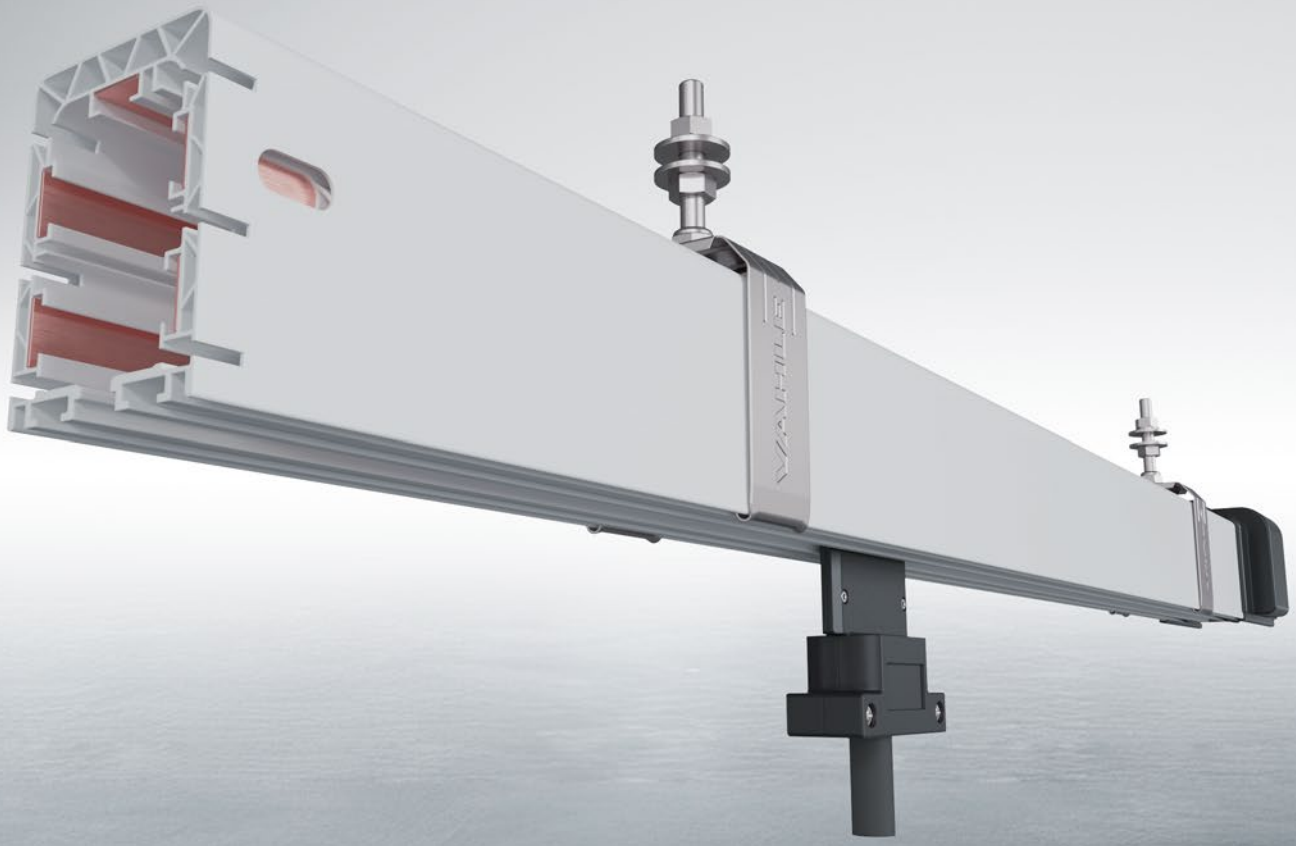
VAHLE

KBH

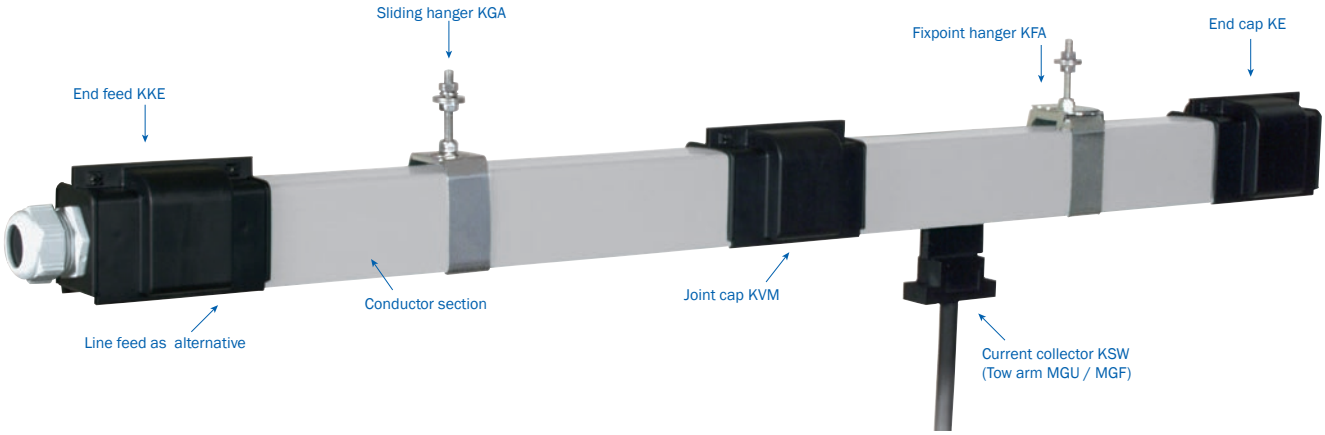
ENCLOSED CONDUCTOR SYSTEM



4B | EN 2022

ENCLOSED CONDUCTOR SYSTEM KBH

Content



Description of the conductor system

The VAHLE Powerail KBH is a shock hazard protected conductor system for indoor and outdoor installations. The plastic housing can accommodate different copper profiles.

Type KBHF: in 4- and 5-conductor version, with preassembled copper conductors and spring loaded connectors from 63 to 100 A.

Type KBHS: in 4- and 5-conductor version, with preassembled copper conductors and bolted joints from 63 to 200 A.

A compact design, corrosion resistance and an easy installation are the main characteristics. The KBH complies with VDE, european and international standards as well as accident prevention regulations. It is protected to IP 23 standards. The KBH can be supplied with sealing strip and heating system. The conductor system with sealing strip is protected to IP 24 standards and EN 60529 (0470, part 1) regulation.

Collectors are touch proof only when fully entered into the conductor system.If there is the possibility to touch live parts by hand, ie. collectors that might leave the conductor system during operation, provide safety barrier or disconnect mains. This is valid only for a supply voltage exceeding 24 V AC or 60 VDC.

Other cross sections, as shown on page 7, are possible. The upper pole is used as N-conductor if required. The max. copper cross section of the conductor is 26 sqmm. If the cross-section of the N-conductor is smaller than the cross section of the outer conductor, it is necessary to protect it against overcurrent and short-circuit, design according to IEC60364-4-43 (HD 60364-4-43).

Low voltages of max. 50 V AC or 120 V DC are valid if the conductor system is only used as control line (type ... SSD). Refer to regulation SELV or PELV (also DIN VDE 0100-410). A ground conductor is required for higher voltages.

TECHNICAL DATA

Applications

For mobile power consumers like cranes, monorails, electric hoists, machine tools, automated storage and retrieval systems, lighting systems.

Approvals

UL-approved

Housing

Color grey, plastic housing for 4 or 5 conductors. Standard section 4 m. Other sections are available. The ground conductor is identified by international color code. Phase reversing prevented by design of the collector and housing. Higher number of conductors possible by combination of several conductor systems.

Couplings

Through plastic joint caps.

Feed sets

Through line feeds or end feeds. When selecting the “overload” protection devices, selection has to be made according to DIN VDE 0100 part 530.

End caps

The open ends of the conductor system are closed by end caps for KBHF and KBHS.

Hangers

Support bracket at the crane track (see page 9). Max. support distance of the conductor at following ambient temperatures:

- Indoor systems and roofed outdoor systems: ≤ 35 °C = 2.00 m
- Indoor and outdoor systems with and without heating: > 35 °C = 1.33 m
- Cold storage ≤ 0 °C = 1.33 m
- APOS systems: -20 up to +50 °C = 1.33 m

It is necessary to provide at least one additional hanger on the sections of the feeds (line feeds), removing sections, anti-condensation sections and expansion sections (1 m sections). This prevents any sagging of the conductor conductor system.

Expansion during temperature fluctuation

The expansion sections are required to compensate the different expansions between copper conductors and steel- or concrete structures, in varying temperatures without interrupting electrical power. The different expansions between the plastic housing and the copper conductors will be compensated in every joint.

Anti-condensation sections

These sections are used for transfer of the Powerail to outdoor areas to avoid condensation. The conductor system is not separated electrically.

Contact sections, turntables and switches

Conductor sections for working areas and transfer applications see page 17 and 19.

Sectionalizing

Conductor dead sections are electrical interrupts of the conductor. Under normal operating conditions a cross over with collectors to switch the voltage off or on is only allowed with low power ratings (control current). The conductors can be seperated through air gaps (5 mm) or insulating pieces (35 mm). With the air gap the collector carbon bridges the gap, e. g. for mains. The insulating piece is longer than the carbon and each conductor section can be separated electrically, e. g. for control. Double isolating sections are recommended to guarantee safely separated conductor sections as per EN 60204.

Collectors

The current collectors are made of re-inforced polyester fiberglass, for high strength and light weight. Spring loaded carbon brushes maintain uniform contact. Connecting cables and hinged or flexible towing arms included.

The length of the connecting cable may not exceed 3 m if the added overload protection device is not designed for the load capacity of this cable. Refer also to regulation VDE 0100, part 430 and EN 60204-32. (Note: this occurs often with several collectors per system).

Continuity of ground conductor

The continuity of the ground conductor has to be guaranteed as per regulation EN60204-32 for conductor rails.

Runways of lifting devices may not be used as ground conductor, only an additional connection is permissible. Therefore a continuous ground conductor is required.

With following system requirements double collectors have to be used

- as proper measure to fulfil the continuity of the ground conductor system via carbon brushes. Refer to regulation EN 60204-1-2007-06 and EN 60204-32-2009-03.
- Transfers with switches and turntables
- Operational voltage below 50 V
- Frequency controlled drives
- Transmission of signals
- High electrical loads

Removing section for collectors

Assembly and disassembly of the collector is possible at the end of the track as well as at the removing section. By opening and closing the sliders at the bottom of the conducor housing the collector can be mounted and demounted easily. Before opening the removing section the conduc-

TECHNICAL DATA

tor system has to be without voltage.

Safety instructions

It must be ensured that the arrangement of the conductor system provides minimum distances (0.5 m) between fixed and mobile plant parts (i. e. between conductor rails, collector trolleys and towing arms) so as to avoid the risk of pinching.

PLEASE NOTE

For use in galvanizing and pickling plants, under agressive conditions and low voltage applications we would appreciate receiving detailled information,especially of the environmental conditions.

For quotations and order processing including conductor systems with curves, dead sections, turntables, switches etc. we require your drawings or sketches. Please use our questionnaire, page 32.

Conductor system values: electrical data

Type	Max. continuous current	Nominal voltage (UL)	Dielectric strength	Spec. resistance	Surface resistivity	Leakage resistance
KBH	200 A (at 100 % DC)	690 V (600 V)	IEC 60243-1-3 30–40 kV/mm	IEC 60093 5×10^{15} Ω/cm	IEC 60093 10^{13} Ω	EN 60112 CTI 400-2.7

Conductor system values: mechanical data

Type	Flexible strength	Tensile strength	Ambient temperature	Flammability	Resistance to chemicals (at 45 °C)
KBH	75 N/mm² ±10 %	40 N/mm² ±10 %	−30 °C up to +60 °C	flame retardant, self extinguishing, UL 94 V0	Gasoline, mineral oil, grease, acid sulfur up to 50 %, caustic soda up to 50 % and hydrochloric acid up to 25 %, concentrated

Temperature correction factor ƒT

Ambient temperature °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C
Correction factor ƒT Standard shrouding	1	0.95	0.89	0.84	0.77	0.71

Voltage drop for the conductor

For three-phase current $\Delta U = \sqrt{3} \cdot I \cdot I_A \cdot Z$

For alternating current $\Delta U = 2 \cdot I \cdot I_A \cdot Z$

For direct current $\Delta U = 2 \cdot I \cdot I_A \cdot R$

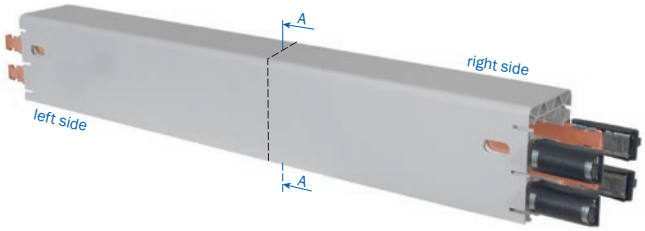
Z = Impedance [Ω/km]
R = Resistance [Ω/km]
I = Feed length [km]
I_A = Inrush current of installation in amperes

Permissible continuous current of the conductor

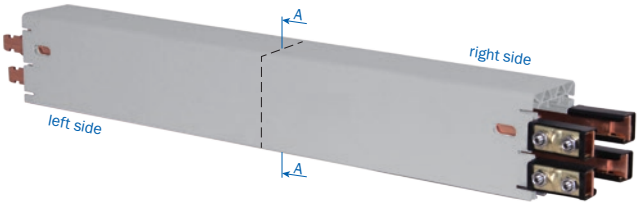
$I_{Dzul.UT} = I_{zul.} \times ƒT[A]$ with $I_{Dzul.UT} > I_{DA}$

$I_{Dzul.UT}$ = Permissible continuous current of the conductor at ambient temperature
$I_{zul.}$ = Permissible continuous current of the conductor at 35 °C (catalogue value) [A]
ƒT = Correction factor

TECHNICAL DATA



KBHF with spring loaded connectors

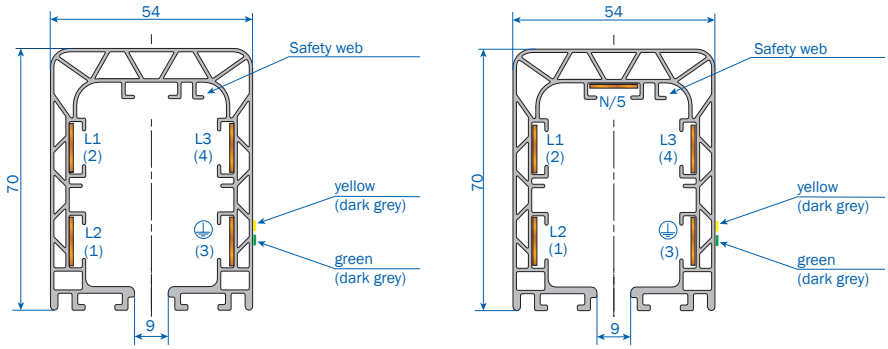


KBHS with bolted joints

Type[1] HS with PE SS without PE	Num-ber of poles	Continuous current A at 35 °C [6] L1 L2 L3			Copper cross section mm²				Nominal voltage V [4]
		60 % DC	80 % DC	100 % DC	L1 L2 L3	⏚	N/5[2]	Control line	
KBHF									
KBHF4/63-....HSC	4	81	70	63	3x10	10	-	-	690
KBHF4/63-....SSD[5]	4	81	70	63	-	-	-	4x10	690
KBHF4/80-....HSC	4	103	89	80	3x17	17	-	-	690
KBHF4/100-....HSC	4	129	112	100	3x26	26	-	-	690
KBHF5/63-....HSC	5	81	70	63	3x10	10	10	-	690
KBHF5/63-....SSD[5]	5	81	70	63	-	-	-	5x10	690
KBHF5/80-....HSC	5	103	89	80	3x17	17	17	-	690
KBHF5/100-....HSC	5	129	112	100	3x26	26	26[3]	-	690
KBHS									
KBHS4/63-....HSC	4	81	70	63	3x10	10	-	-	690
KBHS4/63-....SSD[5]	4	81	70	63	-	-	-	4x10	690
KBHS4/80-....HSC	4	103	89	80	3x17	17	-	-	690
KBHS4/100-....HSC	4	129	112	100	3x26	26	-	-	690
KBHS4/125-....HSC	4	161	140	125	3x33	26	-	-	690
KBHS4/160-....HSC	4	207	179	160	3x51	26	-	-	690
KBHS4/200-....HSC	4	258	224	200	3x70	42	-	-	690
KBHS5/63-....HSC	5	81	70	63	3x10	10	10	-	690
KBHS5/63-....SSD[5]	5	81	70	63	-	-	-	5x10	690
KBHS5/80-....HSC	5	103	89	80	3x17	17	17	-	690
KBHS5/100-....HSC	5	129	112	100	3x26	26	26[3]	-	690
KBHS5/125-....HSC	5	161	140	125	3x33	26	26[3]	-	690
KBHS5/160-....HSC	5	207	179	160	3x51	26	26[3]	-	690
KBHS5/200-....HSC	5	258	224	200	3x70	42	26[3]	-	690

(1) ... Suffix types e.g. 2 m KBHF4/63-2000HSC, Order No. 600972, shorter legths are made up from the next larger standard length.
(2) In case of using a conductor as N see page 3.
(3) 5th. Conductor max. 80 A at 100 % DC.
(4) Nominal voltage UL= 600 V
(5) Vontrol line
(6) Power consumption UL on request

TECHNICAL DATA

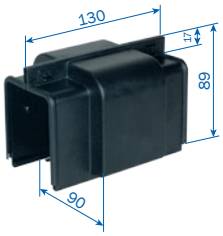


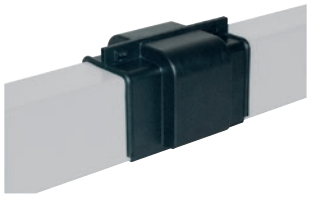
Numbers in paranthesis apply to control line

Leakage distance mm	Impedance at 50 Hertz and 20 °C Ω / 1000 m			Resistance at 20 °C Ω / 1000 m			Weight kg / m	Order No. (1)
	Phase	⏚	N	Phase	⏚	N		
33	1.728	1.728	-	1.717	1.717	-	1.304	60097 •
33	1.728	-	-	1.717	-	-	1.304	60099 •
33	1.074	1.074	-	1.057	1.057	-	1.536	60098 •
33	0.712	0.712	-	0.687	0.687	-	1.864	60002 •
33	1.728	1.728	1.728	1.717	1.717	1.717	1.410	60100 •
33	1.728	-	1.728	1.717	-	1.717	1.410	60102 •
33	1.074	1.074	1.074	1.057	1.057	1.057	1.700	60101 •
33	0.712	0.712	0.712	0.687	0.687	0.687	2.110	60012 •
33	1.782	1.728	-	1.717	1.717	-	1.424	60103 •
33	1.728	-	-	1.717	-	-	1.424	60105 •
33	1.074	1.074	-	1.057	1.057	-	1.656	60104 •
33	0.712	0.712	-	0.687	0.687	-	1.984	60006 •
33	0.579	0.712	-	0.549	0.687	-	2.161	60007 •
30	0.383	0.712	-	0.344	0.687	-	2.699	60008 •
27	0.299	0.457	-	0.254	0.429	-	3.297	60031 •
33	1.728	1.728	1.728	1.717	1.717	1.717	1.560	60106 •
33	1.728	-	1.728	1.717	-	1.717	1.560	60108 •
33	1.074	1.074	1.074	1.057	1.057	1.057	1.850	60107 •
33	0.712	0.712	0.712	0.687	0.687	0.687	2.260	60016 •
33	0.579	0.712	0.712	0.549	0.687	0.687	2.437	60017 •
30	0.383	0.712	0.712	0.344	0.687	0.687	2.926	60018 •
27	0.299	0.457	0.457	0.254	0.429	0.687	3.573	60032 •

• The last number of the order specifies the section length. Please suffix the order number with 1, 2, 3, 4.
⏚ Ground = PE

JOINTING MATERIAL, HANGERS AND END CAPS





Joint cap, self locking

Joint cap ready installed

Type	Weight kg	Order No.
VM-KVM	0.116	600005

Sliding hanger

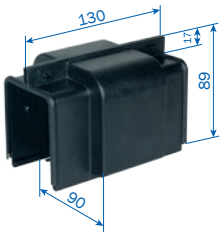
Sliding hanger at conductor section

Type[1]	Weight kg	Order No.
AH-KGA	0.129	600000
AH-KGA/K	0.129	600397

Fixpoint hanger

Fixpoint hanger at conductor section

Type[1]	Weight kg	Order No.
AH-KFA	0.160	600007
AH-KFA/K	0.177	600398



End cap – left and right version

End cap ready installed

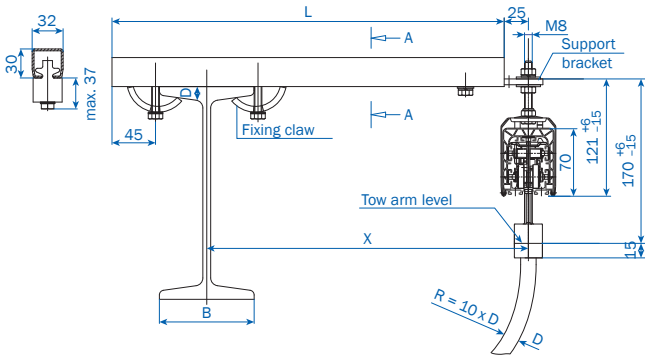
Type	Weight kg	Order No.
EK-KE	0.150	600008

(1) ... / K with stainless screws
All steel metal components

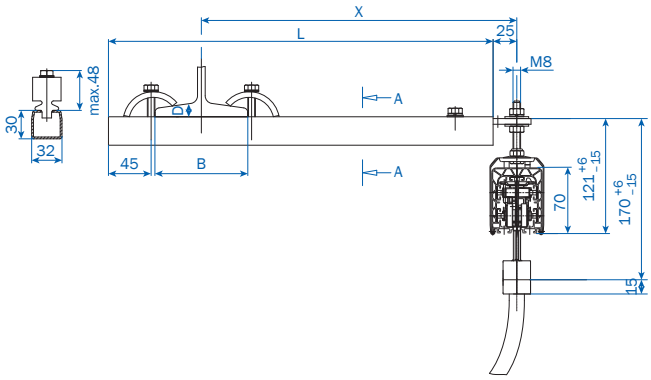
BRACKETS

View without I- beam

Fixing claw suitable for D = 6 – 15 mm



Fixing claw suitable for D = 15 – 25 mm



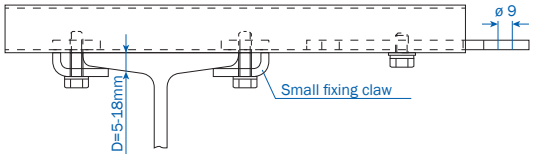
Arrangement EHK with small fixing claw

Attention! Make sure that hoist wheels have enough clearance.

Use small claw if necessary.

Select next larger size bracket when your I-beam dimension B is more than 170 up to 300 mm

-rail of EHK is identical to type S 1, Cat. 8a



Type(1)	X mm	L mm	B max mm	Weight kg	Order No.	
					standard version	small fixing claw(1)
HK-EHK250-NS	250	350	170	1.080	251600	-
HK-EHK250-KS...					-	251720-...
HK-EHK300-NS	300	400	170	1.128	251610	-
HK-EHK300-KS...					-	251730-...
HK-EHK400-NS	400	500	170	1.266	251620	-
HK-EHK400-KS...					-	251740-...
HK-EHK500-NS	500	600	170	1.394	251630	-
HK-EHK500-KS...					-	251750-...
HK-EHK600-NS	600	700	170	1.561	251640	-
HK-EHK600-KS...					-	251760-...
HK-EHK700-NS	700	800	170	1.761	251650	-
HK-EHK700-KS...					-	251770-...
HK-EHK750-NS	750	850	170	1.782	251660	-
HK-EHK750-KS...					-	251780-...
HK-EHK800-NS	800	900	170	1.936	251670	-
HK-EHK800-KS...					-	251790-...

