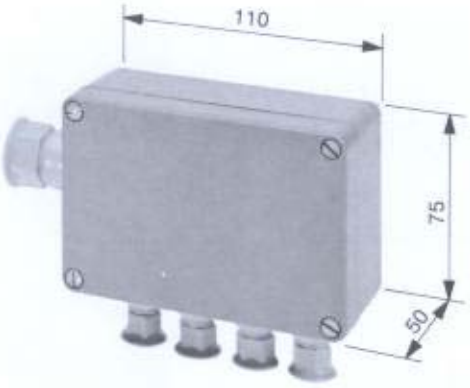
Type	Order-no	Nominal resistance * [Ω/m]	Cable assembly number of wires x Ø wire [mm]	Outside diameter [mm]	Weight [kg/1000 m]
Heating Wire	080106 – 010	0,10	7 x 0,50	2,7	approx. 8,600
	080106 – 020	0,20	7 x 0,40	2,4	
	080106 – 032	0,32	7 x 0,50	2,7	
	080106 – 038	0,38	7 x 0,45	2,55	
	080106 – 060	0,60	7 x 0,40	2,4	
	080106 – 073	0,70	7 x 0,35	2,25	
	080106 – 100	0,976	7 x 0,30	2,1	
	080106 – 148	1,44	7 x 0,25	1,95	
	080106 – 200	2,00	7 x 0,33	1,8	
	080106 – 300	3,00	7 x 0,25	1,95	
	080106 – 485	4,85	7 x 0,20	1,8	

* The nominal resistance of the heating wires can slightly differ depending on manufacturer.

Other resistance values on request. Resistance values can change.

Please note:
When determining the total length of the heating wire an additional length of 0.5 m min. per wire must be ordered for connection purposes and twists in the cable, and 1 pair of "Verbindungsmuffe" 08-L020-0033.

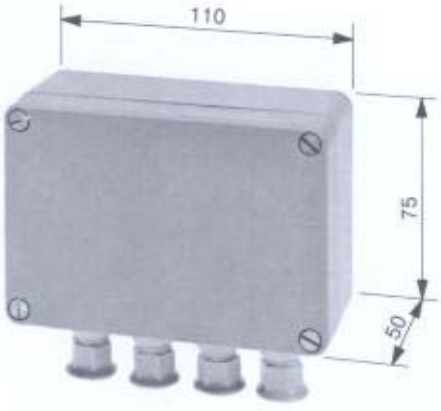
TERMINAL BOX 080102 for power feed
with glands, connectors and accessory



Protection grade: IP 65
Material: Polyester, fibreglass reinforced

Type	Order-no	Weight [kg]
Terminal Box 3-pole	080102 – 3	0,300
Terminal Box 4-pole	080102 – 4	0,310
Terminal Box 5-pole	080102 – 5	0,320

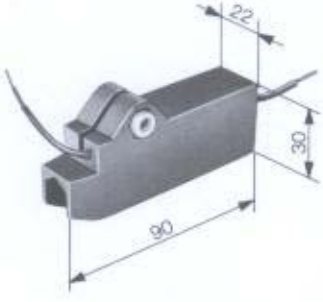
TERMINAL BOX 080103 for joints
with glands, connectors and accessory



Protection grade: IP 65
Material: Polyester, fibreglass reinforced

Type	Order-no	Weight [kg]
Terminal Box 3-pole	080103 – 3	0,290
Terminal Box 4-pole	080103 – 4	0,300
Terminal Box 5-pole	080103 – 5	0,310

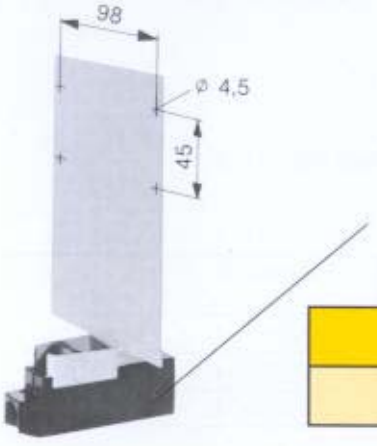
END CAP 081272
for heating wire entry/exit

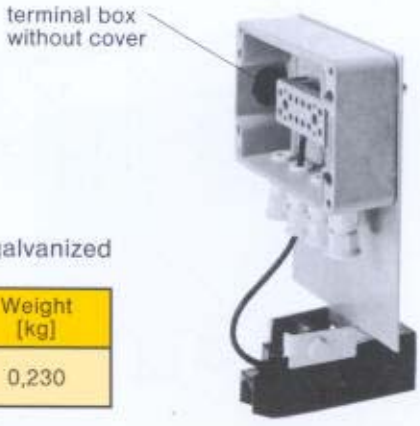


Type	Order-no		Weight [kg]
	hardware galvanized	hardware stainless steel	
End Cap	081272 – 1	081272 – 2	0,140

SUPPORT PLATE 080104

for terminal box 080102 for power feed
and terminal box 080103 for joints at the rail ends



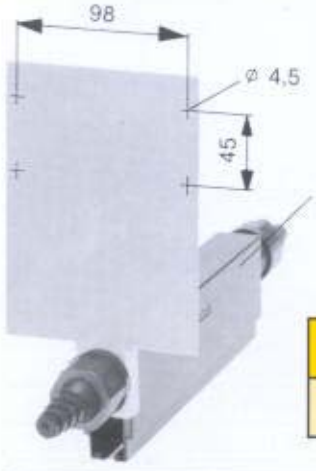


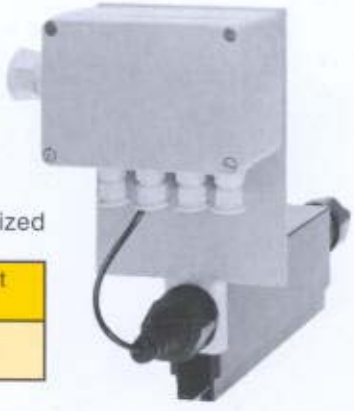
Material: steel, galvanized

Type	Order-no	Weight [kg]
Support Plate	080104	0,230

SUPPORT PLATE 080105

for terminal box 080102 for power feed
and terminal box 080103 for joints within the rail system





Material: steel, galvanized

Type	Order-no	Weight [kg]
Support Plate	080105	0,230

ORDER EXAMPLE

A 180 m, 4 pole conductor rail system must be heated. Operating voltage 400 V, heating capacity approx. 25 W/m with multiple feed. See wiring diagram 2. (1 terminal box is to be provided for each power feed and each joint).

Heating capacity of installation = total heating wire length x W/m
= 724 m x 25 W/m
= 18 kW