(1) e. g. HK-EHK250-KS12 → Order No. 251720-12 for fixing claw with D = 12 mm
Select next larger size bracket when your -beam dimension B is more than 170 mm.

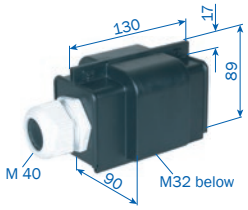
END FEEDS, LINE FEEDS

End feed (up to 80 A)

End feed comes loose without conductor section.

It can be mounted at the left or right hand side.

Electrical connection with customer supplied cable shoes to M6 terminals.



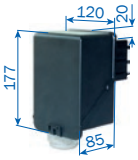
Type	Weight kg	Cable gland (Dimensions see page 13)	Order No.
ES-KKE4/63-80HS	0.271	M 40	600010
ES-KKE5/63-80HS	0.288	M 40	600107
ES-KKE4/63SS	0.252	M 25	600015
ES-KKE5/63SS	0.265	M 25	600108

End feed (up to 100 A)

End feed comes loose without conductor section.

It can be mounted at the left or right hand side.

Electrical connection with customer supplied cable shoes to M6 terminals.



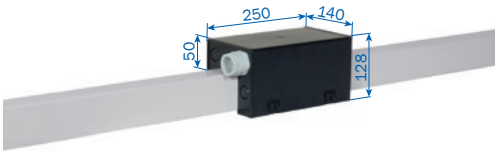
Type	Weight kg	Cable gland (Dimensions see page 13)	Order No.
ES-KKE4/63-100HS	0.613	M 32 or M 50(1)	600422
ES-KKE5/63-100HS	0.646	M 32 or M 50(1)	600423

Line feed (at joint, 63 A)

KSE type comes loose without conductor section.

It can be mounted at any joint.

Electrical connection with customer supplied cable shoes to M6 terminals.



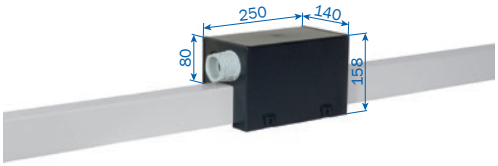
Type	Weight kg	Cable gland (Dimensions see page 13)	Order No.
ES-KSE4/63HS-L	0.806	M 32	600035
ES-KSE5/63HS-L	0.866	M 32	600038
ES-KSE4/63SS-L	0.785	M 25	600028
ES-KSE5/63SS-L	0.843	M 25	600029

Line feed (at joint, 80–100 A)

KSE type comes loose without conductor section.

It can be mounted at any joint.

Electrical connection with customer supplied cable shoes to M6 terminals.



Type	Weight kg	Cable gland (Dimensions see page 13)	Order No.
ES-KSE4/80-100HS-L	0.936	M 50	600036
ES-KSE5/80-100HS-L	0.996	M 50	600039

Feeds in the curve area on request.

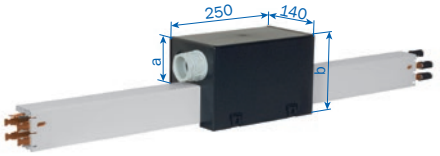
(1) Both cable glands are attached to the packing unit.

LINE FEEDS

Line feed (incl. 1 m section, 63–100 A)

With spring loaded connector.

Electrical connection with customer supplied cable shoes to M6 terminals.

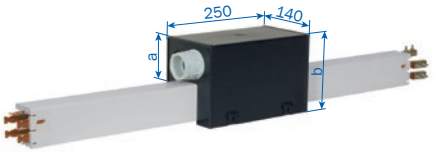


Type	Weight kg	Dimension		Cable gland (Dimensions see page 13)	Order No.
		a	b		
ES-KEF4/63HSC-1000	2.066	50	128	M 32	600975
ES-KEF4/80HSC-1000	2.428	80	158	M 50	600976
ES-KEF5/63HSC-1000	2.232	50	128	M 32	600977
ES-KEF5/80HSC-1000	2.652	80	158	M 50	600978
ES-KEF4/100HSC-1000	2.756	80	158	M 50	600201
ES-KEF5/100HSC-1000	3.062	80	158	M 50	600209
ES-KEF4/63SSD-1000	2.046	50	128	M 25	600979
ES-KEF5/63SSD-1000	2.210	50	128	M 25	600980

Line feed (incl. 1 m section, 63–125 A)

With bolted joints.

Electrical connection with customer supplied cable shoes M6 terminals to 100 A, with M8 terminals to 125 A.



Type	Weight kg	Dimension		Cable gland (Dimensions see page 13)	Order No.
		a	b		
ES-KES4/63HSC-1000	2.190	50	128	M 32	600985
ES-KES4/80HSC-1000	2.552	80	158	M 50	600986
ES-KES5/63HSC-1000	2.387	50	128	M 32	600987
ES-KES5/80HSC-1000	2.807	80	158	M 50	600988
ES-KES4/100HSC-1000	2.880	80	158	M 50	600225
ES-KES4/125HSC-1000	3.222	80	158	M 50	600045
ES-KES5/100HSC-1000	3.217	80	158	M 50	600233
ES-KES5/125HSC-1000	3.621	80	158	M 50	600049
ES-KES4/63SSD-1000	2.170	50	128	M 25	600989
ES-KES5/63SSD-1000	2.365	50	128	M 25	600990

Feeds in the curve area on request.

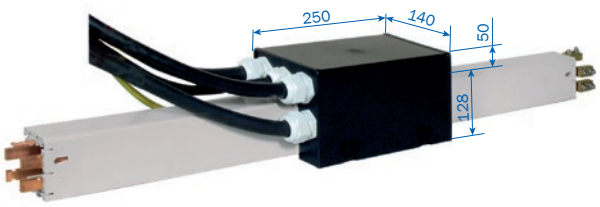
LINE FEED AND TERMINAL BOX

Line feed

including 1 m section (125 – 200 A) with 2 m single cores

Electrical connection with customer supplied cable shoes

to M6 terminals. See below.



Type	Weight kg	Cable cross section in mm² / Ø in mm			Order No.
		L1–L3	Ground	N / 5	
ES-KELS4/125HSC-1000-2	7.803	35 / 16	25 / 10	-	600069
ES-KELS4/160HSC-1000-2	9.690	50 / 18	25 / 10	-	600075
ES-KELS4/200HSC-1000-2	11.668	70 / 21	35 / 11	-	600385
ES-KELS5/125HSC-1000-2	9.150	35 / 16	25 / 10	25 / 15	600077
ES-KELS5/160HSC-1000-2	11.037	50 / 18	25 / 10	25 / 15	600079
ES-KELS5/200HSC-1000-2	13.014	70 / 21	35 / 11	25 / 15	600387

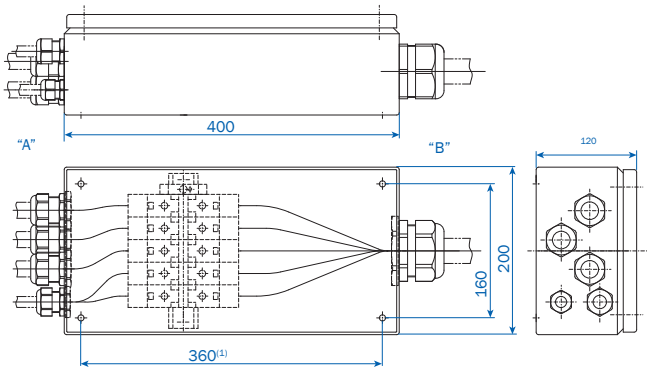
Terminal box (for KELS, 125–200 A)

Electrical connection with customer supplied cable shoes.

Clamping range 16 – 95 mm².

View “A” Input of the single cores of the KELS (a. m.)

View “B” with M 63 (Dimensions see page 13)



Type	Weight kg	For feed line	Order No.
ES-ZK1	5.228	ES-KELS4/125HSC-1000-2	600389
ES-ZK2	5.276	ES-KELS4/160HSC-1000-2 and ES-KELS4/200HSC-1000-2	600390
ES-ZK3	5.595	ES-KELS5/125HSC-1000-2	600391
ES-ZK4	5.645	ES-KELS5/160HSC-1000-2 and ES-KELS5/200HSC-1000-2	600392

Feeds in the bow area on request.

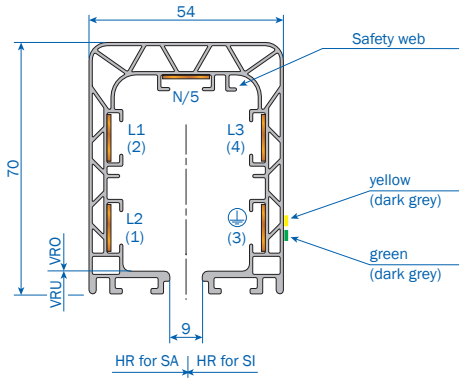
(1) Fixing borings ø 7 mm at the bottom of the box.

CURVES, SEALING STRIP AND CABLE GLANDS FOR FEEDS

Curves

Production corresponding to customer drawing

Min. horizontal bending radius	63–125 A	= 600 mm
	160 A	= 1000 mm
	200 A	= on request
max. ∢ 120°		
min. bending radius, vertical		= 2000 mm
max. curved length		= 3600 mm



Horizontal curve for SI and SA

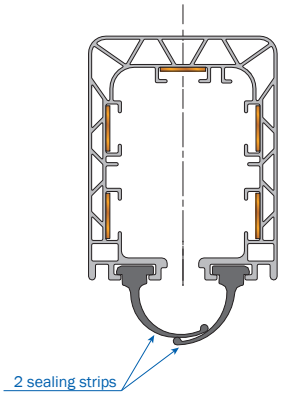
SI = Safety-web inside

SA = Safety web outside

Vertical curve for VRO and VRU

VRO = Vertical radius upwards

VRU = Vertical radius downwards



Safety web will be mounted in direction of track.

Changes in measurements of curves have to be mentioned for replacement orders.

Sealing strip (including accessories)

Type	Description	Order No.
DL-D-KBH-MKH-MKL-TDV	Sealing strip(1)	600551
DL-F-KBH	Fixing clamp for sealing strip (1 per end)	600354
DL-V-KSLT-KBH-MKL/H-LSV/G	Coupling for sealing strip (2 for each joint)	258300
DL-EZRD-KBH	Mounting glider for sealing strip	600109
SA-ZB-DG-KSW-S	Sealing strip slide plate for collectors KSW	600640

Cable glands for feeds

For Type	Cable gland	For cable diam. in mm	Power rating in A	Page
ES-KKE...	M50	27–35	63–100 HS	10
ES-KKE...	M40	17–28	63/80 HS	10
ES-KKE...	M32	15–21	63 SS	10
ES-KSE/KEF/KES...	M32	17–26	63 HS	10 and 11
ES-KSE/KEF/KES...	M50	23–34	80–100 HS	10 and 11
ES-KES...	M50	29–40	125 HS	11
ES-ZK1–4... (Page B)	M63	27–48	125/160/200 HS	12
BH-AKB-KBH...	M25	9–19	-	15
ES-KKE/KSE/KEF/KES...	M25	9–19	63 SS	10 and 11

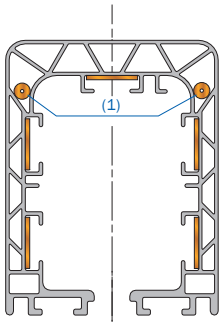
(1) The max. single length is 40 m long. For further distances are joint laces necessary.
For each meter system length have 2 m sealing strip to beordered. The delivery will be in pairs.

HEATING

Heating cable

Type	Resistance[1]	Order No.
HL-0.10-EYCEX-5203-PTFE-260-750	0.10 Ω/m	196381
HL-0.15-EYCEX-5203-PTFE-260-750	0.15 Ω/m	196382
HL-0.20-EYCEX-5203-PTFE-260-750	0.20 Ω/m	196383
HL-0.32-EYCEX-5203-PTFE-260-750	0.32 Ω/m	196384
HL-0.38-EYCEX-5203-PTFE-260-750	0.38 Ω/m	196385
HL-0.48-EYCEX-5203-PTFE-260-750	0.48 Ω/m	196386
HL-0.60-EYCEX-5203-PTFE-260-750	0.60 Ω/m	196387
HL-0.81-EYCEX-5203-PTFE-260-750	0.81 Ω/m	196389
HL-1.00-EYCEX-5203-PTFE-260-750	1.00 Ω/m	196390
HL-1.44-EYCEX-5203-PTFE-260-750	1.44 Ω/m	196391
HL-2.00-EYCEX-5203-PTFE-260-750	2.00 Ω/m	196392
HL-3.00-EYCEX-5203-PTFE-260-750	3.00 Ω/m	196393
HL-4.00-EYCEX-5203-PTFE-260-750	4.00 Ω/m	196394
HL-4.40-EYCEX-5203-PTFE-260-750	4.40 Ω/m	196395
HL-5.16-EYCEX-5203-PTFE-260-750	5.16 Ω/m	196396
HL-5.60-EYCEX-5203-PTFE-260-750	5.60 Ω/m	196397

[1] Tolerance ±2.5 %



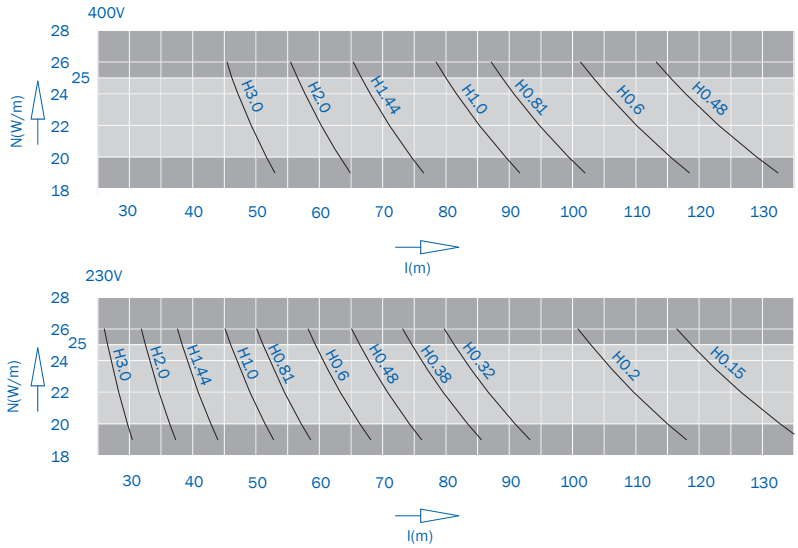
[2] Arrangement of the heating cables on both sides.

We recommend a heating system for outdoor installations and conductor systems in humid plants. The heating consists of two heating cables which are arranged according to the illustration beside.

Attention: Switch on heating system below +5 °C ambient temperature.

The type of heating cable has to be calculated: heat output per heating cable between 20 – 25 W/m.

For longer heating distances the total length has to be devided into different heating sections. For shorter heating distances to feed with lower secondary voltage via transformer.



Heating capacity Watt/m: $N' = \frac{U^2}{R \cdot L^2}$

U = Supply voltage (Volt)

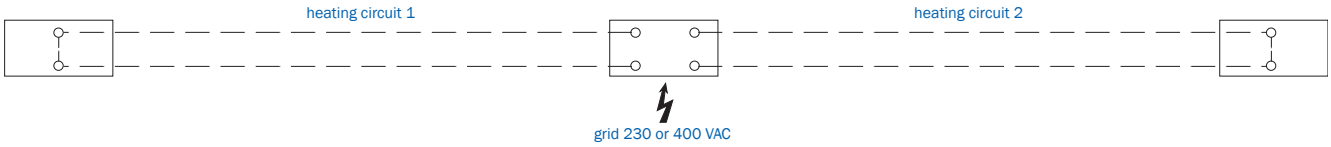
R = Resistance of heating cable (Ohm/m)

L = Length of heating section (m)

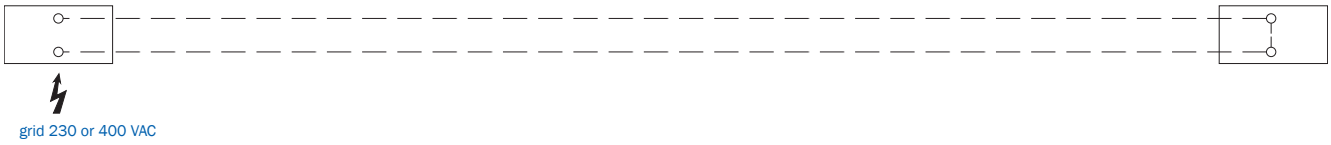
HEATING

Layout examples (depending on system situation)

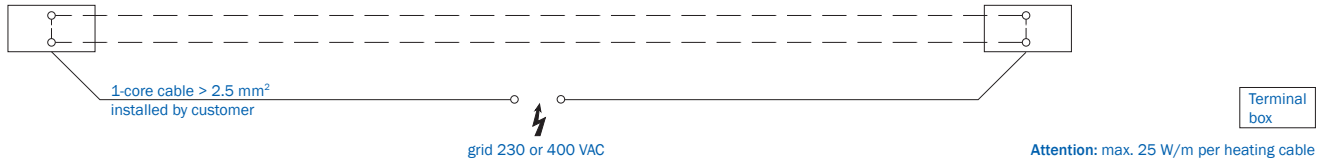
a) 2 heating circuits



b) 1 heating circuit



c) 2 heating circuits



Attention: max. 25 W/m per heating cable

Terminal boxes for heating

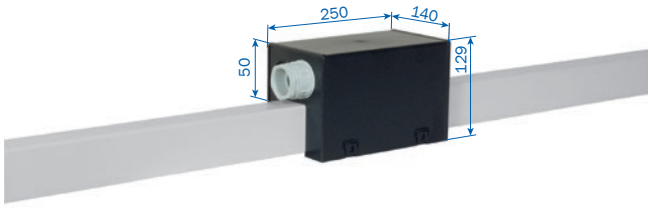
Type	Version	Cable gland Measurements see page 13	Order No.
BH-AKB-KBH-L	left end	M25	600155
BH-AKB-KBH-R	right end	M25	600156
BH-AKB-KBH-M	line feed	2 x M25	600065
BH-MA-KBH-MKL/H-LSV/G	1 set material for connecting clamps		195291

For each end feed box 2 sets of material for connecting ends are required.

For line feed you need 4 sets of material for connection ends.

Order for 60 m powerail – example c)

1) 122 m heating cable type H 2.0 (2 x 60 m and 2 x 1 m additional)
   Voltage 400 V, two heating circles parallel
   heating capacity as per above mentioned diagramm
   2x 22 W/m at 60 m 2x 22 W/m ~2640 W = 2,64 kW.



2) 1x junction box left end, 1x junction box right end

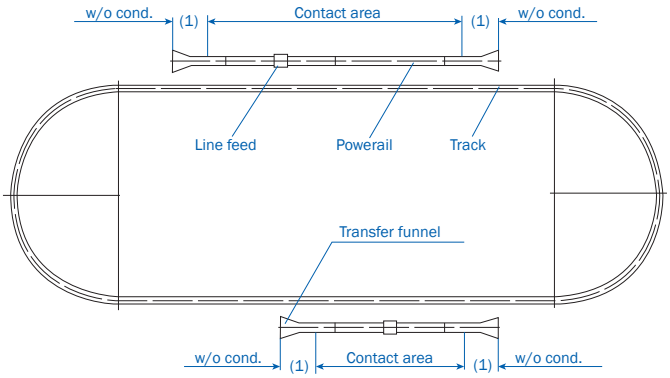
3) 4x sets of material for connection ends.

Switch gear assembly and temperature control unit as per customers inquiry.

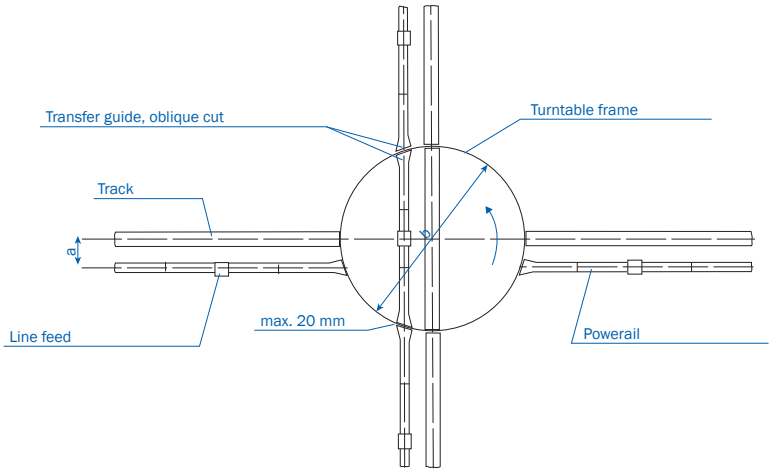
Fuses, cables etc. have to be provided by the customer.

CONTACT SECTIONS, TURNTABLES AND SWITCHES

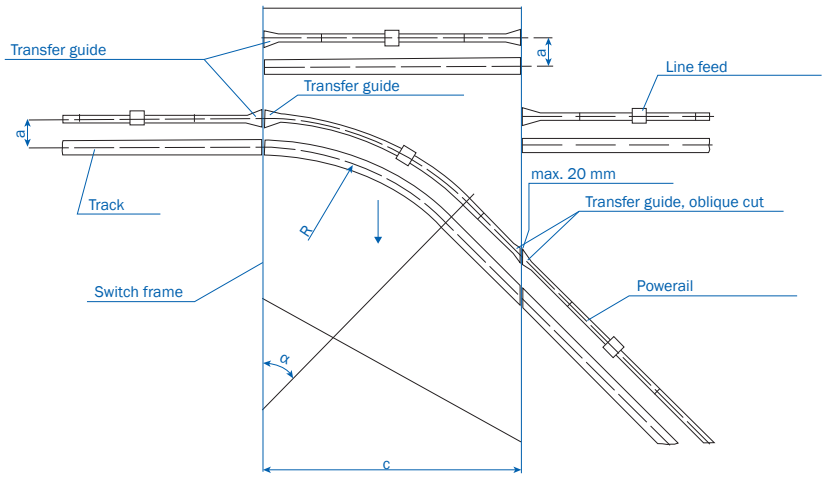
Contact section[1]



Turntable



Switch



Please submit drawings of transfer applications.

Specify dimensions a, b, c, R and angle α.

$\alpha = 50°$

Max. 20 mm air gap between transfer guides.

To create all parts for contact sections, turntables and switches we require detailed construction drawings.

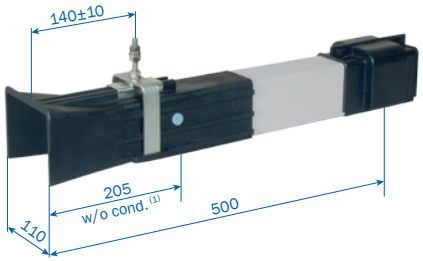
(1) Contact sections must not be activated before collectors are fully engaged.

TRANSFER FUNNELS

Transfer funnel

Conductor system should not be activated before the collectors carbons have complete contact with the conductors.

Offset:
- max. 10 mm horizontal
- max. 10 mm vertical



Max. speed for crossover of the current collector 60 m/min.

Hints for dimensioning the left-and right hand version refer to page 6 and 7.