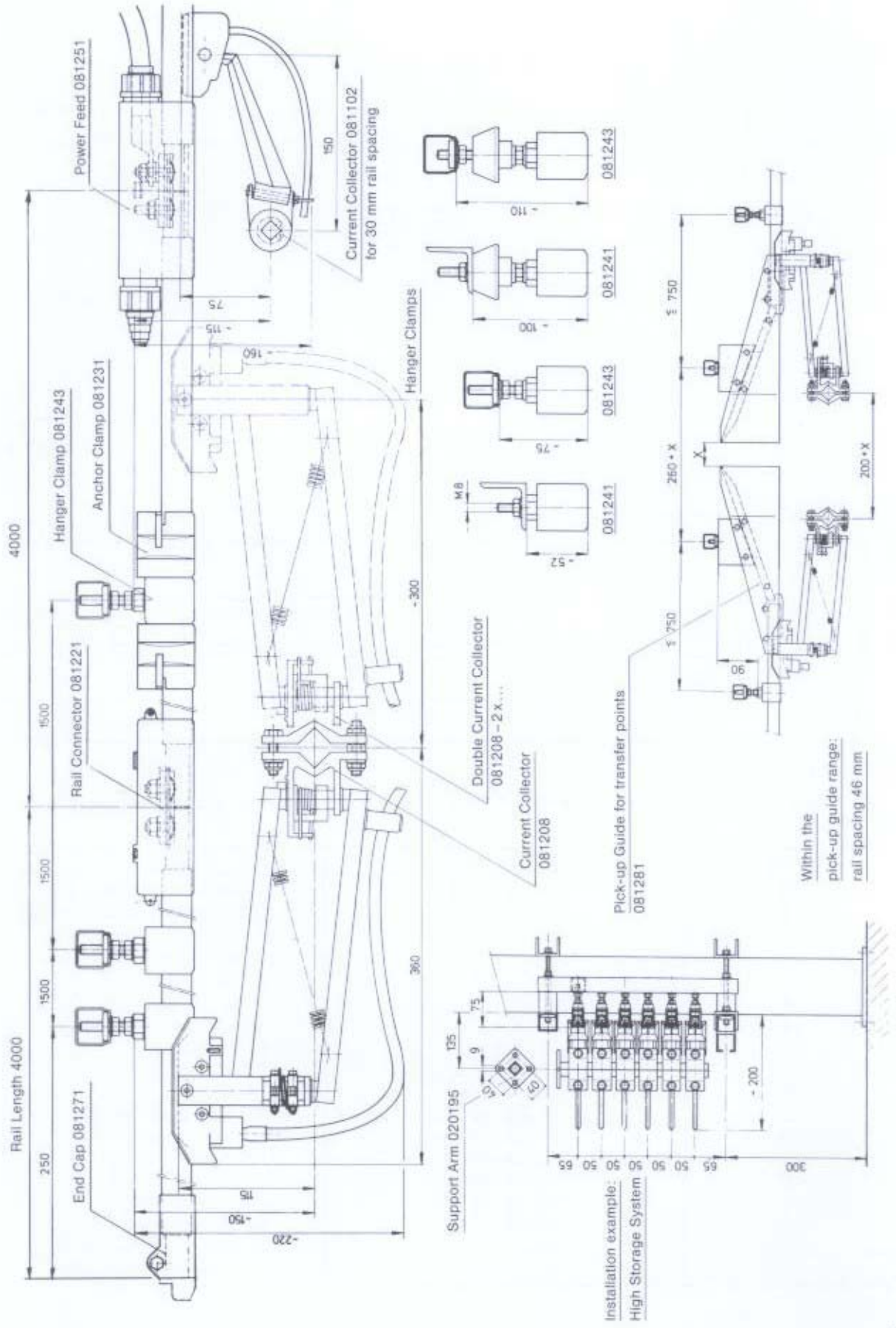
Quantity	Order-no	Description
1	080101 – 24	Temperature Control Unit
724 m	080106 – 020	Heating Wire
16	080106 – 000	„Verbindungsmuffe" for de-icing system (pair)
2	080102 – 4 for power feed	Terminal Box
4	080103 – 4 for joints	Terminal Box
2	080104	Support Plate
4	080105	Support Plate
8	081251	Power Feed
8	081271	End Cap

Installation instructions are enclosed in each consignment!