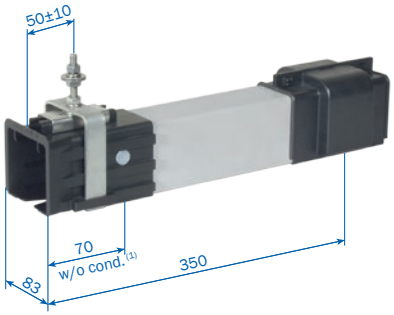
Type	Weight kg	Order No.	
		Left version	Right version
ET-KET4/63-125-L-HSC-500(2)	1.552	600285	-
ET-KET4/63-125-R-HSC-500(2)	1.493	-	600279
ET-KET4/160-L-HSC-500	1.636	600286	-
ET-KET4/160-R-HSC-500	1.562	-	600280
ET-KET4/200-L-HSC-500	1.786	600305	-
ET-KET4/200-R-HSC-500	1.688	-	600303
ET-KET5/63-125-L-HSC-500(2)	1.702	600288	-
ET-KET5/63-125-R-HSC-500(2)	1.632	-	600282
ET-KET5/160-L-HSC-500	1.784	600289	-
ET-KET5/160-R-HSC-500	1.701	-	600283
ET-KET5/200-L-HSC-500	1.934	600306	-
ET-KET5/200-R-HSC-500	1.823	-	600304
ET-KET4/63-L-SSD-500(2)	1.524	600287	
ET-KET4/63-R-SSD-500(2)	1.524	-	600281
ET-KET5/63-L-SSD-500(2)	1.524	600290	-
ET-KET5/63-R-SSD-500(2)	1.524	-	600284

(1) Corresponding to the center of collector
(2) Also suitable for former 40 A-version

TRANSFER GUIDES

Transfer guides, straight

Necessary with all types of double collectors or 2 single collectors.



Staggered arrangement of the transfer guides to each other:

- max. 5 mm horizontal
- max. 3 mm vertical

Max. speed for crossover of the current collector 80 m/min.

Hints for dimensioning the left-and right hand version refer to page 6 and 7.

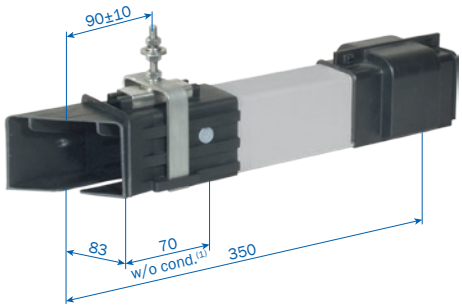
Type	Weight kg	Order No.	
		Left version	Right version
UE-KÜ4/63-125-L-HSC-350(2)	1.276	600261	-
UE-KÜ4/63-125-R-HSC-350(2)	1.276	-	600255
UE-KÜ4/160-L-HSC-350	1.351	600262	-
UE-KÜ4/160-R-HSC-350	1.351	-	600256
UE-KÜ4/200-L-HSC-350	1.490	600309	-
UE-KÜ4/200-R-HSC-350	1.490	-	600307
UE-KÜ5/63-125-L-HSC-350(2)	1.434	600264	-
UE-KÜ5/63-125-R-HSC-350(2)	1.434	-	600258
UE-KÜ5/160-L-HSC-350	1.509	600265	-
UE-KÜ5/160-R-HSC-350	1.509	-	600259
UE-KÜ5/200-L-HSC-350	1.648	600310	-
UE-KÜ5/200-R-HSC-350	1.648	-	600308
UE-KÜ4/63-L-SSD-350(2)	1.276	600263	-
UE-KÜ4/63-R-SSD-350(2)	1.276	-	600257
UE-KÜ5/63-L-SSD-350(2)	1.427	600266	-
UE-KÜ5/63-R-SSD-350(2)	1.427	-	600260

(1) Corresponding to the center of collector
(2) Also suitable for former 40 A-version

TRANSFER GUIDES AND CONDUCTOR DEAD SECTION

Transfer guides, oblique

Necessary with all types of double collectors or 2 single collectors.



Staggered arrangement of the transfer guides to each other:

- max. 5 mm horizontal
- max. 3 mm vertical

Measurements (oblique) and angle to be specified by customer

Max. speed for crossover of the current collector 80 m/min.

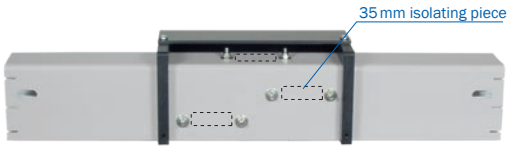
Hints for dimensioning the left-and right hand version refer to page 6 and 7.

Type(1)	Weight kg	Order No.	
		Left version	Right version
UE-KÜS4/63-125-L-HSC-350(2)	1.243	600273	-
UE-KÜS4/63-125-R-HSC-350(2)	1.243	-	600267
UE-KÜS4/160-L-HSC-350	1.324	600274	-
UE-KÜS4/160-R-HSC-350	1.324	-	600268
UE-KÜS4/200-L-HSC-350	1.517	600317	-
UE-KÜS4/200-R-HSC-350	1.517	-	600315
UE-KÜS5/63-125-L-HSC-350(2)	1.381	600276	-
UE-KÜS5/63-125-R-HSC-350(2)	1.381	-	600270
UE-KÜS5/160-L-HSC-350	1.447	600277	-
UE-KÜS5/160-R-HSC-350	1.447	-	600271
UE-KÜS5/200-L-HSC-350	1.668	600318	-
UE-KÜS5/200-R-HSC-350	1.668	-	600316
UE-KÜS4/63-L-SSD-350(2)	1.243	600275	-
UE-KÜS4/63-R-SSD-350(2)	1.243	-	600269
UE-KÜS5/63-L-SSD-350(2)	1.379	600278	-
UE-KÜS5/63-R-SSD-350(2)	1.379	-	600272

Conductor dead section

Please advise us which conductors should be disconnected (see page 6 and 7).

The dead section comes factory assembled.



Picture shows a isolating piece.

Air gap 5 mm		Isolating piece 35 mm	
Type(3)	Order No.	Type	Order No.
ST-KTL1...	600298	ST-KTI1...	600293
ST-KTL2...	600299	ST-KTI2...	600294
ST-KTL3...	600300	ST-KTI3...	600295
ST-KTL4...	600301	ST-KTI4...	600296
ST-KTL5...	600302	ST-KTI5...	600297

(1) Corresponding to the center of collector
(2) Also suitable for former 40 A-version
(3) Complete types e. g. ST-KTI3HS-L1/L2/L3-KSW for a 35 mm isolating piece with separation of cinductors L1, L2, L3 and 2 for the current collector KSW
→ Order No.: 600295

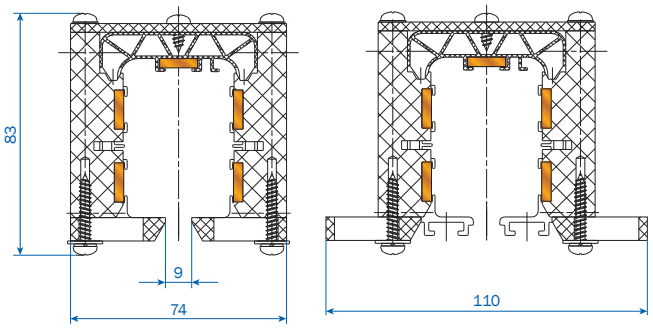
REMOVING SECTION

Removing section (incl. 1 m conductor section)

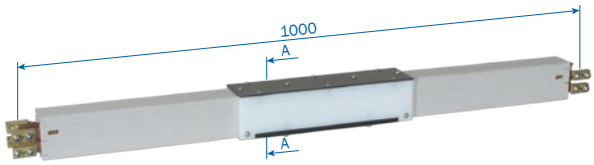
with special bolted joints for KBHF and KBHS on both ends.
Assembly and disassembly of the collector is possible at the end of the track as well as at the removing section.

By opening and closing the sliders at the bottom of the removing section housing the collector can be mounted and demounted easily.

Before opening disconnect mains. The removing section does not disconnect the conductor system electrically.



A-A close A-A open



For single collectors

Type	Weight kg	Order No.
AT-KAT4/63-125HSC-1000(1)	3.507	600165
AT-KAT4/160HSC-1000	3.763	600166
AT-KAT4/200HSC-1000	4.260	600327
AT-KAT5/63-125HSC-1000(1)	3.957	600167
AT-KAT5/160HSC-1000	4.213	600168
AT-KAT5/200HSC-1000	4.710	600328
AT-KAT4/63SSD-1000(1)	3.449	600169
AT-KAT5/63SSD-1000(1)	3.899	600170

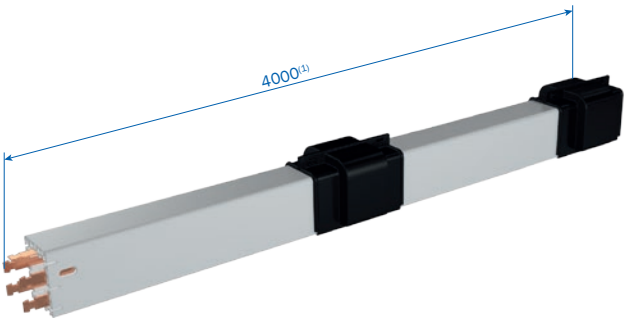
For double collectors

Type	Weight kg	Order No.
AT-KATD4/63-125HSC-1000(1)	4.330	600175
AT-KATD4/160HSC-1000	4.566	600176
AT-KATD4/200HSC-1000	5.050	600329
AT-KATD5/63-125HSC-1000(1)	4.780	600177
AT-KATD5/160HSC-1000	5.015	600178
AT-KATD5/200HSC-1000	5.501	600330
AT-KATD4/63SSD-1000(1)	4.312	600179
AT-KATD5/63SSD-1000(1)	4.762	600180

(1) Also suitable for former 40 A-version

MAINTENANCE SECTIONS

For maintenance work with KBH systems, collector removal and conductor bar replacement can be easily and quickly achieved with a maintenance section. Maintenance sections conveniently drop out or reinstall at existing runway installations. To obtain best possible accessibility at longer runways we recommend installing several maintenance repair sections at convenient intervals or locations.



Type	Weight kg	Order No.
RVT-KRT4/63-4000HSC	5.534	601005
RVT-KRT5/63-4000HSC	5.953	601007
RVT-KRT4/80-4000HSC	6.462	601006
RVT-KRT5/80-4000HSC	7.113	601008
RVT-KRT4/100-4000HSC	7.774	600811
RVT-KRT5/100-4000HSC	8.753	600812
RVT-KRT4/125-4000HSC	8.482	600813
RVT-KRT5/125-4000HSC	9.461	600814
RVT-KRT4/160-4000HSC	10.438	600816
RVT-KRT5/160-4000HSC	11.417	600817
RVT-KRT4/200-4000HSC	13.016	600801
RVT-KRT5/200-4000HSC	13.994	600802
RVT-KRT4/63-4000SSD	5.534	601009
RVT-KRT5/63-4000SSD	5.953	601010

(1) Standard length = 4000 mm; other lengths and also maintenance sections in curves (R_{min} = 1000 mm / L_{min} = 1000 mm) on request.

ANTI-CONDENSATION SECTION

Anti-condensation section

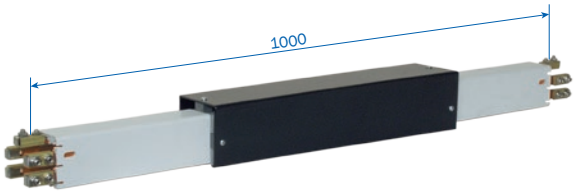
with special bolted joints for KBHF and KBHS at both ends.

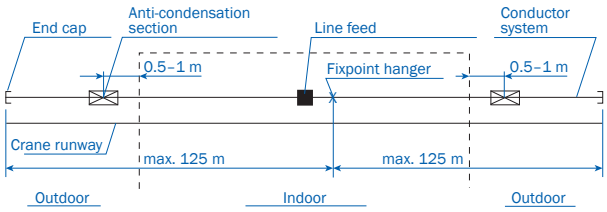
Application of anti-condensation section

The anti-condensation section will be used where conductor systems are passing from indoor to outdoor, preventing condensation of the outside mounted conductor section. The warm air from indoors can escape through the anti condensation section (see sketch). The anti-condensation section does not interrupt the conductor system electrically. Additional feeds are not required.

Assembly

The anti-condensation section is to be placed directly (0.5 m – 1 m max.) at the transfer point from indoor to outdoor (see sketch).





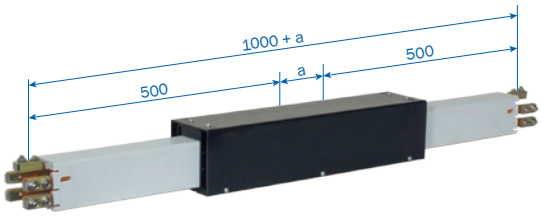
Type	Weight kg	Order No.
BT-KBT4/63-125HSC-1000(1)	3.573	600185
BT-KBT4/160HSC-1000	3.843	600186
BT-KBT4/200HSC-1000	4.358	600319
BT-KBT5/63-125HSC-1000(1)	3.805	600188
BT-KBT5/160HSC-1000	4.075	600189
BT-KBT5/200HSC-1000	4.590	600320
BT-KBT4/63SSD-1000(1)	3.573	600187
BT-KBT5/63SSD-1000(1)	3.805	600190

(1) Also suitable for former 40 A-version

EXPANSION SECTION

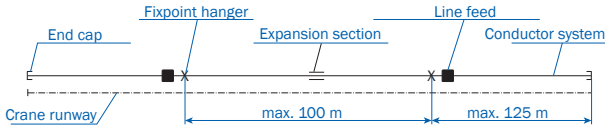
Expansion section

The Expansion sections are required to compensate the different expansions between copper conductors and steel- or concrete structures, in varying temperatures without interrupting electrical power.



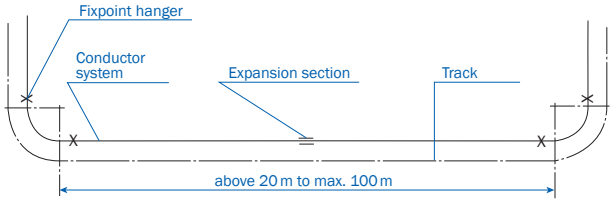
Expansion joints are used when the conductor length between feeds, curves, switches or other fix points is exceeding 20 m.

Max. length during differences in temperature:
Δ t 90 °C (–30 °C up to +60 °C)
Install one expansion joint per 100 m.
An additional expansion joint every 100 m.



Arrangement of fixpoints according to sketches.

The remaining conductor sections have to be arranged in sliding hangers. Additional feeds or current collectors are not required as the expansion-sections do not interrupt electrical power.



Assembly

The gap dimension “a” is 75 mm and is valid for an ambient temperature of –10 °C to +35 °C during installation.

Type	Weight kg	Order No.
DT-KD4/63-125HSC-1000(1)	4.540	600135
DT-KD4/160HSC-1000	4.752	600136
DT-KD4/200HSC-1000	5.034	600325
DT-KD5/63-125HSC-1000(1)	5.014	600138
DT-KD5/160HSC-1000	5.218	600139
DT-KD5/200HSC-1000	5.508	600326
DT-KD4/63SSD-1000(1)	4.540	600137
DT-KD5/63SSD-1000(1)	5.014	600140

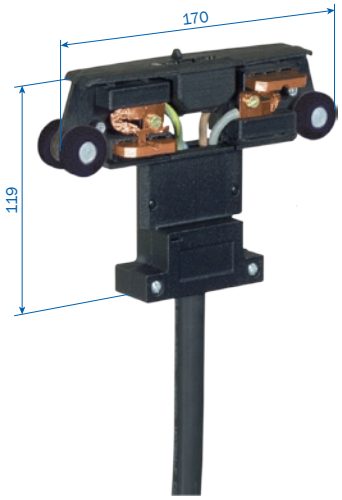
(1) Also suitable for former 40 A-version

SINGLE CURRENT COLLECTOR

Collector KSW

max. speed 150 m/min.

For conductor systems with sealing strip up to 100 m/min.



Connecting cable

for 25 A with 2.5 mm² / core

for 40 A with 4.0 mm² / core

for 60 A with 6.0 mm² / core

1 m long, longer cables on request.

Cleaning collector on request

Order example for a 2 m long cable

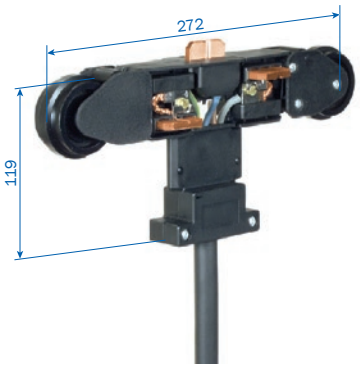
Order No. 600096-2 for collector SA-KSW4/40-2HS28-60

Type	Weight kg	Number of poles	Power rating at 60 % DC in A	Approx. diameter of connecting-cables in mm	Order No.
SA-KSW4/25-1HS28-60	0.552	4	25	13.0	600095
SA-KSW4/40-1HS28-60	0.656	4	40	15.0	600096
SA-KSW4/60-1HS28-40	0.797	4	60(1)	17.0	600066
SA-KSW5/25-1HS28-60	0.634	5	25	14.0	600098
SA-KSW5/40-1HS28-60	0.771	5	40	17.0	600099
SA-KSW5/60-1HS28-40	0.945	5	60(1)	19.0	600413
SA-KSW4/25-1SS28-60	0.472	4	25	11.0	600097
SA-KSW5/25-1SS28-60	0.534	5	25	12.0	600100

Collector KSWS

max. speed 250 m/min.

For conductor systems with sealing strip up to 100 m/min.



Connecting cable

for 25 A with 2.5 mm² / core

for 40 A with 4.0 mm² / core

for 60 A with 6.0 mm² / core

1 m long, longer cables on request.

Order example for a 2 m long cable

Order No. 600149-2 for collector SA-KSWS5/40-2HS28-60

Type	Weight kg	Number of poles	Power rating at 60 % DC in A	Approx. diameter of connecting-cables in mm	Order No.
SA-KSWS4/25-1HS28-60	0.664	4	25	13.0	600145
SA-KSWS4/40-1HS28-60	0.768	4	40	15.0	600146
SA-KSWS4/60-1HS28-40	0.942	4	60(1)	17.0	600416
SA-KSWS5/25-1HS28-60	0.724	5	25	13.5	600148
SA-KSWS5/40-1HS28-60	0.861	5	40	16.0	600149
SA-KSWS5/60-1HS28-40	1.035	5	60(1)	19.0	600417
SA-KSWS4/25-1SS28-60	0.584	4	25	11.0	600147
SA-KSWS5/25-1SS28-60	0.624	5	25	12.0	600150

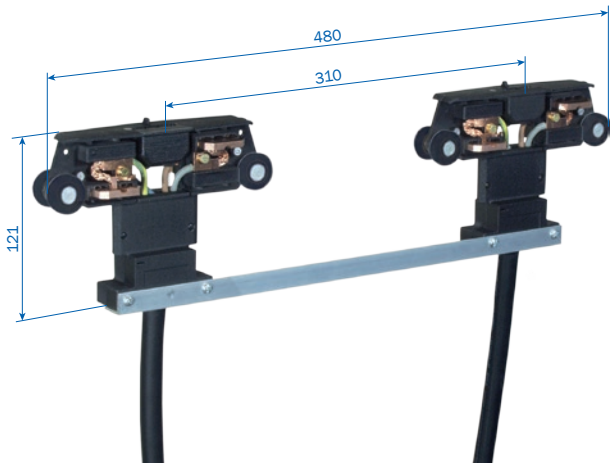
(1) At 40 % DC

DOUBLE COLLECTOR AND TOW ARMS

Double collector DKSW (max. speed 150 m/min.)

Also for conductor systems with sealing strip up to 100 m/min.

The double collectors are supplied as an assembly kit consisting of 2 collectors (KSW) and a connecting bar with mounting material. For the collector KSWS there are no double collectors available 2 single collectors must be used instead.



Connecting cable

for 50 A with (2x) 2.5 mm²/core

for 80 A with (2x) 4.0 mm²/core

for 120 A with (2x) 6.0 mm²/core

1 m long, longer cables on request.

Order example for 2 m long cables

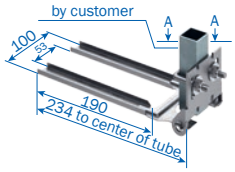
Order No. 600119-2 for collector SA-DKSW5/80-2HS28-60

For curves use single collectors only.

Type	Weight kg	Number of poles	Power rating at 60 % DC in A	Approx. diameter of connecting-cables in mm	Order No.
SA-DKSW-4/50-1HS28-60	1.215	4	50	12.5	600115
SA-DKSW4/80-1HS28-60	1.423	4	80	14.5	600116
SA-DKSW4/120-1HS28-40	1.705	4	120(1)	17.0	600414
SA-DKSW5/50-1HS28-60	1.379	5	50	13.5	600118
SA-DKSW5/80-1HS28-60	1.653	5	80	16.0	600119
SA-DKSW5/120-1HS28-40	2.001	5	120(1)	19.0	600415
SA-DKSW4/50-1SS28-60	1.055	4	50	11.0	600117
SA-DKSW5/50-1SS28-60	1.179	5	50	12.0	600120

A-A
Version with square hollow profile (without adapter plate)

A-A
Version with tube(2)



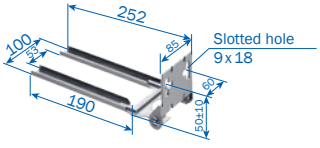
Tow arm

Installation options of 30 mm square-, hollow profile or tube with 30–34 mm

Type	Weight kg	Order No.
MN-MGUN	0.436	600887
MN-MGU/K(3)	0.550	600336

Tow arm

Installation option for plane surface



Type	Weight kg	Order No.
MN-MGFN	0.328	600888
MN-MGF/K(3)	0.442	600337

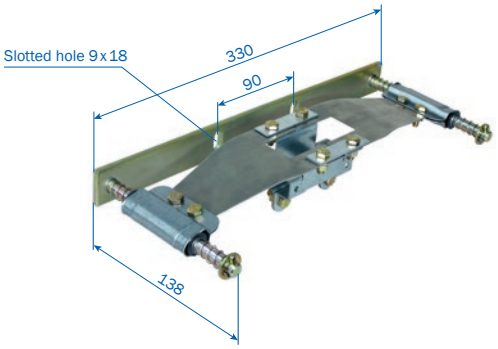
(1) At 40 % DC
(2) For assembly use enclosed adapter plate
(3) Stainless steel

FLEXIBLE TOW ARM

Flexible tow arm

Flexible support type for single collector for installations with transfer funnels type KET (see page 17). Measurements for installation see below.

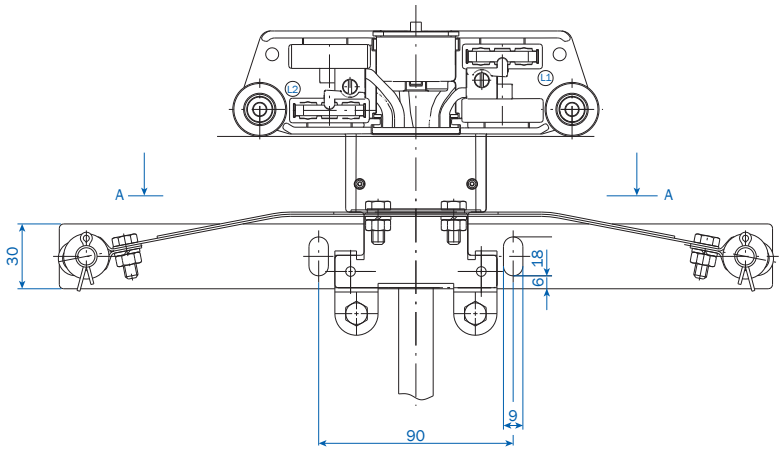
If you are going to use the flexible towing arm in system with curves please contact us.

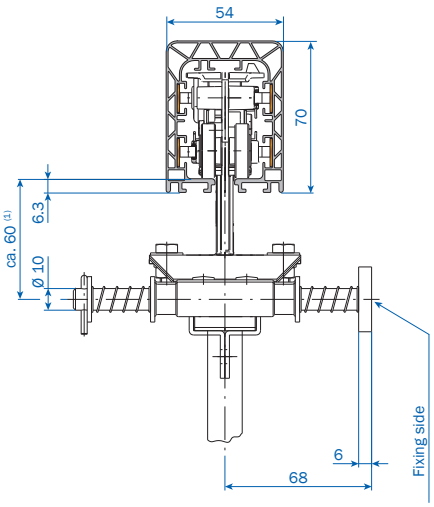


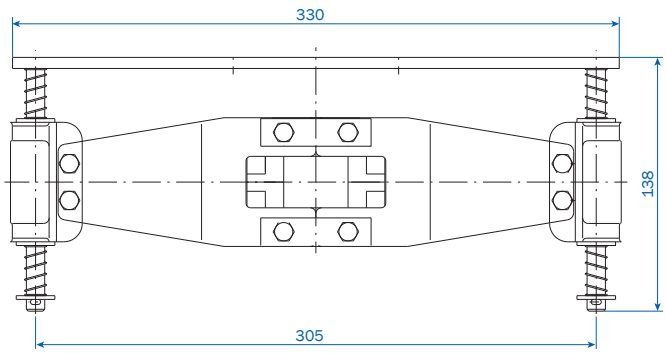
Type	Weight kg	Order No.
MN-KFMHN	1.067	600558

Arrangement of a flexible tow arm

KFMHN with collector type KSW







max. horizontal offset 10 mm

max. vertical offset 10 mm

(1) To be fixed during installation.

EXAMPLES FOR ORDERING

Installation length of 64 m KBH... (configuration see page 6 and 7)

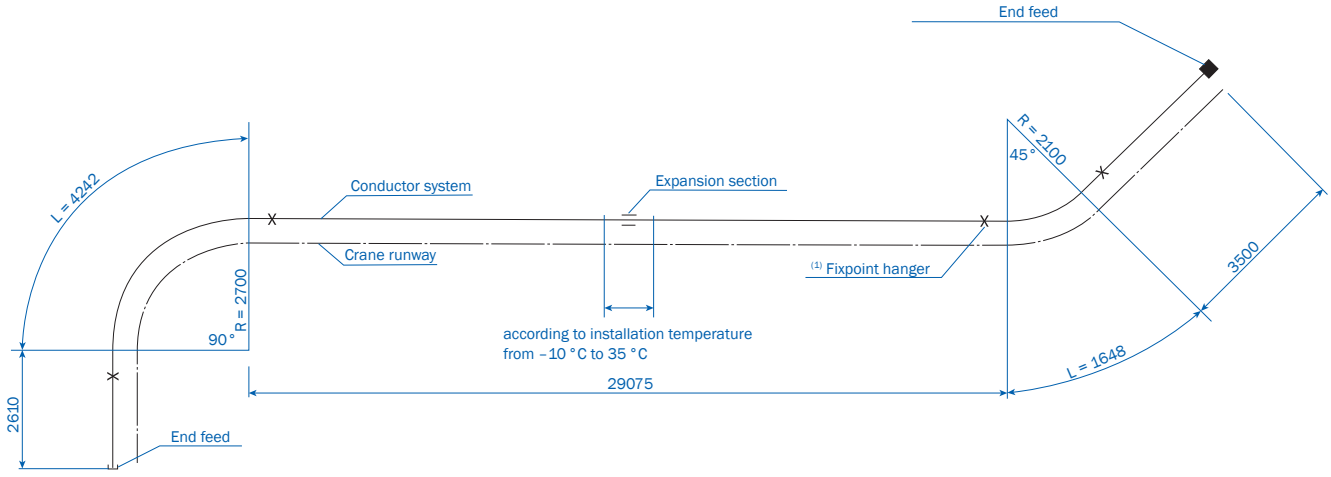
Quantity	Article	KBHF4/80-....HSC with end feed		KBHF5/100-....HSC with line feed		KBHS5/160-....HSC with line feed incl. 1 m conductor section	
		Type	Order No.	Type	Order No.	Type	Order No.
16	conductor section, 4 m long	KBHF4/80-4000HSC	600984	KBHF5/100-4000HSC	600124	-	-
15	conductor section, 4 m long	-	-	-	-	KBHS5/160-4000HSC	600184
1	conductor section, 3 m long	-	-	-	-	KBHS5/160-3000HSC	600183
1	End feed	ES-KKE4/63-80HS	600010	-	-	-	-
1	Line feed	-	-	ES-KSE5/100HS-L	600039	-	-
1	Line feed, 1 m long	-	-	-	-	ES-KELS5/ 160HSC-1000-2	600079
1	End cap	EK-KE	600008	-	-	-	-
2	End cap	-	-	EK-KE	600008	EK-KE	600008
15	Joint cap	VM-KVM	600005	-	-	-	-
14	Joint cap	-	-	VM-KVM	600005	-	-
16	Joint cap	-	-	-	-	VM-KVM	600005
1	Fixpoint hanger	AH-KFA	600007	AH-KFA	600007	AH-KFA	600007
32	Sliding hanger	AH-KGA	600000	AH-KGA	600000	AH-KGA	600000
1	Current collector	SA-KSW4/40-1HS28-60	600096	SA-KSW5/ 40-1HS28-60	600099	SA-KSW5/ 40-1HS28-60	600099
1	Tow arm	MN-MGU	600334	MN-MGU	600334	MN-MGU	600334

EXAMPLES FOR ORDERING

Installations with curves as per customer drawing

41.075 m conductor system.

Quan-tity	Article	KBHF4/80-....HSC		KBHS5/80-....HSC	
		Type	Order No.	Type	Order No.
7	Conductor system, 4 m long	KBHF4/80-4000HSC	600984	KBHS5/80-4000HSC	601074
1	Conductor system, 4 m long for 1 x 3500 mm short length	KBHF4/80-4000HSC	600984	KBHS5/80-4000HSC	601074
1	Conductor system, 3 m long for 1 x 2610 mm short length	KBHF4/80-3000HSC	600983	KBHS5/80-2000HSC	601073
1	Conductor system, 2 m long for horizontal curve 45 °, R = 2100 mm, L = 1648 mm, SA	KBHF4/80-2000HSC	600982	KBHS4/125-2000HSC	601072
2	Conductor system, 3 m long for horizontal curve 2 x 45 °, R = 2700 mm, L = 2121 mm, SI	KBHF4/80-3000HSC	600983	KBHS5/80-3000HSC	601073
1	End feed	ES-KKE4/63-80HS	600010	ES-KKE5/63-80HS	600107
1	Expansion section	DT-KD4/63-125HSC-1000	600135	DT-KD5/63-125HSC-1000	600138
11	Joint cap	VM-KVM	600005	VM-KVM	600005
4	Fixpoint hanger	AH-KFA	600007	AH-KFA	600007
24	Sliding hanger	AH-KGA	600000	AH-KGA	600000
1	End cap	EK-KE	600008	EK-KE	600008
1	Current collector	SA-KSW4/40-1HS28-60	600096	SA-KSW5/40-1HS28-60	600099
1	Tow arm	MN-MGF	600335	MN-MGF	600335



(1) Rest of conductor system to be installed with sliding hangers

SPARE PART LIST

Spare part list for conductor system

Type		KBHF Order No.	KBHS Order No.
VM-KVM	Joint cap (pair)	600005	600005
VM-STV13/63-100 A-KBHF/MKHF(1)	Spring loades connector 63–100 A	600483	-
VM-SCHV13/63-200 A-KBHS/MKHS/MKLS(1)	Bolted joints 63–160 A	-	262018
VM-SCHV13/200 A-KBHS	Bolted joints 200 A	-	600712
DL-D-KBH-MKH-MKL-TDV	Neoprene sealing strip, in pairs (max. length 40 m each)	600551	600551
DL-V-KSLT-KBH-MKL/H-LSV/G	Coupling for sealing strip, in pairs (for lengths <40 m each)	258300	258300
DL-F-KBH	Fixing clamp for sealing strip (1 per end)	600354	600354
DL-EZRD-KBH	Mounting glider for sealing strip (>10 m system length)	600109	600109
AK-KKE-MKE13/63-80-SO(1)	Feed terminal for end feed (63/80 A)	600006	600006
AK-KSE-KEF-KES13/63-100 A-S-70.2	Feed terminal for line feed (lateral)	600017	600017
AK-KSE-KEF-KES13/63-100 A-O-67.2	Feed terminal for line feed (on top, 5th conductor)	600016	600016

Spare part list for current collector

Type		KSW / DKSW Order No.	KSWS Order No.
SK-KSW-MSWA-PH/SU-28	Carbon brush phase (lateral)	600088	600088
SK-KSW-PH/O-28	Carbon brush 5th conductor (top)	600089	600089
SK-KSW-MSWA-PE/S-28	Carbon brush ground (lateral PE)	600090	600090
SA-KF-KSW-MSWA-SP	Carbon pressure spring (standard), suitable for all carbon brushes	600338	600338
TR-DKSW-SB310	Connecting bar for double collector DKSW	600105	-
SA-ZB-AS-KSW-P-250	Assembly kit KSWS	-	600106
SA-ZB-DG-KSW-S	Sealing strip slide plate for collectors KSW	600640	600640

Cleaning accessories on request

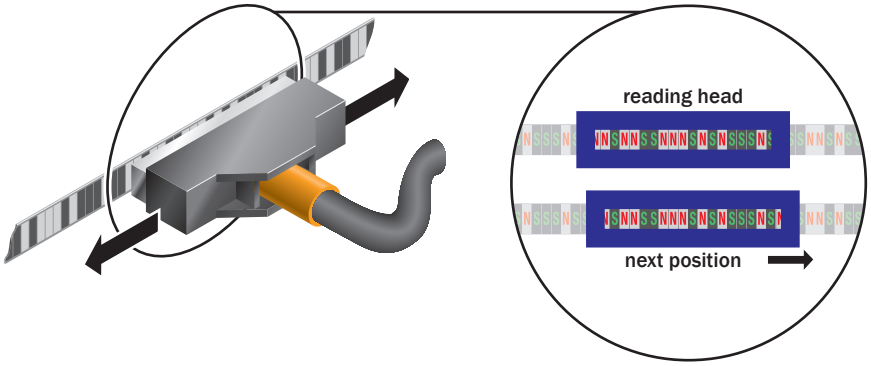
(1) Also suitable for former 40 A-version

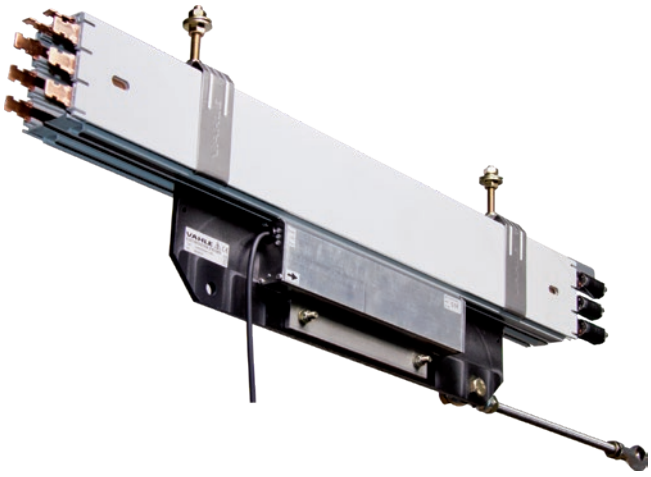
APOS POSITIONING SYSTEM

were developed for automated handling systems in material flow technology.

The control system can constantly query the absolute position of the mobile consumer.

The APOS Positioning system can be used in connection with the VAHLE Powercom® data transmission system.





Features

- absolute position determination up to and 262 m
- Systems for exceeded lengths on request
- Space-saving solutions for integration into the powerail system or for installation in parallel to the runway
- retrofittable
- absolute position immediately available when switching on or after a power failure
- reliable position detection even in humid or dusty environments
- trouble-free functionality even in poor lighting conditions
- travel speed up to 250 m/min
- no wear (contactless)

For more information see our catalog VAHLE APOS® (7a)

VAHLE POWERCOM®

VAHLE Powercom®-Data transmission systems in conjunction with VAHLE conductor bars or sliprings were developed for automated handling systems in material flow technology. They enable the uninterrupted and cost effective data transfer between the central control system and the accompanying automation devices on the conveying vehicles. The VAHLE Powercom® data transmission system can be used in connection with the VAHLE Powercom® data Transmission system.

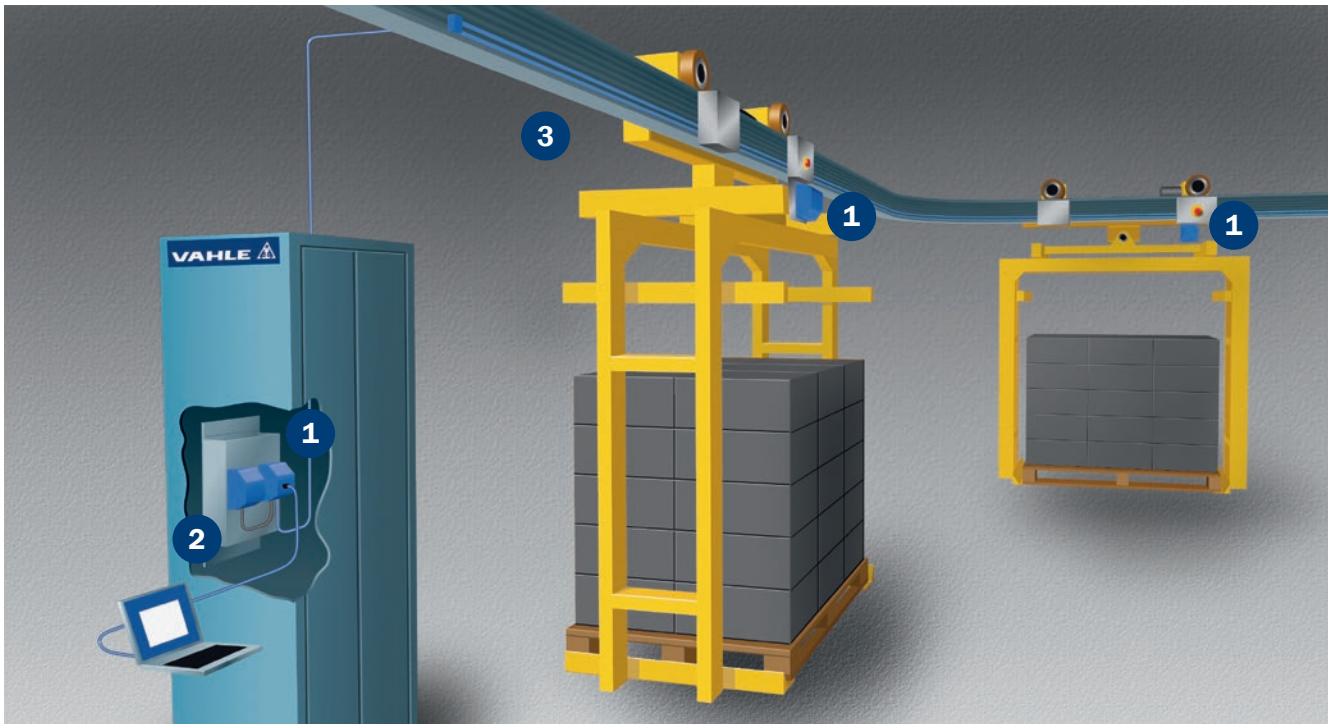
19.2 kbps

VAHLE Powercom® 485

- RS 485 Interface (transparent protocol)
- to be used in various BUS-Systems.
- Transfer rate 19.2 kbps

For more information see our catalog VAHLE Powercom® (6a)

Example of use



1 VAHLE Powercom®
2 VAHLE Powercom® Double filter
3 VAHLE Powercom® Terminal resistance

QUESTIONNAIRE

Company: _____ Date: _____

Phone: _____ Fax: _____

Email: _____ Website: _____

1. Number of conductor system installations: _____
2. Type of equipment to be powered: _____
3. Operating voltage: _____ Volt Frequency: _____ Hz

   ☐ Three-phase voltage ☐ AC voltage ☐ DC voltage
4. Track length: _____
5. Number of conductors: _____ neutral: _____ control: _____ ground: _____
6. Mounted position of conductor system:

   ☐ Conductor system pendant, collector cable facing to the bottom ☐ Conductor system pendant, lateral payout of conductor cable(1)

   ☐ Support distance _____ m (max. 2 m) ☐ Other: _____
7. Number of consumers per system: _____
8. ☐ Indoor system ☐ Outdoor system
9. Other operating conditions (humidity, dust, chemical influence, etc.) _____
10. Ambient temperature: _____ °C min. _____ °C max.
11. Hall expansion joints _____ pieces _____ expansion max.
12. Position and number of feeding points(1): _____
13. Position and number of isolating sections (e. g. for maintenance)(1): _____
14. How will the conductor be arranged?(1): _____
15. Brackets required: ☐ Yes ☐ No c/c distance beam/conductor system: _____
16. Travel speed: _____ m/min. in curves: _____ m/min. at transfers: _____ m/min.
17. Max. voltage drop from the conductor system feed point to the consumer considering starting current. _____
18. Power consumption of the individual consumer loads: _____

Motor data	Crane 1							Crane 2						
	Power kW	Nominal current			Starting current		Type of motors (2)	Power kW	Nominal current			Starting current		Type of motors (2)
		A	cos φN	% duty	A	cos φA			A	cos φN	% duty	A	cos φA	
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

Mark with * those motors which can run simultaneously.

Mark with Δ those motors which can start up simultaneously.

Further remarks: _____

_____

Signature:

(1) For curved tracks, powerail with isolating sections etc., we require sketches to enable us to prepare a quotation

(2) Use: K for squirrel cage motor, S for slipring motor, F for frequency controlled motor

Please copy and fill in the questionnaire.

PICTURES OF PLANTS

NOTES

NOTES

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Westicker Str. 52
59174 Kamen
Germany

+49 2307 7040
info@vahle.com
vahle.com

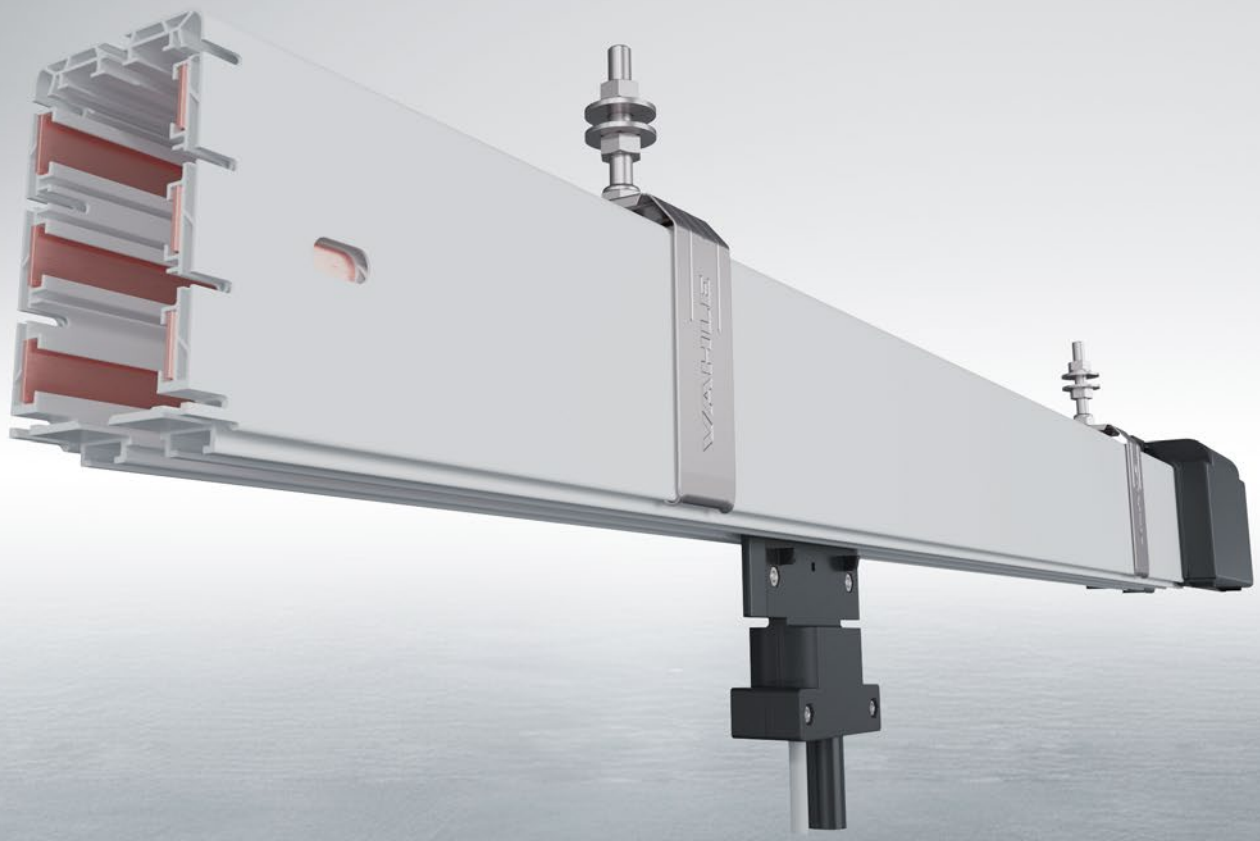
You can find your local contact at:
vahle.com/contact

W2507640/00/en | Rev.03 | 03/24 | Errors and technical modifications subject to change.

VAHLE

MKH

ENCLOSED CONDUCTOR SYSTEM



4C | EN 2022

ENCLOSED CONDUCTOR SYSTEM MKH

Content

Description of the conductor system

The VAHLE conductor system MKH ... is a totally enclosed conductor system for indoor and outdoor use. The insulated housing can accommodate different copper sections.

Type MKHD 6-pole up to 10-pole conductor version, continuous copper strips from 63 to 160 A
(copper strips come as separate items as coils).

Type MKHF 6-pole up to 8-pole conductor version, with preassembled copper conductors and spring loaded connectors from 63 to 100 A.

Type MKHS 6-pole up to 8-pole conductor version, with preassembled copper conductors and bolted joints from 63 to 200 A.

A compact design, corrosion resistance and easy installation are the main characteristics. The MKH complies with VDE, european and international standards as well as accident prevention regulations. It is protected to IP 23 standards. The MKH can be supplied with sealing strip and heating system. The conductor system with sealing strip is protected to IP 24 standards and EN 60529 (0470, part 1) regulation.

Collectors are safe against touch only when fully entered into the conductor system. If there is the possibility to touch live parts by hand, ie. collectors that might leave the powerail during operation, provide safety barrier or disconnect mains. This is valid only for a supply voltage exceeding 24 V AC or 60 V DC.

Cross-sections other than those shown on pages 5 and 6 are possible. If the cross-section of the N-conductor is smaller than the cross-section of the outer conductor, it is necessary to protect it against overcurrent and short circuit, design according to IEC60364-4-43 (HD 60364-4-43).

Low voltages of max. 50 V AC or 120 V DC are valid if the conductor system is only used as control line (type...SSD). Refer to regulation SELV or PELV (also DIN VDE 0100-410). A ground conductor is required for higher voltages.

Applications

Mobile power feeding of overhead cranes, monorail systems, electric hoists, electric power tools, machine tools, automated storage and retrieval systems, assembly and test lines, hangar doors, studio and station lighting systems and many others.

Approvals

UL-approved

Housing

Color grey, plastic housing for 6 to 10 conductors.
Standard section 4 m. Other sections are available. The ground conductor is identified by international color code.
Phase reversing prevented by design of the collector and housing.
Higher number of conductors possible by combination of several conductor systems.

Couplings

Through plastic joint caps.

TECHNICAL DATA

Feed sets

Through line feeds or end feeds.

When selecting the “overload” protection devices, selection has to be made according to DIN VDE 0100 part 530.

Continuity of the ground conductor

The continuity of the ground conductor has to be guaranteed as per regulation EN60204-32 for conductor rails.

Runways of lifting devices may not be used as ground conductor, only an additional connection is permissible. Therefore a continuous ground conductor is required.