SYSTEM ARRANGEMENT

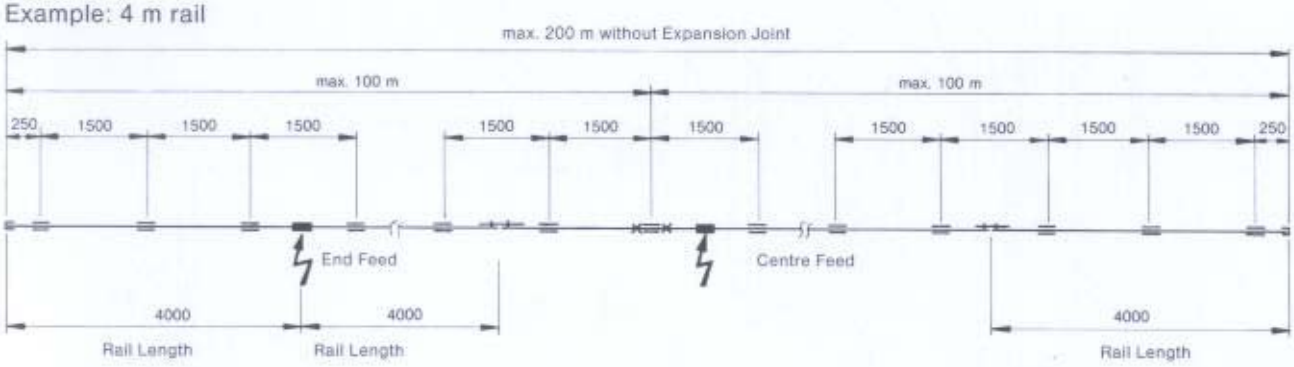
PROGRAMME 812

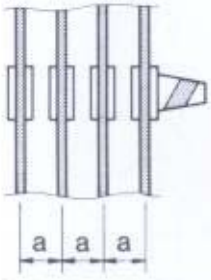
with current collector parallel arm type



CONDUCTOR RAIL ARRANGEMENT

Example: 4 m rail





Hanger Clamp

Hanger Clamp with Anchor Clamp

Rail Connector

End Cap

Centre Feed resp. End Feed

Centre distance between two conductor rails	Standard installation of current collectors	Staggered installation of current collectors	Installation of current collectors for systems with pick-up guides multipole *
Minimum distance a [mm]	50	40	50

* see installation hint for pick-up guides

ORDER EXAMPLE

A 55 m, 4 pole, 80 Amps conductor rail system is to be ordered complete with all accessories, current collectors and support arms.

Quantity	Order-no	Description
39	081211 – 4 x 11	Conductor Rail »Phase«, 4 m long
3	081211 – 3 x 11	Conductor Rail »Phase«, 3 m long
13	081211 – 4 x 12	Conductor Rail »PE«, 4 m long
1	081211 – 3 x 12	Conductor Rail »PE«, 3 m long
152	081243 – 01	Hanger Clamp
8	081231 – 1	Anchor Clamp
52	081221 – 2	Rail Connector
4	081251 – 2	Power Feed
4	080051 – 16	Cable Lug 16 mm^2
8	081271 – 1	End Cap
3	081205 – 01	Current Collector »Phase«
1	081205 – 02	Current Collector »PE«
1	020195 – 400	Towing Arm
38	020185 – 0500	Support Arm
76	020180 – 08	Girder Clip
1	081045	Weld-on Bracket
1	080021	**wampfler** Conductive Grease
4	081001 – 11	Collector Shoe (spare part)

QUESTIONNAIRE

for determining the wampfler-conductor rail system — Programme 812

1. **Type of consumer:**
   Hoist, mono-rail, crane etc. _____
2. **Length of conductor rail system:** _____
3. **Conductor rail arrangement:** _____
   vertical ☐ horizontal ☐
   For special applications please enclose sketch and description.
4. **Number of conductor rail poles:**
   Phase conductor _____
   Earth conductor _____
   Control conductor _____
5. **Length of collector connecting cable:** _____ m
6. **Operating voltage:**
   3 phase current _____ V _____ Hz
   Alternating current _____ V _____ Hz
   Direct current _____ V
7. **Indoor installation** ☐ **Outdoor installation** ☐
8. **Operating conditions:** _____
   (dampness, dust, aggressive gases etc.)
9. **Ambient temperature:** max. _____ °C, min. _____ °C
10. **Duty cycle:** _____ %
11. **Must a de-icing system be provided?** _____
12. **Number and position of power feed:** _____
13. **Type of power feed:** _____
14. **Max. permissible voltage drop:** _____ V

POWER CONSUMPTION AND NUMBER OF CONSUMERS

Motor data	Crane 1			Crane 2			Crane 3			Crane 4		
	Power consumption kW/PS	Current consumption Amps*	Duty Cycle %	Power consumption kW/PS	Current consumption Amps*	Duty Cycle %	Power consumption kW/PS	Current consumption Amps*	Duty Cycle %	Power consumption kW/PS	Current consumption Amps*	Duty Cycle %
Main hoist												
Micro hoist												
Drive main crab												
Drive auxiliary crab												
Crane drive												

* Please state the cos φ-values of the motors for I_A and I_N.

Further information for determining: _____

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