End sections

End section incl. end cap for MKHD and end caps for MKHF and MKHS.

Hangers

The brackets are installed to the crane track (see page 11).

The conductor rails are located in sliding and fixpoint hangers.

Max. support distance with the following ambient temperatures:

- Indoor systems and covered outdoor systems: ≤35 °C = 2.00 m
- Indoor and outdoor systems with and without heating: >35 °C = 1.33 m
- Cold and frozen storage warehouses: ≤ 0 °C = 1.33 m

It is necessary to provide at least one additional hanger on the sections of the feeds (line feeds), removing sections, anti-condensation sections and expansion sections (1 m sections). This prevents any sagging of the conductor conductor system.

Expansion during temperature fluctuation

Housing-expansion section without electrical isolation for MKHD.

Expansion section (Housing and Cu) without electrical isolation for MKHF and MKHS.

Anti-condensation sections

For combined indoor/outdoor applications use anti-condensation sections. They do not interrupt electric conductors.

Contact sections, turntables, switches

Conductor systems with entry funnels or transfer guides (see pages 19–22).

Sectionalizing

Conductor dead sections are electrical interrupts of the conductor. Under normal operating conditions a cross over with collectors to switch the voltage off or on is only allowed with low power ratings (control current). The conductors can be seperated through air gaps (5 mm) or insulating pieces (35 mm). With the air gap the collector carbon bridges the gap, e. g. for mains. The insulating piece is longer than the carbon and each conductor rail section can be separated electrically, e.g. for control.

Double isolating sections are recommended to guarantee safely separated conductor sections as per EN 60204.

Collectors

The current collectors are made of re-inforced polyester fiberglass, for high strength and light weight. Spring loaded carbon brushes maintain uniform contact. Connecting cables and hinged or flexible towing arms included.

The length of the connecting cable may not exceed 3 m if the added overload protection device is not designed for the load capacity of this cable. Refer also to regulation VDE 0100, part 430 and EN 60204-32. (Note: this occurs often with several collectors per system).

With following system requirements double collectors have to be used

- as proper measure to fulfil the continuity of the ground conductor system via carbon brushes. Refer to regulation DIN EN 60204-1:2007-06 and DIN EN 60204-32:2009-03
- Transfers with switches and turntables
- Operational voltage below 50 V
- Frequency controlled drives
- Transmission of signals
- High electrical loads

PLEASE NOTE

For use in galvanizing and pickling plants, under agressive conditions and low voltage applications we would appreciate receiving detailled information,especially of the environmental conditions.

For quotations and order processing including Powerail systems with curves, dead sections, turntables, switches etc. we require your drawings or sketches. Please use our questionnaire, page 39.

In case of special environmental conditions the PVC – housing can be equipped with stainless steel conductors (refer to page 33).
Please send detailed information. For low voltage applications please consult our factory.

TECHNICAL DATA

Conductor system values: electrical data

Max. continuous current	Nominal voltage (UL)	Dielectric strength	Spec. resistance	Surface resistance	Leakage resistance
200 A (with 80 % ED)	690 V (600 V)	IEC 60243 30–40 kV/mm	IEC 60093 5×10^{15} Ω/cm	IEC 60093 10^{13} Ω	EN 60112 CTI 400-2.7

Conductor system values: mechanical data

Flexible strength	Tensile strength	Ambient temperature	Flammability	Resistance to chemicals (at 45 °C)
75 N/mm² ±10 %	40 N/mm² ±10 %	−30 °C up to +60 °C	flame retardant, self extinguishing, UL 94 V0	Gasoline, mineral oil, grease, acid sulfur up to 50 %, caustic soda up to 25 % and hydrochloric acid up to 50 %, concentrated

Correction factor ƒT

Ambient temperature °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C
Correction factor ƒT Standard shrouding	1	0.95	0.89	0.84	0.77	0.71

Voltage drop for the conductor

For three-phase current $\Delta U = \sqrt{3} \cdot I \cdot I_A \cdot Z$

For alternating current $\Delta U = 2 \cdot I \cdot I_A \cdot Z$

For direct current $\Delta U = 2 \cdot I \cdot I_A \cdot R$

Z = impedance [Ω/km]
R = resistance [Ω/km]
I = feed length [km]
I_A = inrush current of installation in amperes

Permissible continuous current of the conductor

$I_{Dzul.UT} = I_{zul.} \times ƒT[A]$ mit $I_{Dzul.UT} > I_{DA}$

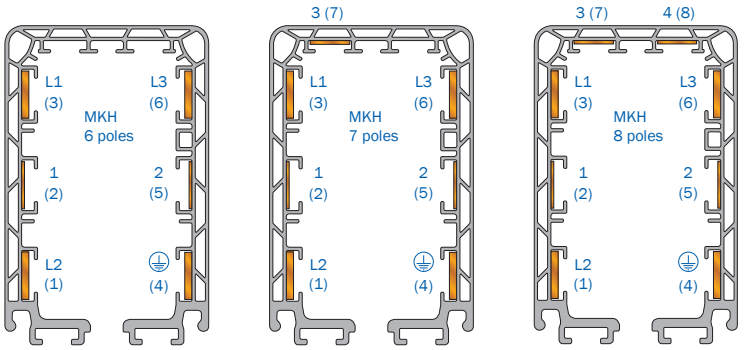
$I_{Dzul.UT}$ = permissible continuous currentat at ambient temperature
$I_{zul.}$ = permissible continuous currentat at 35 °C (catalogue value)[A]
$ƒT$ = temperature correction factor

TECHNICAL DATA

MKHD/MKHF/MKHS

Cross sections[1]

In case of using a neutral conductor copper pos. 1 will be taken. Layout of the system on request. (see page 3)



Type[2] (HS with PE / SS without PE)	No. of poles	Copper cross section mm²				Ampere rating with 35 °C in A, L1, L2, L3[5]			Nominal voltage V[4]	Impedance at 50 Hz 20 °C Ω/1000 m		Resistance at 20 °C Ω/1000 m		Leakage distance mm
		Phase L1, L2, L3	⏚	Control line		60 % ED	80 % ED	100 % ED		Phase L1, L2, L3	⏚	Phase L1, L2, L3	⏚	
MKH ... 6/63-HSC	6	3 x 10	10	2 x 10		81	70	**63**	690	1.731	1.731	1.717	1.717	30
MKH ... 6/63-SSD	6			6 x 10		81	70	**63**	690	1.731		1.717		30
MKH ... 6/80-HSC	6	3 x 17	17	2 x 10		103	89	**80**	690	1.078	1.078	1.057	1.057	30
MKH ... 6/100-HSC	6	3 x 26	26	2 x 10		129	112	**100**	690	0.717	0.717	0.687	0.687	30
MKH ... 6/140-HSC	6	3 x 33	26	2 x 10		161	**140**	125	690	0.586	0.717	0.549	0.687	30
MKH ... 6/160-HSC	6	3 x 42	26	2 x 10		184	**160**	143	690	0.473	0.717	0.429	0.687	30
MKH ... 6/200-HSC[3]	6	3 x 51	26	2 x 10		231	**200**	179	690	0.393	0.717	0.344	0.687	30
MKH ... 7/63-HSC	7	3 x 10	10	2 x 10	1 x 11	81	70	**63**	690	1.731	1.731	1.717	1.717	30
MKH ... 7/63-SSD	7			6 x 10	1 x 11	81	70	**63**	690	1.731		1.717		30
MKH ... 7/80-HSC	7	3 x 17	17	2 x 10	1 x 11	103	89	**80**	690	1.078	1.078	1.057	1.057	30
MKH ... 7/100-HSC	7	3 x 26	26	2 x 10	1 x 11	129	112	**100**	690	0.717	0.717	0.687	0.687	30
MKH ... 7/140-HSC	7	3 x 33	26	2 x 10	1 x 11	161	**140**	125	690	0.586	0.717	0.549	0.687	30
MKH ... 7/160-HSC	7	3 x 42	26	2 x 10	1 x 11	184	**160**	143	690	0.473	0.717	0.429	0.687	30
MKH ... 7/200-HSC[3]	7	3 x 51	26	2 x 10	1 x 11	231	**200**	179	690	0.393	0.717	0.344	0.687	30
MKH ... 8/63-HSC	8	3 x 10	10	2 x 10	2 x 11	81	70	**63**	690	1.731	1.731	1.717	1.717	30
MKH ... 8/63-SSD	8			6 x 10	2 x 11	81	70	**63**	690	1.731		1.717		30
MKH ... 8/80-HSC	8	3 x 17	17	2 x 10	2 x 11	103	89	**80**	690	1.078	1.078	1.057	1.057	30
MKH ... 8/100-HSC	8	3 x 26	26	2 x 10	2 x 11	129	112	**100**	690	0.717	0.717	0.687	0.687	30
MKH ... 8/140-HSC	8	3 x 33	26	2 x 10	2 x 11	161	**140**	125	690	0.586	0.717	0.549	0.687	30
MKH ... 8/160-HSC	8	3 x 42	26	2 x 10	2 x 11	184	**160**	143	690	0.473	0.717	0.429	0.687	30
MKH ... 8/200-HSC[3]	8	3 x 51	26	2 x 10	2 x 11	231	**200**	179	690	0.393	0.717	0.344	0.687	30

(1) Numbers in paranthesis apply to control line
(2) Complete types e.g. MKH ... 7/63HSC for 7 poles with bolted joints
(3) only for MKHS
(4) Nominal voltage UL = 600 V
(5) Power consumption UL on request

TECHNICAL DATA AND STANDARD SECTIONS

MKHD/MKHF/MKHS

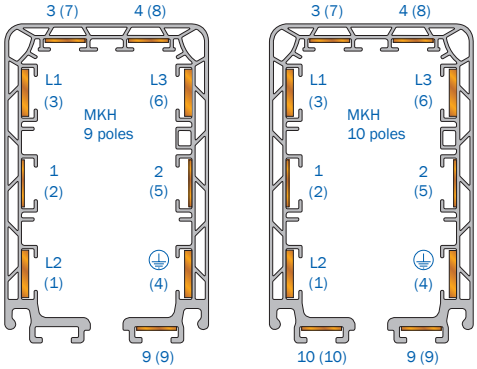
Cross sections[1]

In case of using a neutral conductor copper pos. 1 will be taken.

Layout of the system on request.

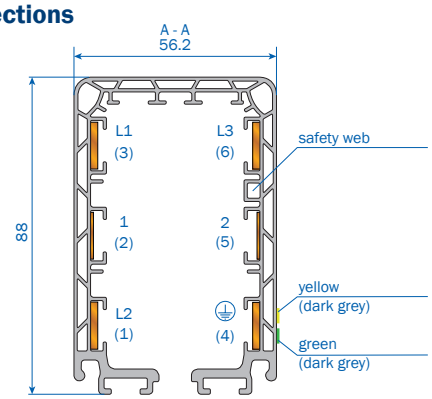
Pole 9 and 10 for max. 24 V

AC or 60 V DC.

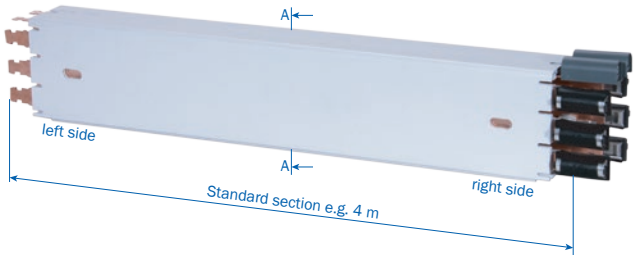


Type	No. of poles	Copper cross section mm²				Ampere rating with 35 °C in A, L1, L2, L3[3]			Nominal voltage V	Impedance at 50 Hz 20 °C Ω/1000 m		Resistance at 20 °C Ω/1000 m		Leakage distance mm
		Phase L1, L2, L3	⏚	Control line		60 % ED	80 % ED	100 % ED		Phase L1, L2, L3	⏚	Phase L1, L2, L3	⏚	
MKHD ... 9/63-HSC	9	3 x 10	10	2 x 10	3 x 11	81	70	**63**	690	1.731	1.731	1.717	1.717	30
MKHD ... 9/63-SSD	9			6 x 10	3 x 11	81	70	**63**	690	1.731		1.717		30
MKHD ... 9/80-HSC	9	3 x 17	17	2 x 10	3 x 11	103	89	**80**	690	1.078	1.078	1.057	1.057	30
MKHD ... 9/100-HSC	9	3 x 26	26	2 x 10	3 x 11	129	112	**100**	690	0.717	0.717	0.687	0.687	30
MKHD ... 9/140-HSC	9	3 x 33	26	2 x 10	3 x 11	161	**140**	125	690	0.586	0.717	0.549	0.687	30
MKHD ... 9/160-HSC	9	3 x 42	26	2 x 10	3 x 11	184	**160**	143	690	0.473	0.717	0.429	0.687	30
MKHD ... 10/63-HSC	10	3 x 10	10	2 x 10	4 x 11	81	70	**63**	690	1.731	1.731	1.717	1.717	30
MKHD ... 10/63-SSD	10			6 x 10	4 x 11	81	70	**63**	690	1.731		1.717		30
MKHD ... 10/63-HSC	10	3 x 17	17	2 x 10	4 x 11	103	89	**80**	690	1.078	1.078	1.057	1.057	30
MKHD ... 10/100-HSC	10	3 x 26	26	2 x 10	4 x 11	129	112	**100**	690	0.717	0.717	0.687	0.687	30
MKHD ... 10/140-HSC	10	3 x 33	26	2 x 10	4 x 11	161	**140**	125	690	0.586	0.717	0.549	0.687	30
MKHD ... 10/160-HSC	10	3 x 42	26	2 x 10	4 x 11	184	**160**	143	690	0.473	0.717	0.429	0.687	30

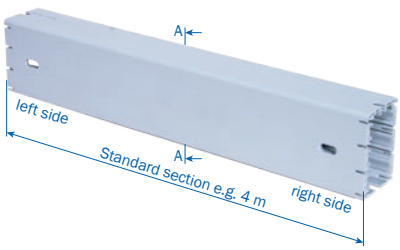
Standard sections



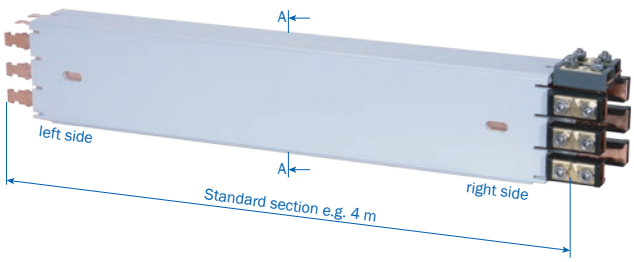
Type MKHF
with plug-in joints, factory assembled



Type MKHD for
continuous copper strips



Type MKHS
with bolted joints, factory assembled



(1) Numbers in paranthesis apply to control line
(2) Nominal voltage UL = 600 V
(3) Power consumption UL on request

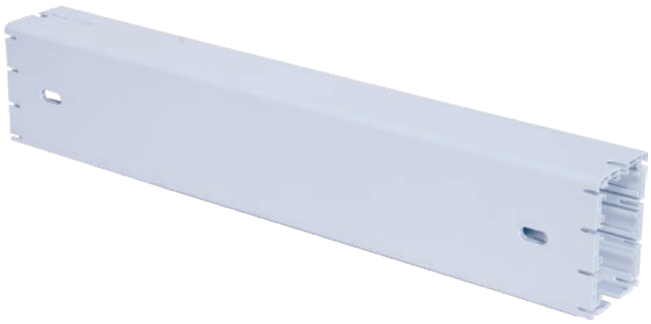
TYPES AND ORDER NUMBERS

MKHD/MKHF

Type MKHD

with continuous copper strips

(to be drawn in during installation)



Type[1]	Weight kg/m	Order No.
MKHD-....HSC	1.052	26250•
MKHD-....SSD	1.052	26251•

Type MKHF

with factory assembled copper strips

and plug-in joints (63 – 100 A)

Type[1]	Weight kg/m	Order No.
MKHF6/63-....HSC	1.638	26320•
MKHF6/63-....SSD	1.638	26322•
MKHF6/80-....HSC	1.839	26321•
MKHF6/100-....HSC	2.176	26205•
MKHF7/63-....HSC	1.748	26323•
MKHF7/63-....SSD	1.748	26325•
MKHF7/80-....HSC	1.949	26324•
MKHF7/100-....HSC	2.277	26209•
MKHF8/63-....HSC	1.858	26326•
MKHF8/63-....SSD	1.858	26328•
MKHF8/80-....HSC	2.059	26327•
MKHF8/100-....HSC	2.387	26213•

(1) Complete types e.g. MKHD-**4000**HSC for 4 m with PE Order No. 262504
MKHF8/63-**4000**HSC for 4 m with PE Order No. 263264
The 4-digit number (in bold) in the type indicates the length of the section in mm.

• The last number of the order specifies the section length. Please suffix the order number with 1, 2, 3, 4.

TYPES AND ORDER NUMBERS

MKHS

Type MKHS

with factory assembled copper strips and bolted joints

(63 – 200 A)

Type[1]	Weight kg/m	Order No.
MKHS6/63-....HSC	1.824	26329 •
MKHS6/63-....SSD	1.824	26331 •
MKHS6/80-....HSC	1.950	26330 •
MKHS6/100-....HSC	2.353	26220 •
MKHS6/140-....HSC	2.530	26221 •
MKHS6/160-....HSC	2.773	26222 •
MKHS6/200-....HSC	3.019	26223 •
MKHS7/63-....HSC	1.961	26332 •
MKHS7/63-....SSD	1.961	26334 •
MKHS7/80-....HSC	2.087	26333 •
MKHS7/100-....HSC	2.490	26227 •
MKHS7/140-....HSC	2.667	26228 •
MKHS7/160-....HSC	2.910	26229 •
MKHS7/200-....HSC	3.156	26230 •
MKHS8/63-....HSC	2.098	26335 •
MKHS8/63-....SSD	2.098	26337 •
MKHS8/80-....HSC	2.224	26336 •
MKHS8/100-....HSC	2.627	26234 •
MKHS8/140-....HSC	2.804	26235 •
MKHS8/160-....HSC	3.047	26236 •
MKHS8/200-....HSC	3.293	26237 •

1) Complete types e.g. MKHS8/63-**4000**HSC for 4 m with PE Order No. 263354
The 4-digit number (in bold) in the type indicates the length of the section in mm.

• The last number of the order specifies the section length. Please suffix the order number with 1, 2, 3, 4

SECTIONS AND SEALING STRIPS

MKHD/MKHF/MKHS

Curves

Min. bending radius, horizontal = 1000 mm

max. length L = 3600 mm

max. ∢ 120°

Smallest vertical radius: on request

HR for SI = Horizontal radius – Safety web inside

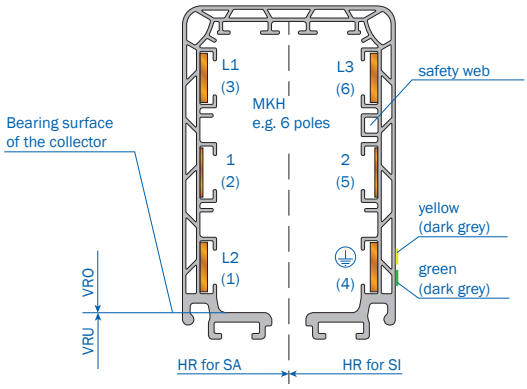
HR for SA = Horizontal radius – Safety web outside

VRO = Vertical radius upwards

VRU = Vertical radius downwards

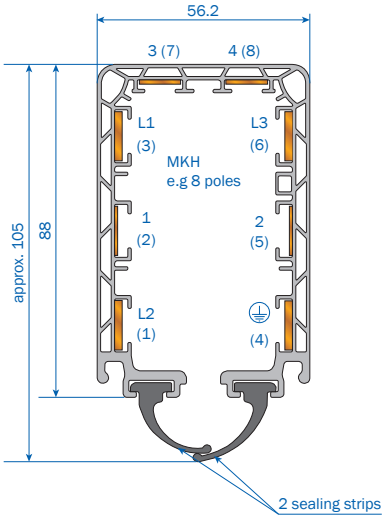
Safety web will be mounted in direction of track.

Changes in measurements of curves have to be mentioned for replacement orders.



Sealing strip including accessories

The sealing strip is available in lengths of 10 m, 20 m and 40 m.

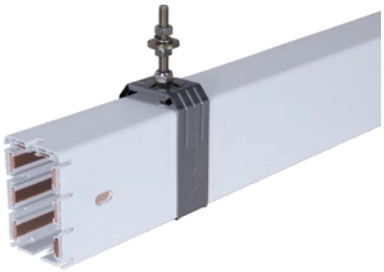


Type	Description	Order No.
DL-D-KBH-MKH-MKL-TDV10(1)	Sealing strip 10 m long	600551-10
DL-D-KBH-MKH-MKL-TDV20(1)	Sealing strip 20 m long	600551-20
DL-D-KBH-MKH-MKL-TDV40(1)	Sealing strip 40 m long	600551-40
DL-F-MKL/H	Fixing clamp for sealing strip (1 per end)	236105
DL-V-KSLT-KBH-MKL/H-LSV/G	Joint for coupling the sealing strip (2 per joint)	258300
DL-EZRD-MKL/H	Mounting glider for sealing strip EZRD	234552
SA-ZB-DG-MSWA-S	Sealing strip slide plate for collector MSWA	236625

(1) The max. single length is 40 m long. For longer distances joint laces are necessary.
For each meter system length 2 m sealing strip to be ordered.
Not available for 9- and 10-pole systems.

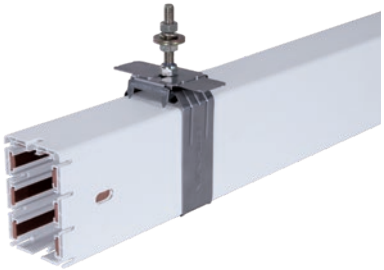
HANGERS AND END SECTIONS

MKHD/MKHF/MKHS



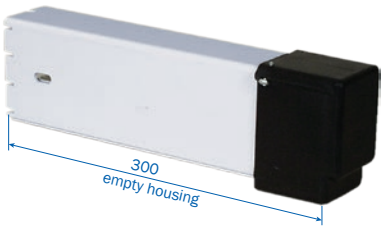
Sliding hanger

Type	Weight kg	Order No.
AH-MGH	0.134	262000
AH-MGH/K(1)	0.134	262003



Fixpoint hanger

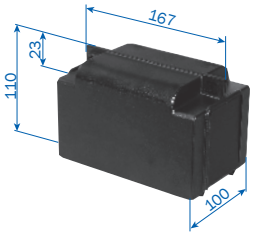
Type	Weight kg	Order No.
AH-MFH	0.182	262001
AH-MFH/K(1)	0.182	262002



End section (MKHD)

with 0.3 m section

Type	Weight kg	Execution	Order No.
EK-MHED/L	0.401	left	262537
EK-MHED/R	0.401	right	262536



End cap (MKHF / MKHS)

Type	Weight kg	Execution	Order No.
EK-MSES	0.308	left and right	235141

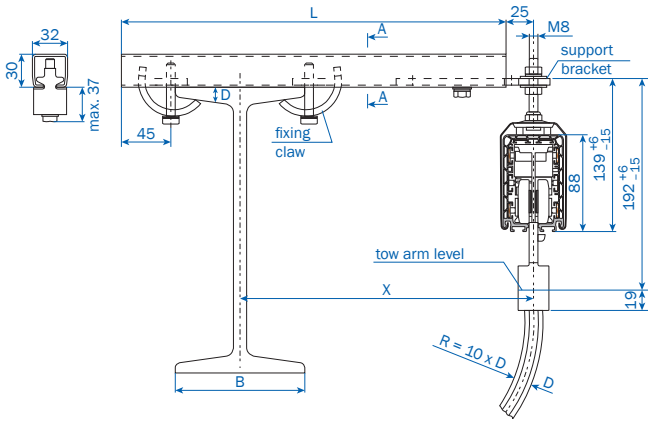
(1) stainless steel

BRACKETS

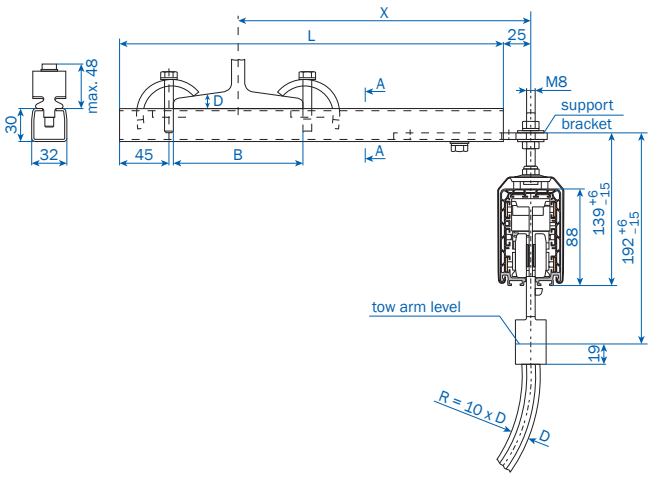
MKHD/MKHF/MKHS

View without I- beam

Position of the fixing claw for D = 6 – 15 mm



Position of the fixing claw for D = 15 – 25 mm

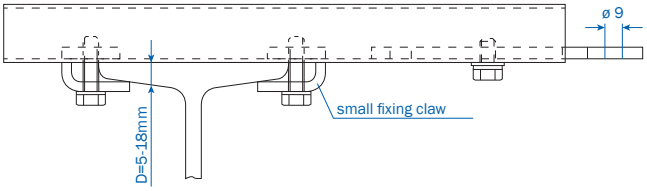


Arrangement EHK with small fixing claw

Attention! Make sure that hoist wheels have enough clearance!

Use small claw if necessary!

The ⊓-rail of EHK is identical to type S1 (catalog 8a).

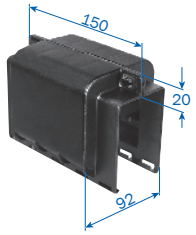


Type[1]	X mm	L mm	B max mm	Weight kg	Order No.	
					standard version	with small fixing claw[1]
HK-EHK250-NS	250	350	170	1.080	251600	–
HK-EHK250-KS...					–	251720-...
HK-EHK300-NS	300	400	170	1.128	251610	–
HK-EHK300-KS...					–	251730-...
HK-EHK400-NS	400	500	170	1.313	251620	–
HK-EHK400-KS...					–	251740-...
HK-EHK500-NS	500	600	170	1.510	251630	–
HK-EHK500-KS...					–	251750-...
HK-EHK600-NS	600	700	170	1.639	251640	–
HK-EHK600-KS...					–	251760-...
HK-EHK700-NS	700	800	170	1.804	251650	–
HK-EHK700-KS...					–	251770-...
HK-EHK750-NS	750	850	170	1.782	251660	–
HK-EHK750-KS...					–	251780-...
HK-EHK800-NS	800	900	170	2.026	251670	–
HK-EHK800-KS...					–	251790-...

(1) e.g. HK-EHK250-KS12 → Order No. 251720-12 for fixing claw with D = 12 mm
Select next larger size bracket when your -beam dimension B is more than 170 upto 300 mm.

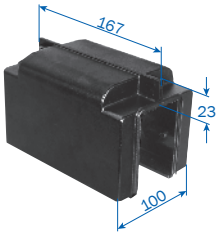
JOINTING MATERIAL AND END FEEDS

MKHD/MKHF/MKHS



Joint cap, self locking (MKHD)

Type	Weight kg	Order No.
VM-MVMD	0.160	234678



Joint cap, self locking (MKHF / MKHS)

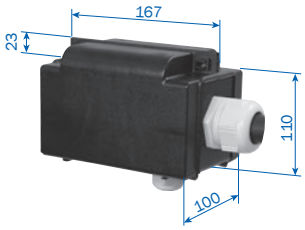
Type	Weight kg	Order No.
VM-MVMS	0.274	234585

End feed (MKHD)

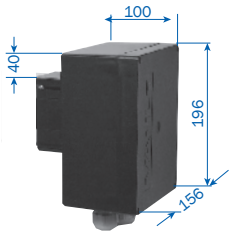
End feed comes loose without standard section.

It can be mounted at the left or right hand side.

Electrical connection with customer supplied cable shoes to M6 terminals



6- to 8-poles



9- to 10-poles

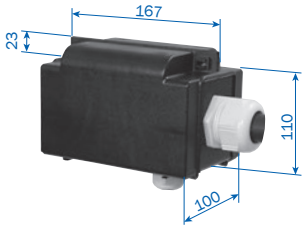
Type	Weight kg	Cable gland (dimensions see page 33)	Order No.
ES-MKED6-8/63-80HS	0.515	M 25 and M 40	235152
ES-MKED9-10/63-80HS	1.071	M 25 and M 40	262538
ES-MKED6-8/63SS	0.470	M 25	235157
ES-MKED9-10/63SS	1.020	M 25	262539

End feed (MKHF / MKHS)

End feed comes loose without standard section.

It can be mounted at the left or right hand side.

Electrical connection with customer supplied cable shoes to M6 terminals

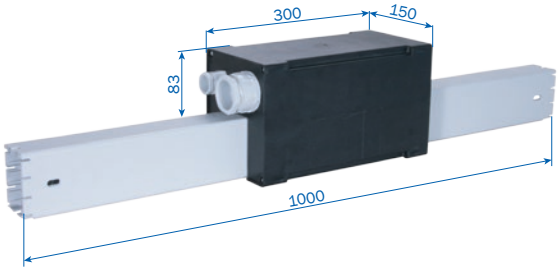


Type	Weight kg	Cable gland (dimensions see page 33)	Order No.
ES-MKES6-8/63-80HS	0.492	M 25 and M 40	235230
ES-MKES6-8/63SS	0.446	M 25	235233

LINE FEEDS

MKHD

Electrical connection with customer supplied cable shoes to M8 terminals



Type	Weight kg	M-Cable gland (dimensions see page 33)	Order No.
ES-MHGD6/63-100HSC-1000	2.445	M 50 and M 25	262545
ES-MHGD7/63-100HSC-1000	2.530	M 50 and M 25	262546
ES-MHGD8/63-100HSC-1000	2.615	M 50 and M 25	262547
ES-MHGD9/63-100HSC-1000	2.654	M 50 and M 25	262548
ES-MHGD10/63-100HSC-1000	2.693	M 50 and M 25	262549
ES-MHGD6/140-160HSC-1000	2.431	M 50 and M 25	262550
ES-MHGD7/140-160HSC-1000	2.516	M 50 and M 25	262551
ES-MHGD8/140-160HSC-1000	2.601	M 50 and M 25	262552
ES-MHGD9/140-160HSC-1000	2.640	M 50 and M 25	262553
ES-MHGD10/140-160HSC-1000	2.679	M 50 and M 25	262554
ES-MHGD6/63SSD-1000	2.385	M 25	262540
ES-MHGD7/63SSD-1000	2.460	M 25	262541
ES-MHGD8/63SSD-1000	2.545	M 25	262542
ES-MHGD9/63SSD-1000	2.584	M 25	262543
ES-MHGD10/63SSD-1000	2.623	M 25	262544

LINE FEEDS

MKHF/MKHS

Electrical connection with customer supplied cable shoes to M8 terminals

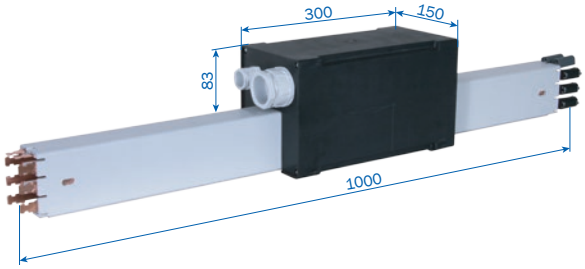


Photo shows MHGF

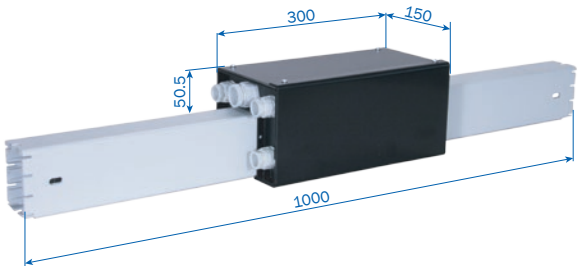
Type	Weight kg	M-Cable gland (dimensions see page 33)	Order No.
ES-MHGF6/63HSC-1000	3.056	M 50 and M 25	263205
ES-MHGF7/63HSC-1000	3.250	M 50 and M 25	263206
ES-MHGF8/63HSC-1000	3.444	M 50 and M 25	263207
ES-MHGF6/80HSC-1000	3.288	M 50 and M 25	263208
ES-MHGF7/80HSC-1000	3.482	M 50 and M 25	263209
ES-MHGF8/80HSC-1000	3.676	M 50 and M 25	263210
ES-MHGF6/100HSC-1000	3.616	M 50 and M 25	262498
ES-MHGF7/100HSC-1000	3.810	M 50 and M 25	262499
ES-MHGF8/100HSC-1000	4.004	M 50 and M 25	262500
ES-MHGF6/63SSD-1000	2.948	M 25	263215
ES-MHGF7/63SSD-1000	3.142	M 25	263216
ES-MHGF8/63SSD-1000	3.336	M 25	263217

Type	Weight kg	M-Cable gland (dimensions see page 33)	Order No.
ES-MHGS6/63HSC-1000	3.242	M 50 and M 25	263218
ES-MHGS7/63HSC-1000	3.463	M 50 and M 25	263219
ES-MHGS8/63HSC-1000	3.684	M 50 and M 25	263220
ES-MHGS6/80HSC-1000	3.474	M 50 and M 25	263225
ES-MHGS7/80HSC-1000	3.695	M 50 and M 25	263226
ES-MHGS8/80HSC-1000	3.916	M 50 and M 25	263227
ES-MHGS6/100HSC-1000	3.802	M 50 and M 25	262456
ES-MHGS7/100HSC-1000	4.023	M 50 and M 25	262457
ES-MHGS8/100HSC-1000	4.244	M 50 and M 25	262458
ES-MHGS6/140HSC-1000	3.965	M 50 and M 25	262459
ES-MHGS7/140HSC-1000	4.186	M 50 and M 25	262460
ES-MHGS8/140HSC-1000	4.407	M 50 and M 25	262461
ES-MHGS6/160HSC-1000	4.208	M 50 and M 25	262462
ES-MHGS7/160HSC-1000	4.429	M 50 and M 25	262463
ES-MHGS8/160HSC-1000	4.650	M 50 and M 25	262464
ES-MHGS6/200HSC-1000	4.454	M 50 and M 25	262465
ES-MHGS7/200HSC-1000	4.675	M 50 and M 25	262466
ES-MHGS8/200HSC-1000	4.896	M 50 and M 25	262467
ES-MHGS6/63SSD-1000	3.135	M 25	263228
ES-MHGS7/63SSD-1000	3.356	M 25	263229
ES-MHGS8/63SSD-1000	3.577	M 25	263230

LINE FEEDS

MKHD

Electrical connection with customer supplied cable shoes to M8 terminals



Type	Weight kg	M-Cable gland (dimensions see page 33)	Order No.
ES-MHLD6/63-100HSC-1000-0	2.565	M 25 for L1, L2, L3 M 25 for 1 – 4 M 20 for PE, 9/10	262560
ES-MHLD7/63-100HSC-1000-0	2.651		262561
ES-MHLD8/63-100HSC-1000-0	2.737		262562
ES-MHLD9/63-100HSC-1000-0	2.745		262563
ES-MHLD10/63-100HSC-1000-0	2.749		262564
ES-MHLD6/140-160HSC-1000-0	2.553	M 25 for L1, L2, L3 M 25 for 1 – 4 M 20 for PE, 9/10	262565
ES-MHLD7/140-160HSC-1000-0	2.639		262566
ES-MHLD8/140-160HSC-1000-0	2.725		262567
ES-MHLD9/140-160HSC-1000-0	2.733		262568
ES-MHLD10/140-160HSC-1000-0	2.737		262569
ES-MHLD6/63SSD-1000-0	2.517	1x M 25	262555
ES-MHLD7/63SSD-1000-0	2.593		262556
ES-MHLD8/63SSD-1000-0	2.679		262557
ES-MHLD9/63SSD-1000-0	2.687	2x M 25	262558
ES-MHLD10/63SSD-1000-0	2.691		262559

LINE FEEDS

MKHF/MKHS

Electrical connection with customer supplied cable shoes to M8 terminals

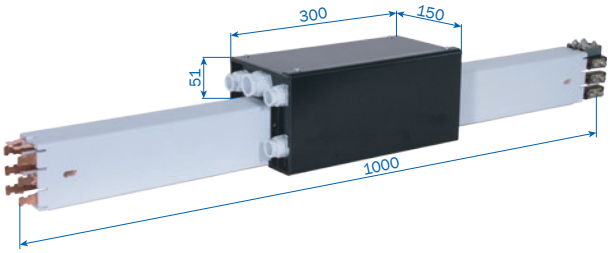


Photo shows MHLS

Type	Weight kg	M-Cable gland (dimensions see page 33)	Order No.
ES-MHLF6/63HSC-1000-0	3.170	M 25 for L1, L2, L3	263235
ES-MHLF7/63HSC-1000-0	3.364	M 25 for 1 – 4	263236
ES-MHLF8/63HSC-1000-0	3.558		263237
ES-MHLF6/80HSC-1000-0	3.402	M 20 for PE	263238
ES-MHLF7/80HSC-1000-0	3.596		263239
ES-MHLF8/80HSC-1000-0	3.790		263240
ES-MHLF6/100HSC-1000-0	3.730		262486
ES-MHLF7/100HSC-1000-0	3.924		262487
ES-MHLF8/100HSC-1000-0	4.118		262488
ES-MHLF6/63SSD-1000-0	3.075	M 25	263245
ES-MHLF7/63SSD-1000-0	3.269		263246
ES-MHLF8/63SSD-1000-0	3.463		263247

Type	Weight kg	M-Cable gland (dimensions see page 33)	Order No.
ES-MHLS6/63HSC-1000-0	3.356	M 25 for L1, L2, L3	263248
ES-MHLS7/63HSC-1000-0	3.577	M 25 for 1 – 4	263249
ES-MHLS8/63HSC-1000-0	3.798		263250
ES-MHLS6/80HSC-1000-0	3.588	M 20 for PE	263255
ES-MHLS7/80HSC-1000-0	3.809		263256
ES-MHLS8/80HSC-1000-0	4.030		263257
ES-MHLS6/100HSC-1000-0	3.916		262524
ES-MHLS7/100HSC-1000-0	4.137		262525
ES-MHLS8/100HSC-1000-0	4.358		262526
ES-MHLS6/140HSC-1000-0	4.081	M 25 for PE, L1, L2, L3	262527
ES-MHLS7/140HSC-1000-0	4.302	M 25 for 1 – 4	262528
ES-MHLS8/140HSC-1000-0	4.523		262529
ES-MHLS6/160HSC-1000-0	4.324		262530
ES-MHLS7/160HSC-1000-0	4.545		262531
ES-MHLS8/160HSC-1000-0	4.766		262532
ES-MHLS6/200HSC-1000-0	4.570		262533
ES-MHLS7/200HSC-1000-0	4.791		262534
ES-MHLS8/200HSC-1000-0	5.012		262535
ES-MHLS6/63SSD-1000-0	3.256	M 25	263258
ES-MHLS7/63SSD-1000-0	3.477		263259
ES-MHLS8/63SSD-1000-0	3.698		263260

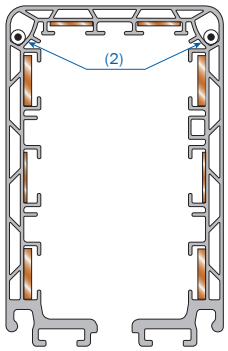
HEATING

MKHD/MKHF/MKHS

Heating cable

Type	Resistance[1]	Order No.
HL-0,10-EYCEX-5203-PTFE-260-750	0.10 Ω/m	196381
HL-0,15-EYCEX-5203-PTFE-260-750	0.15 Ω/m	196382
HL-0,20-EYCEX-5203-PTFE-260-750	0.20 Ω/m	196383
HL-0,32-EYCEX-5203-PTFE-260-750	0.32 Ω/m	196384
HL-0,38-EYCEX-5203-PTFE-260-750	0.38 Ω/m	196385
HL-0,48-EYCEX-5203-PTFE-260-750	0.48 Ω/m	196386
HL-0,60-EYCEX-5203-PTFE-260-750	0.60 Ω/m	196387
HL-0,81-EYCEX-5203-PTFE-260-750	0.81 Ω/m	196389
HL-1,00-EYCEX-5203-PTFE-260-750	1.00 Ω/m	196390
HL-1,44-EYCEX-5203-PTFE-260-750	1.44 Ω/m	196391
HL-2,00-EYCEX-5203-PTFE-260-750	2.00 Ω/m	196392
HL-3,00-EYCEX-5203-PTFE-260-750	3.00 Ω/m	196393
HL-4,00-EYCEX-5203-PTFE-260-750	4.00 Ω/m	196394
HL-4,40-EYCEX-5203-PTFE-260-750	4.40 Ω/m	196395
HL-5,16-EYCEX-5203-PTFE-260-750	5.16 Ω/m	196396
HL-5,60-EYCEX-5203-PTFE-260-750	5.60 Ω/m	196397

[1] Divergences ±2.5 %

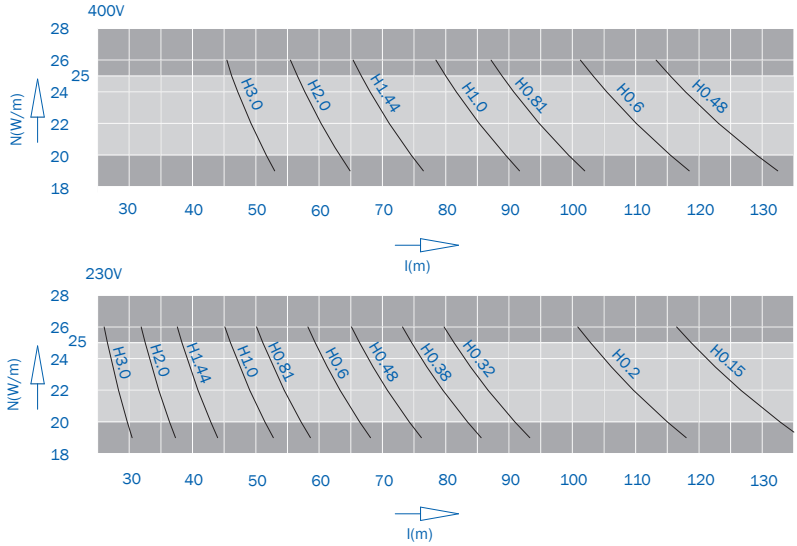


[2] Arrangement of heating cable

We recommend a heating system for outdoor installations and installations in humid plants. The heating consists of arrangement two heating cables as per drawing.

Attention: Switch on heating system below +5 °C ambient temperature.

The type of heating cable has to be calculated: heat output per heating cable between 20 – 25 W/m.
For longer heating distances the total length has to be devided into several heating sections.
For short heating distances to feed with lower secondary voltage via transformer.



Heating capacity Watt/m: $N' = \frac{U^2}{R \cdot L^2}$

U = Supply voltage (Volt)

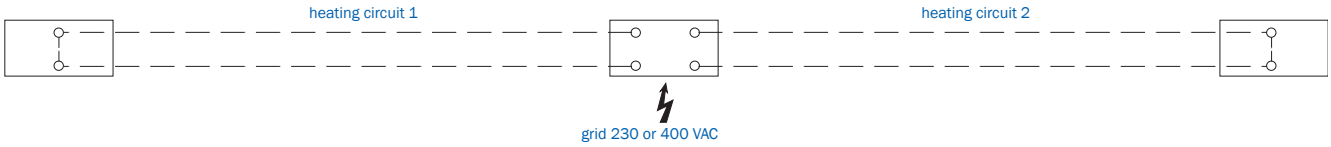
R = Resistance of heating cable (Ohm/m)

L = Lenght of heating section (m)

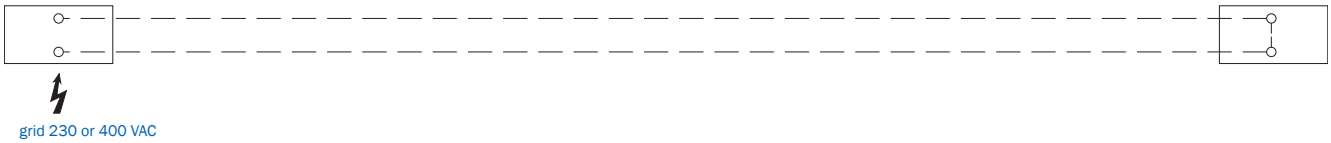
HEATING

Switching examples (depending on the plant situation) MKHD/MKHF/MKHS

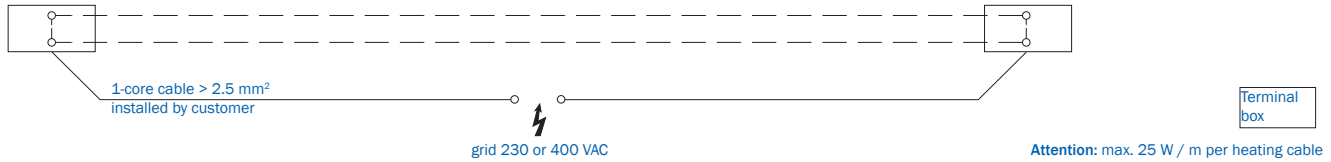
a) 2 heating circuits



b) 1 heating circuit



c) 2 heating circuits



Connecting boxes for heating

Type	Execution	Cable gland (dimensions see page 13)	Order No.
BH-AKB-MKH-L	left end	M 20	262037
BH-AKB-MKH-R	right end	M 20	262038
BH-AKB-MKH-M	line feed	2 x M 20	262039
BH-MA-KBH-MKL/H-LSV/G	1 set material for connecting clamps		195291

For each end feed box 2 sets of material for connecting ends are required.
For line feed you need 4 sets of material for connection ends.

Order for 60 m conductor system example c)

1) 122 m heating cable type H 2.0 (2 x 60 m and 2 x 1 m additional)
   Voltage 400 V, two heating circuits in parallel
   heating capacity as per above mentioned diagramm 2 x 22 W/m
   at 60 m 2 x 22 W/m ~2640 W = 2.64 kW.

2) 1x junction box left end, 1x junction box right end

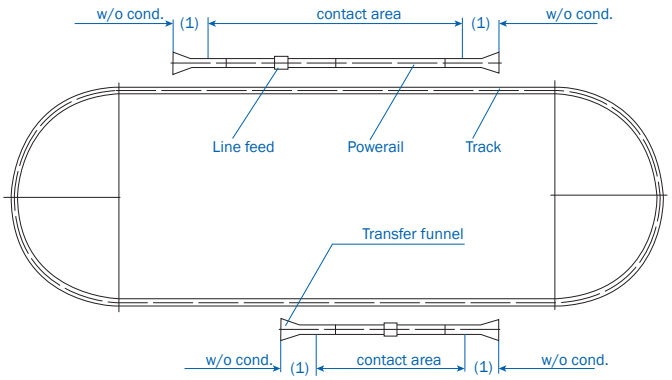
3) 4x sets of material for connection ends.

Switch gear assembly and temperature control unit as per customer's inquiry.
Fuses, cables etc. have to be provided by the customer.

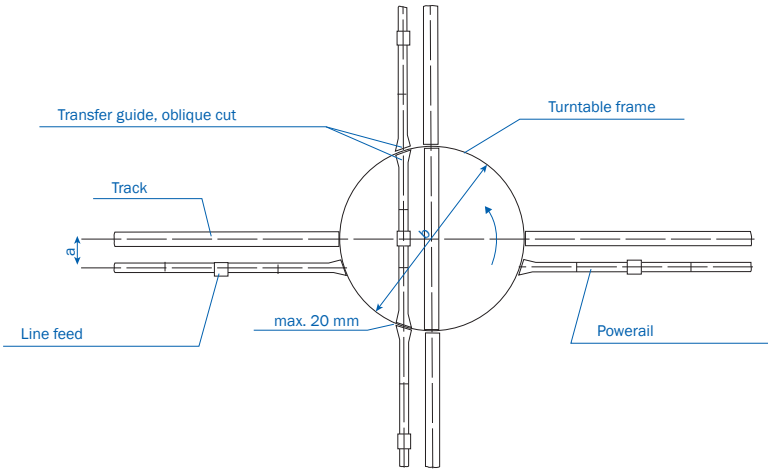
CONTACT SECTIONS, TURNTABLES AND SWITCHES

MKHD/MKHF/MKHS

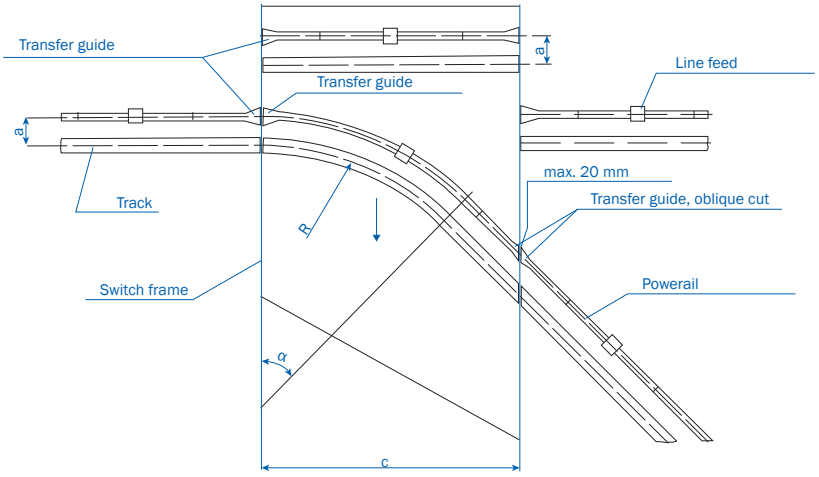
Contact section[1]



Turntable



Sliding switch



Specify dimensions a, b, c,

R and angle α.

α = 50° max.

Max. 20 mm air gap between transfer guides.

To create all components for contact sections, turntables and switches we require detailed construction drawings.

(1) Contact sections must not be activated before collectors are fully engaged.

ENTRY FUNNEL

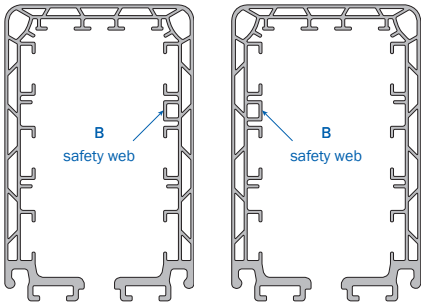
MKHD/MKHF/MKHS

Powerail should not be activated before the collector carbons have complete contact with the conductors. The use of flexible tow arm is required for all types.

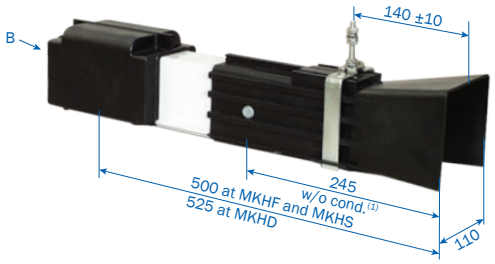
Offset of the funnel/guide to the collector:

- max. 15 mm horizontal
- max. 10 mm vertical

Max. speed for crossover of the current collector 60 m/min



Left version Right version



Type	Weight kg	Order No. Version	
		left	right
ET-MTH6/63-100-L-HSC-500(525)(2)	2.018	262375	–
ET-MTH6/63-100-R-HSC-500(525)(2)	2.049	–	262387
ET-MTH7/63-100-L-HSC-500(525)(2)	2.089	262376	–
ET-MTH7/63-100-R-HSC-500(525)(2)	2.120	–	262388
ET-MTH8/63-100-L-HSC-500(525)(2)	2.160	262377	–
ET-MTH8/63-100-R-HSC-500(525)(2)	2.191	–	262389
ET-MTH6/140-160-L-HSC-500(525)	2.029	262378	–
ET-MTH6/140-160-R-HSC-500(525)	2.060	–	262390
ET-MTH7/140-160-L-HSC-500(525)	2.100	262379	–
ET-MTH7/140-160-R-HSC-500(525)	2.131	–	262391
ET-MTH8/140-160-L-HSC-500(525)	2.171	262380	–
ET-MTH8/140-160-R-HSC-500(525)	2.202	–	262392
ET-MTH6/200-L-HSC-500(525)	2.082	262384	–
ET-MTH6/200-R-HSC-500(525)	2.121	–	262396
ET-MTH7/200-L-HSC-500(525)	2.153	262385	–
ET-MTH7/200-R-HSC-500(525)	2.192	–	262397
ET-MTH8/200-L-HSC-500(525)	2.224	262386	–
ET-MTH8/200-R-HSC-500(525)	2.263	–	262398
ET-MTH6/63-L-SSD-500(525)(2)	2.006	262381	–
ET-MTH6/63-R-SSD-500(525)(2)	2.006	–	262393
ET-MTH7/63-L-SSD-500(525)(2)	2.075	262382	–
ET-MTH7/63-R-SSD-500(525)(2)	2.075	–	262394
ET-MTH8/63-L-SSD-500(525)(2)	2.144	262383	–
ET-MTH8/63-R-SSD-500(525)(2)	2.144	–	262395

(1) corresponding to the center of collector
(2) Also suitable for former version with 40 A

TRANSFER GUIDES

MKHD/MKHF/MKHS

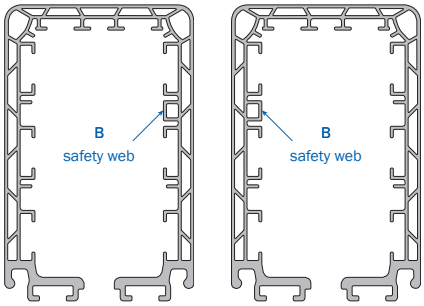
Transfer guides, straight

Necessary with all types of double collectors or
2 single collectors.

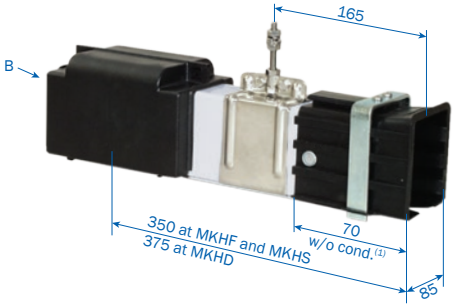
Staggered arrangement of the transfer guides to each other:

- max. 4 mm horizontal
- max. 3 mm vertical

Max. speed for crossover of the current collector 80 m/min



Left version Right version



Type(1)	Weight kg	Order No. Version	
		left	right
UE-MUH6/63-100-L-HSC-350(375)(2)	2.005	262399	–
UE-MUH6/63-100-R-HSC-350(375)(2)	2.005	–	262408
UE-MUH7/63-100-L-HSC-350(375)(2)	2.077	262400	–
UE-MUH7/63-100-R-HSC-350(375)(2)	2.077	–	262409
UE-MUH8/63-100-L-HSC-350(375)(2)	2.119	262401	–
UE-MUH8/63-100-R-HSC-350(375)(2)	2.119	–	262410
UE-MUH6/140-160-L-HSC-350(375)	2.020	262402	–
UE-MUH6/140-160-R-HSC-350(375)	2.020	–	262411
UE-MUH7/140-160-L-HSC-350(375)	2.092	262403	–
UE-MUH7/140-160-R-HSC-350(375)	2.092	–	262412
UE-MUH8/140-160-L-HSC-350(375)	2.134	262404	–
UE-MUH8/140-160-R-HSC-350(375)	2.134	–	262413
UE-MUH6/200-L-HSC-350(375)	2.092	262417	–
UE-MUH6/200-R-HSC-350(375)	2.092	–	262420
UE-MUH7/200-L-HSC-350(375)	2.164	262418	–
UE-MUH7/200-R-HSC-350(375)	2.164	–	262421
UE-MUH8/200-L-HSC-350(375)	2.236	262419	–
UE-MUH8/200-R-HSC-350(375)	2.236	–	262422
UE-MUH6/63-L-SSD-350(375)(2)	1.986	262405	–
UE-MUH6/63-R-SSD-350(375)(2)	1.986	–	262414
UE-MUH7/63-L-SSD-350(375)(2)	2.055	262406	–
UE-MUH7/63-R-SSD-350(375)(2)	2.055	–	262415
UE-MUH8/63-L-SSD-350(375)(2)	2.124	262407	–
UE-MUH8/63-R-SSD-350(375)(2)	2.124	–	262416

(1) corresponding to the center of collector
(2) Also suitable for former version with 40 A

TRANSFER GUIDES, OBLIQUE(1)

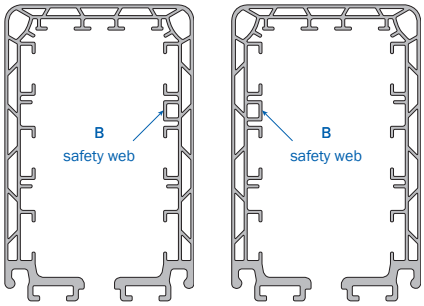
MKHD/MKHF/MKHS

Necessary with all types are 2 single collectors.

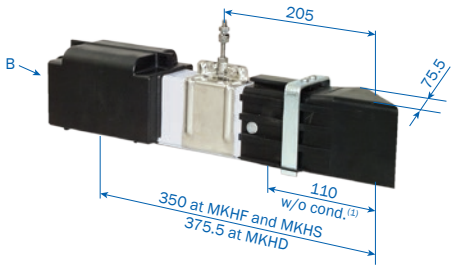
Staggered arrangement of the transfer guides to each other:

- max. 4 mm horizontal
- max. 3 mm vertical

Max. speed for crossover of the current collector 80 m/min



Left version Right version



Type	Weight kg	Order No. Version	
		left	right
UE-MUHS6/63-100-L-HSC-350(375)(2)	2.017	262423	–
UE-MUHS6/63-100-L-HSC-350(375)(2)	2.017	–	262432
UE-MUHS7/63-100-L-HSC-350(375)(2)	2.082	262424	–
UE-MUHS7/63-100-R-HSC-350(375)(2)	2.082	–	262433
UE-MUHS8/63-100-L-HSC-350(375)(2)	2.147	262425	–
UE-MUHS8/63-100-R-HSC-350(375)(2)	2.147	–	262434
UE-MUHS6/140-160-L-HSC-350(375)	2.032	262426	–
UE-MUHS6/140-160-R-HSC-350(375)	2.032	–	262435
UE-MUHS7/140-160-L-HSC-350(375)	2.097	262427	–
UE-MUHS7/140-160-R-HSC-350(375)	2.097	–	262436
UE-MUHS8/140-160-L-HSC-350(375)	2.162	262428	–
UE-MUHS8/140-160-R-HSC-350(375)	2.162	–	262437
UE-MUHS6/200-L-HSC-350(375)	2.050	262441	–
UE-MUHS6/200-R-HSC-350(375)	2.050	–	262444
UE-MUHS7/200-L-HSC-350(375)	2.115	262442	–
UE-MUHS7/200-R-HSC-350(375)	2.115	–	262445
UE-MUHS8/200-L-HSC-350(375)	2.180	262443	–
UE-MUHS8/200-R-HSC-350(375)	2.180	–	262446
UE-MUHS6/63-L-SSD-350(375)(2)	2.020	262429	–
UE-MUHS6/63-R-SSD-350(375)(2)	2.020	–	262438
UE-MUHS7/63-L-SSD-350(375)(2)	2.085	262430	–
UE-MUHS7/63-R-SSD-350(375)(2)	2.085	–	262439
UE-MUHS8/63-L-SSD-350(375)(2)	2.150	262431	–
UE-MUHS8/63-R-SSD-350(375)(2)	2.150	–	262440

(1) corresponding to the center of collector
(2) Also suitable for former version with 40 A

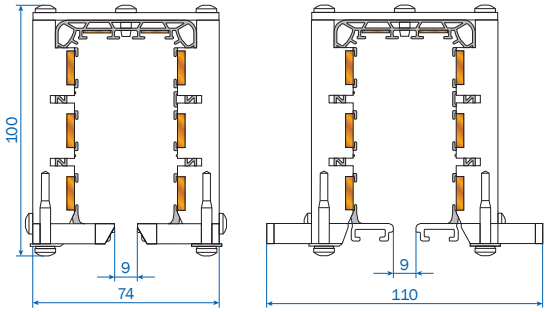
REMOVAL SECTIONS

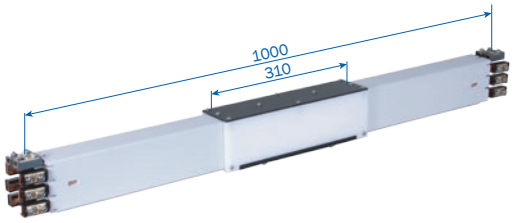
MKHD/MKHF/MKHS

Assembly and disassembly of the collector is possible at the end of the track as well as at the removal section.

By opening and closing the sliders at the bottom of the conductor housing the collector can be mounted and removed easily. Before opening disconnect mains.

The removal section does not disconnect the powerail electrically.





For single collectors

Type	Weight kg	Order No.
AT-MATH6/63-100HSC-1000(1)	4.392	262147
AT-MATH7/63-100HSC-1000(1)	4.568	262148
AT-MATH8/63-100HSC-1000(1)	4.744	262149
AT-MATH 6/140-160HSC-1000	4.422	262150
AT-MATH7/140-160HSC-1000	4.598	262151
AT-MATH8/140-160HSC-1000	4.774	262152
AT-MATH6/200HSC-1000	4.652	262156
AT-MATH7/200HSC-1000	4.828	262157
AT-MATH8/200HSC-1000	5.004	262158
AT-MATH6/63SSD-1000(1)	4.404	262153
AT-MATH7/63SSD-1000(1)	4.580	262154
AT-MATH8/63SSD-1000(1)	4.756	262155

For double collectors

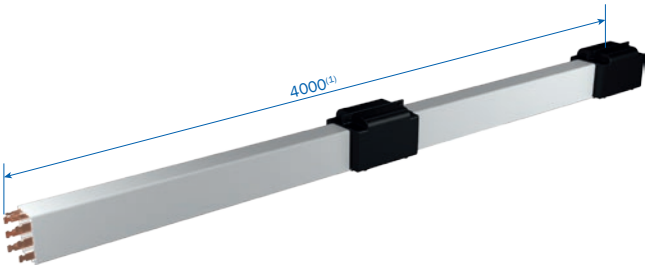
Type	Weight kg	Order No.
AT-MATHD6/63-100HSC-1000(1)	5.108	262159
AT-MATHD7/63-100HSC-1000(1)	5.284	262160
AT-MATHD8/63-100HSC-1000(1)	5.460	262161
AT-MATHD6/140-160HSC-1000	5.138	262162
AT-MATHD7/140-160HSC-1000	5.314	262163
AT-MATHD8/140-160HSC-1000	5.490	262164
AT-MATHD6/200HSC-1000	5.352	262168
AT-MATHD7/200HSC-1000	5.528	262169
AT-MATHD8/200HSC-1000	5.704	262170
AT-MATHD6/63SSD-1000(1)	5.116	262165
AT-MATHD7/63SSD-1000(1)	5.291	262166
AT-MATHD8/63SSD-1000(1)	5.468	262167

(1) Also suitable for former version with 40 A

MAINTENANCE SECTIONS

MKHS

For maintenance work with MKH systems, collector removal and conductor bar replacement can be easily and quickly achieved with a maintenance section. Maintenance sections conveniently drop out or reinstall at existing runway installations. To obtain best possible accessibility at longer runways we recommend installing several maintenance repair sections at convenient intervals or locations.



For single collectors

Type	Weight kg	Order No.
RVT-MRT6/63-4000HSC	7.104	263265
RVT-MRT7/63-4000HSC	7.539	263266
RVT-MRT8/63-4000HSC	7.974	263267
RVT-MRT6/80-4000HSC	8.032	263268
RVT-MRT7/80-4000HSC	8.467	263269
RVT-MRT8/80-4000HSC	8.902	263270
RVT-MRT6/100-4000HSC	9.339	263014
RVT-MRT7/100-4000HSC	9.774	263015
RVT-MRT8/100-4000HSC	10.209	263016
RVT-MRT6/140-4000HSC	10.047	263017
RVT-MRT7/140-4000HSC	10.482	263018
RVT-MRT8/140-4000HSC	10.917	263019
RVT-MRT6/160-4000HSC	11.019	263020
RVT-MRT7/160-4000HSC	11.454	263021
RVT-MRT8/160-4000HSC	11.889	263022
RVT-MRT6/200-4000HSC	12.003	263023
RVT-MRT7/200-4000HSC	12.430	263024
RVT-MRT8/200-4000HSC	12.873	263025
RVT-MRT6/63-4000SSD	7.104	263275
RVT-MRT7/63-4000SSD	7.539	263276
RVT-MRT8/63-4000SSD	7.974	263277

(1) Standard length = 4000 mm; any other length and maintenance sections in curves on request (R_{min} = 1000 mm / L_{min} = 1000 mm).

CONDUCTOR DEAD SECTIONS

MKHD/MKHF/MKHS

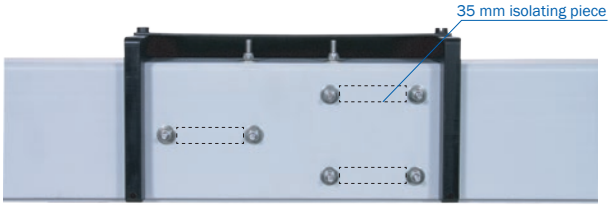


Photo shows isolating piece

5 mm air gap

Type(1)	Weight kg	Order No.
ST-MHTL1...	0.238	262578
ST-MHTL2...	0.246	262579
ST-MHTL3...	0.254	262580
ST-MHTL4...	0.262	262581
ST-MHTL5...	0.270	262582
ST-MHTL6...	0.278	262583
ST-MHTL7...	0.286	262584
ST-MHTL8...	0.294	262585

35 mm isolating piece

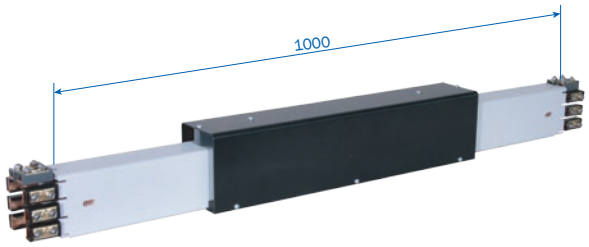
Type(1)	Weight kg	Order No.
ST-MHTI1...	0.274	262586
ST-MHTI2...	0.294	262587
ST-MHTI3...	0.309	262588
ST-MHTI4...	0.324	262589
ST-MHTI5...	0.339	262590
ST-MHTI6...	0.354	262591
ST-MHTI7...	0.369	262592
ST-MHTI8...	0.384	262593
ST-MHTI9...	0.387	262594
ST-MHTI10...	0.390	262595

Please advise us which conductors should be disconnected (see pages 24 and 25). The dead section comes factory assembled.
(1) Complete types e.g. ST-MHTI4HS-L1/L2/L3/2-MSWA for a 35 mm isolation piece with seperation of conductors L1, L2, L3 und 2 for the current collector MSWA
→ Order No.: 262589

ANTI-CONDENSATION SECTIONS

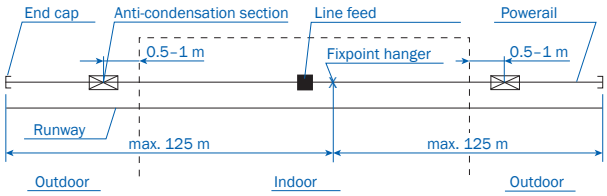
MKHD/MKHF/MKHS

The anti-condensation section consists of 1 m conductor with air circulation holes, covered by a protection hood. The anti-condensation section doesn't separate the conductor.



Use of the anti-condensation section

At transition areas where the system transitions from indoor to outdoor. Thereby an icing of the outside conductor will be avoided, as the warm air leaks out of the anticondensation section and will not condensate in the housing (see sketch).



Feeding

No extra feeds required as the Powerail is not interrupted.

Collectors

No extra collectors required.

Installation

The anti-condensation section is to be placed outdoors approximately 0.5 m to max. 1 m to the transition point.

For MKHD

Type	Weight kg	Order No.
BT-MBHD6-10HSC-1000	2.081	262570
BT-MBHD6-10SSD-1000	2.081	262571

For MKHF/S

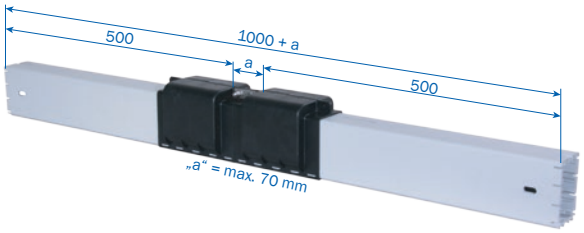
Type	Weight kg	Order No.
BT-MBHS6/63-100HSC-1000(1)	4.678	262135
BT-MBHS7/63-100HSC-1000(1)	4.854	262136
BT-MBHS8/63-100HSC-1000(1)	5.030	262137
BT-MBHS6/140-160HSC-1000	4.708	262138
BT-MBHS7/140-160HSC-1000	4.884	262139
BT-MBHS8/140-160HSC-1000	5.060	262140
BT-MBHS6/200HSC-1000	4.954	262144
BT-MBHS7/200HSC-1000	5.130	262145
BT-MBHS8/200HSC-1000	5.306	262146
BT-MBHS6/63SSD-1000(1)	4.730	262141
BT-MBHS7/63SSD-1000(1)	4.906	262142
BT-MBHS8/63SSD-1000(1)	5.082	262143

(1) Also suitable for former version with 40 A

EXPANSION SECTIONS

MKHD

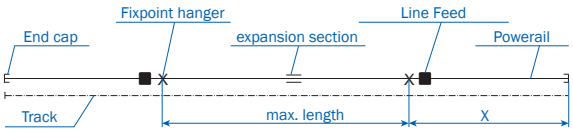
Expansion sections are required to compensate for the different expansions between copper conductors and steel- or concrete structures, in varying temperatures without interrupting electrical power: Expansion joints are used when the Powerail length between feeds, curves, switches or other fix points is exceeding 10 m.



Max. length during differences in temperature:

Δt 20 °C = 70 m Δt 40 °C = 35 m Δt 80 °C = 17 m

Δt 30 °C = 45 m Δt 60 °C = 23 m



Longer runs or higher differences in temperature require more expansion joints.

X = max. 55 m for outdoor systems

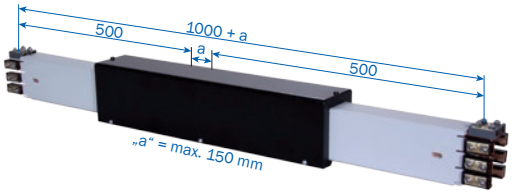
X = max. 100 m for indoor systems

Type	Weight kg	Order No.
DT-MDHD6-8HSC-1000	1.424	262572
DT-MDHD9HSC-1000	1.418	262573
DT-MDHD10HSC-1000	1.412	262574
DT-MDHD6-8SSD-1000	1.424	262575
DT-MDHD9SSD-1000	1.418	262576
DT-MDHD10SSD-1000	1.412	262577

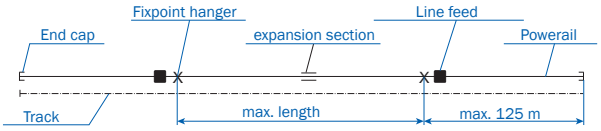
EXPANSION SECTIONS

MKHF/MKHS

The expansion sections are required to compensate for the different expansions between copper conductors and steel- or concrete structures, in varying temperatures without interrupting electrical power: Expansion joints are used when the Powerail length between feeds, curves, switches or other fix points is exceeding 20 m.

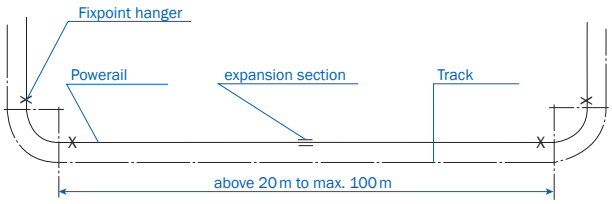


Max. length during differences in temperature:
Δ t 90 °C (–30 °C bis +60 °C) one expansion joint per 100 m.
An additional expansion joint every 100 m.



Arrangement of fixpoints according to sketches.

The remaining conductor sections have to be installed with sliding hangers.
Additional feeds or current collectors are not required as the expansion-sections do not interrupt electrical power.



Assembly

The gap dimension „a“ is 75 mm during installation.
Valid for an ambient temperature of –10 °C to +35 °C during installation.

Type	Weight kg	Order No.
DT-MDHS6/63-100HSC-1000(1)	6.354	262004
DT-MDHS7/63-100HSC-1000(1)	6.619	262005
DT-MDHS8/63-100HSC-1000(1)	6.884	262006
DT-MDHS6/140-160HSC-1000	6.384	262007
DT-MDHS7/140-160HSC-1000	6.649	262008
DT-MDHS8/140-160HSC-1000	6.914	262009
DT-MDHS6/200HSC-1000	6.564	262013
DT-MDHS7/200HSC-1000	6.829	262014
DT-MDHS8/200HSC-1000	7.094	262015
DT-MDHS6/63SSD-1000(1)	6.368	262010
DT-MDHS7/63SSD-1000(1)	6.633	262011
DT-MDHS8/63SSD-1000(1)	6.898	262012

(1) Also suitable for former version with 40 A

COLLECTORS

MKHD/MKHF/MKHS

Single collector MSWA

upto max. 180 m/min.

In conductor rails with sealing strip upto 100 m/min.

Connecting cables

for power line: cable 1 → 4 x 6 mm²

cable 2 → ... x 1.5 mm²

for control line: cable 1 → ... x 2.5 mm²

(two cables for 8-pole and more)

Example of ordering double collectors with 2 m cable

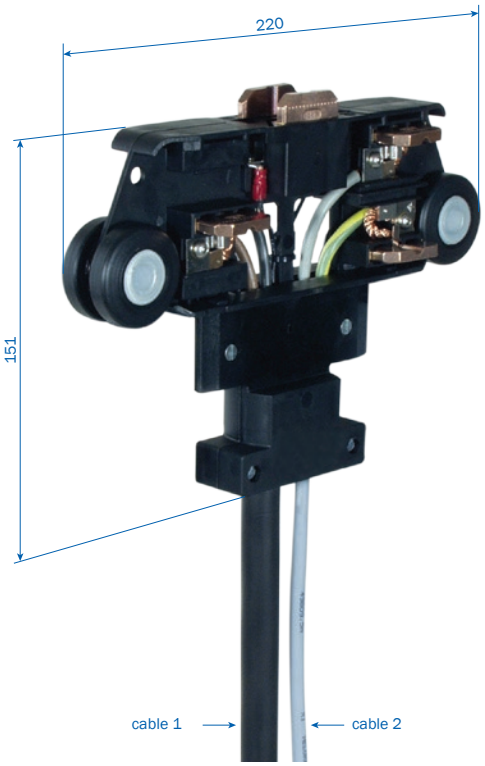
Order No. 236177-2

for collector SA-MSWA6/50-2HS28-60

Cleaning trolleys on request

For curves use single collectors only.

Connecting cable 1 m, longer cable available.



Type	Weight kg	No of Poles	Power rating at 60 % ED in A	Ø of connecting-cables in mm		Order No.
				Cable 1	Cable 2	
SA-MSWA6/50-1HS28-60	1.254	6	50	≈ 17.0	≈ 7.0	236177
SA-MSWA7/50-1HS28-60	1.307	7	50	≈ 17.0	≈ 7.5	236178
SA-MSWA8/50-1HS28-60	1.369	8	50	≈ 17.0	≈ 8.0	236179
SA-MSWA9/50-1HS28-60	1.484	9	50	≈ 17.0	≈ 9.0	236180
SA-MSWA10/50-1HS28-60	1.592	10	50	≈ 17.0	≈ 9.5	236181
SA-MSWA6/25-1SS28-60	0.922	6	25	≈ 11.5	–	236182
SA-MSWA7/25-1SS28-60	0.958	7	25	≈ 11.5	–	236183
SA-MSWA8/25-1SS28-60	1.030	8	25	≈ 10.0	≈ 10.0	236184
SA-MSWA9/25-1SS28-60	1.158	9	25	≈ 11.0	≈ 10.0	236185
SA-MSWA10/25-1SS28-60	1.347	10	25	≈ 11.5	≈ 10.0	236186

COLLECTORS

MKHD/MKHF/MKHS

Single collector MSWAS

upto max. 250 m/min.

In conductor rails with sealing strip upto 100 m/min.

Connecting cables

for power line: cable 1 → 4 x 6 mm²

cable 2 → ... x 1.5 mm²

for control line: cable 1 → ... x 2.5 mm²

(two cables for 8-pole and more)

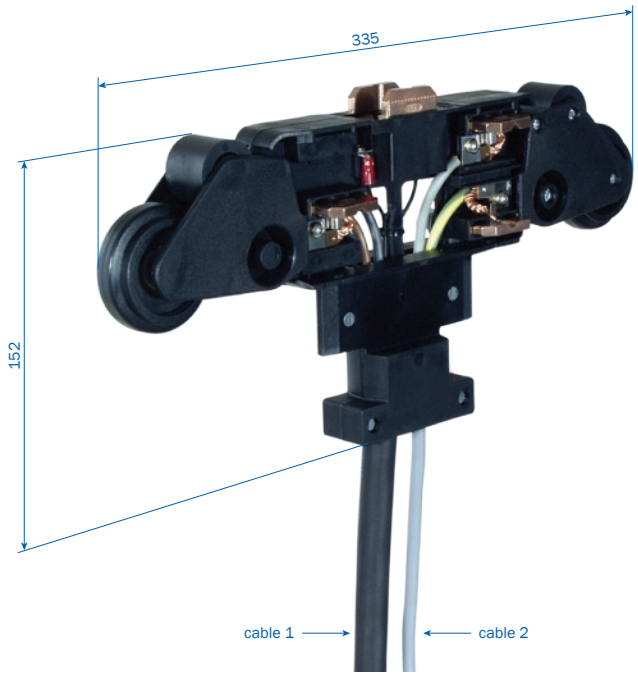
Example of ordering collector with 2 m cable

Order No. 236200-2

for collector SA-MSWAS6/50-2HS28-60

For curves use single collectors only.

Connecting cable 1 m, longer cable available.



Type	Weight kg	No of Poles	Power rating at 60 % ED in A	Ø of connecting-cables in mm		Order No.
				cables 1	cables 2	
SA-MSWAS6/50-1HS28-60	1.354	6	50	≈ 17.0	≈ 7.0	236200
SA-MSWAS7/50-1HS28-60	1.407	7	50	≈ 17.0	≈ 7.5	236201
SA-MSWAS8/50-1HS28-60	1.469	8	50	≈ 17.0	≈ 8.0	236202
SA-MSWAS9/50-1HS28-60	1.584	9	50	≈ 17.0	≈ 9.0	236203
SA-MSWAS10/50-1HS28-60	1.692	10	50	≈ 17.0	≈ 9.5	236204
SA-MSWAS6/25-1SS28-60	1.022	6	25	≈ 11.5	–	236205
SA-MSWAS7/25-1SS28-60	1.058	7	25	≈ 11.5	–	236206
SA-MSWAS8/25-1SS28-60	1.130	8	25	≈ 10.0	≈ 10.0	236207
SA-MSWAS9/25-1SS28-60	1.258	9	25	≈ 11.0	≈ 10.0	236208
SA-MSWAS10/25-1SS28-60	1.447	10	25	≈ 11.5	≈ 10.0	236209

COLLECTORS

MKHD/MKHF/MKHS

Double collector DMSWA

upto max. 180 m/min.

In conductor rails with sealing strip upto 100 m/min.

Connecting cables

for power line: cable 1 → 4 x 6 mm²

cable 2 → ... x 1.5 mm²

for control line: cable 1 → ... x 2.5 mm²

(two cables for 8-pole and more)

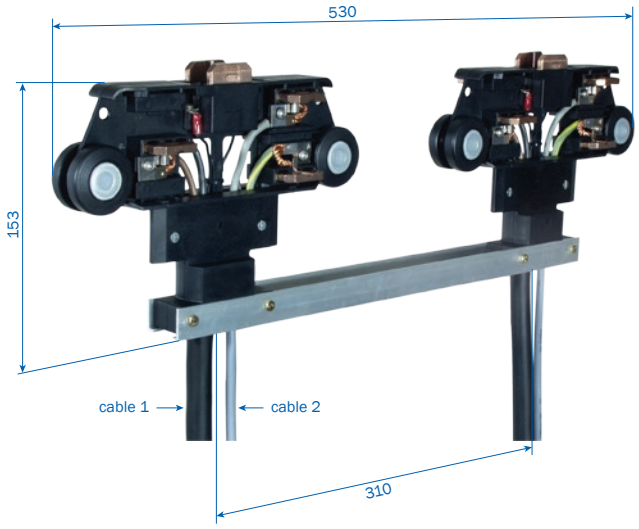
Example of ordering collector with 2 m cable

Order No. 236315-2

for collector SA-DMSWA6/100S-2HS28-60

For curves use single collectors only.

Connecting cable 1 m, longer cable available.



Type	Weight kg	No of Poles	Power rating at 60 % ED in A	Ø of connecting-cables in mm		Order No.
				cable 1	cable 2	
SA-DMSWA6/100S-1HS28-60	2.670	6	100	≈ 17.0	≈ 7.0	236315
SA-DMSWA7/100S-1HS28-60	2.776	7	100	≈ 17.0	≈ 7.5	236316
SA-DMSWA8/100S-1HS28-60	2.900	8	100	≈ 17.0	≈ 8.0	236317
SA-DMSWA9/100S-1HS28-60	3.130	9	100	≈ 17.0	≈ 9.0	236318
SA-DMSWA10/100S-1HS28-60	3.346	10	100	≈ 17.0	≈ 9.5	236319
SA-DMSWA6/50S-1SS28-60	2.006	6	50	≈ 11.5	–	236320
SA-DMSWA7/50S-1SS28-60	2.078	7	50	≈ 11.5	–	236321
SA-DMSWA8/50S-1SS28-60	2.222	8	50	≈ 10.0	≈ 10.0	236322
SA-DMSWA9/50S-1SS28-60	2.478	9	50	≈ 11.0	≈ 10.0	236323
SA-DMSWA10/50S-1SS28-60	2.856	10	50	≈ 11.5	≈ 10.0	236324

TOW ARMS

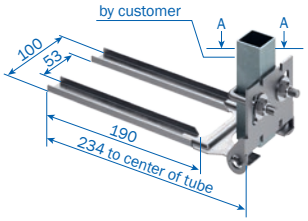
MKHD/MKHF/MKHS

Tow arm

Installation options of 30 mm square-,
hollow profile or tube with 30 – 34 mm

A - A
Version with square hollow profile (without adapter plate)

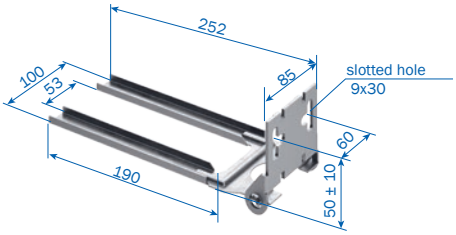
A - A
Version with tube(1)



Type	Weight kg	Order No.
MN-MGUN	0.436	600887
MN-MGU/K(3)	0.550	600336

Tow arm

for plane surface

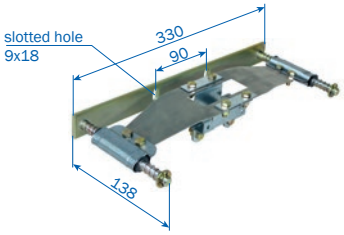


Type	Weight kg	Order No.
MN-MGFN	0.328	600888
MN-MGF/K(2)	0.442	600337

Flexible tow arm

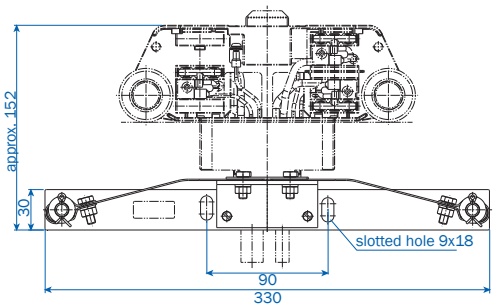
For single collectors
for systems with transfer funnels MTH

If you are going to use the flexible towing arm in system with curves please contact us.

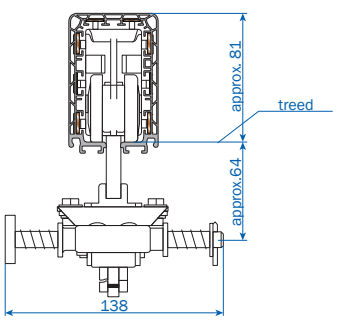


Type	Weight kg	Order No.
MN-MFMN	1.021	236460

Flexible tow arm configuration



max.horizontal offset 15 mm
max. vertical offset 10 mm

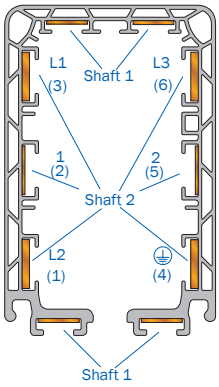


(1) For assembly use enclosed adapter plate (Prisma).
(2) ... / K Stainless steel

FLAT COPPER AND CABLE GLANDS

MKHD/MKHF/MKHS

Flat copper (MKHD)



Max. length of 11 mm wide strip (for shaft 1)

Type	Description	Weight kg/m	Type of cassette			Order No. (Cu)	Order No. (Inox)
			A	B	C		
SS-FLCU40A/11-11X1-E	11 mm² 11 x 1 mm (40 A)	0.10	90	260	300	234198	–
SS-INOX40A/11-11X1-E	11 mm² 11 x 1 mm	0.09	90	260	300	–	234384

Max. length of 13 mm wide strips (for shaft 2)

Type	Description	Weight kg/m	Type of cassette			Order No. (Cu)	Order No. (Inox)
			A	B	C		
SS-FLCU63A/10-13X0,8-E	10 mm² 13 x 0.8 mm (63 A)	0.09	115	300	–	234197	–
SS-FLCU80A/17-13X1,3-E	17 mm² 13 x 1.3 mm (80 A)	0.15	65	200	300	234199	–
SS-INOX40A/17-13X1,3-E	17 mm² 13 x 1.3 mm	0.14	65	200	300	–	234383
SS-FLCU100A/26-13X2-E	26 mm² 13 x 2 mm (100 A)(2)	0.23	45	130	200	234200	–
SS-FLCU140A/33-13X2,5-E	33 mm² 13 x 2.5 mm (140 A)(2)	0.29	35	100	160	234201	–
SS-FLCU160A/42-13X3,2-E	42 mm² 13 x 3.2 mm (160 A)(2)	0.37	25	80(1)	120(1)	234202	–

Cable glands

Cable glands	for cable-Ø in mm	Capacity in A (execution: D / F / S)	Page
M 25 and M 40	11 – 17 and 19 – 28	63 – 80 HS	P. 12, 13
M 25	11 – 17	63 SS	P. 12, 13
M 25 and M 50	9 – 19 and 23 – 34	63 – 100 HS	P. 13, 14
M 25 and M 50	9 – 19 and 29 – 40	163 – 200 HS	P. 13, 14
M 25	9 – 19	63 SS	P. 13, 14
M 25 for L1/L2/L3	9 – 19	63 – 200 HS	P. 15, 16
M 25 for 1 – 4 and 9/10	6 – 15	63 – 200 HS	P. 15, 16
M 25 6 to 10 poles	9 – 19	63 SS	P. 15, 16
M 20	6 – 13	63 – 200 SS / HS	P. 15, 16, 18

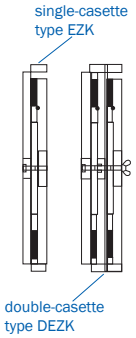
(1) Values for installation through VAHLE-engineers (with help device possible). Use bolted joints and possibly expansion sections for bigger lengths than shown in the table. In this case installation by VAHLE experts is recommended, especially for copper cross section of 42 mm². Consult factory for proper layout.

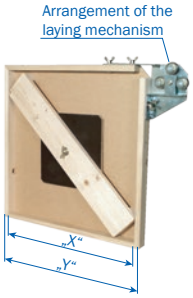
(2) With straightening tool (see page 34).

ASSEMBLING TOOLS

MKHD/MKHF/MKHS

Copper cassettes





Type	Weight kg	Dim „X“	Dim „Y“	Type of cassette	Order No.
MZ-EZK1-MKL/H	2.364	462	500	A	234219
MZ-EZK2-MKL/H	3.890	662	700	B	234220
MZ-EZK3-MKL/H	5.648	862	900	C	234250
MZ-DEZK1-MKL/H	4.831	462	500	A	234221
MZ-DEZK2-MKL/H	7.883	662	700	B	234222
MZ-DEZK3-MKL/H	11.387	862	900	C	234251

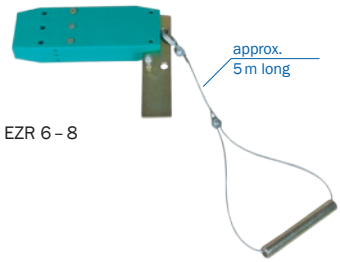
Type of copper cassette depends on copper cross section and system length (see page 33)

Straightening tool

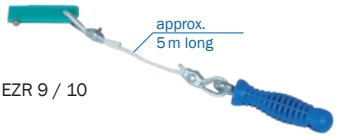
required from strip sections 26 mm² Cu. upwards

Type	Weight kg	Order No.
MZ-RV-MKL/H	0.952	234218

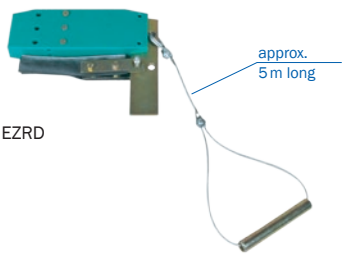
Conductor threading tool



EZR 6 – 8



EZR 9 / 10



EZRD

Type	Weight kg	Description	Order No.
MZ-EZR6-8-MKL/H	0.991	(for conductors inside housing, shafts 1 und 2)	234204
MZ-EZR9/10-MKL/H	0.182	(for conductors outside housing, shafts 1)	234730
DL-EZRD-MKL/H	1.197	(for sealing strip and for conductors inside housing 1 and 2)	234552

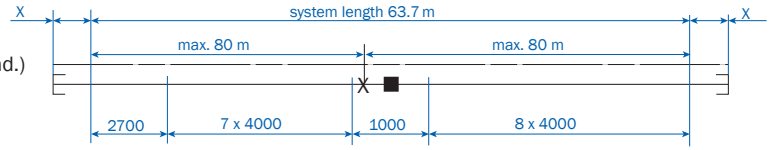
EXAMPLE FOR ORDERING

MKHD/MKHF/MKHS

MKH ... 8/100 ... HSC (see pages 5 and 6)

X = 300 mm end section for copper conductor MKHD (w/o cond.)

Not for MKHF and MKHS.



Quantity	Type	MKHD		MKHF		MKHS	
		Type	Order No.	Type	Order No.	Type	Order No.
15	Profile section, 4 m	MKHD-4000HSC	262504	–	–	–	–
1	Profile section, 3 m for 2.7 m short length	MKHD-3000HSC	262503	–	–	–	–
15	Conductor system 4 m	–	–	MKH 8/100-4000HSC	262134	MKHS8/100-4000HSC	262344
1	Conductor system 3 m for 2.7 m short length	–	–	MKH 8/100-3000HSC	262133	MKHS8/100-3000HSC	262343
1	Line feed	ES-MHG 8/63-100HSC-1000	262547	ES-MHGF8/100HSC-1000	262500	ES-MHGS6/100HSC-1000	262456
1	End section, left 0.3 m long	EK-MHED/L	262537	–	–	–	–
1	End section, right, 0.3 m long	EK-MHED/R	262536	–	–	–	–
2	End cap	–	–	EK-MSES	235141	EK-MSES	235141
18	Joint caps	VM-MVMD	234678	–	–	–	–
16	Joint caps	–		VM-MVMS	234585	VM-MVMS	234585
1	Fixpoint hanger	AH-MFH	262001	AH-MFH	262001	AH-MFH	262001
32	Sliding hangers	AH-MGH	262000	AH-MGH	262000	AH-MGH	262000
260 m	Flat copper strip 4 coils à 65 m, 26 mm²	SS-FLCU100A/26-13X2-E	234200	–	–	–	–
130 m	Flat copper strip 2 coils à 65 m, 10 mm²	SS-FLCU40A/10-13X0,8-E	234197	–	–	–	–
130 m	Flat copper strip 2 coils à 65 m, 11 mm²	SS-FLCU40A/11-11X1-E	234198	–	–	–	–
1	Single collector	SA-MSWA8/50-1HS28-60	236179	SA-MSWA8/50-1HS28-60	236179	SA-MSWA8/50-1HS28-60	236179
1	Tow arm	MN-MGU	600334	MN-MGU	600334	MN-MGU	600334
1	Copper cassette	MZ-EZK2-MKL/H	234220	–	–	–	–
1	Laying mechanism	MZ-RV-MKL/H	234218	–	–	–	–
1	Conductor threading tool	MZ-EZR6-8-MKL/H	234204	–	–	–	–

SPARE PARTS

MKHD/MKHF/MKHS

For enclosed conductor system

Type	Description	Order No.
VM-STV11/40A-MKHF	Plug-in joint for MKHF (11 mm Cu; 40 A)	262020
VM-STV13/63-100A-KBHF/MKHF(1)	Plug-in joint for MKHF (13 mm Cu; 63–100 A)	600483
VM-SCHV11/40A-MKHS/MKLS	Bolted joint for MKHS (11 mm Cu; 40 A)	262019
VM-SCHV13/63-200A-KBHS/MKHS/MKLS(1)	Bolted joint for MKHS (13 mm Cu; 63–200 A)	262018
VM-MVMT-MT-MU/S-9/10POL	Joint cap for transfer guide and transfer funnel, pair (MKHD, MKHF and MKHS)	234779
DL-D-KBH-MKH-MKL-TDV	Sealing strip (max. length each 40 m)	600551
DL-V-KSLT-KBH-MKL/H-LSV/G	Coupling for sealing strip, in pairs (2 per joint)	258300
DL-F-MKL/H	Fixing clamp for sealing strip (1 per end)	236105

For collector MSWA

Type	Description	Order No.
SK-KSW-MSWA-PH/SU-28	Carbon phase (lateral, 9. and 10. pole)	600088
SK-KSW-MSWA-PE/S-28	Carbon ground (lateral, PE)	600090
SK-MSWA-PH/O-28	Carbon top (7. and 8. pole)	236187
SA-KF-KSW-MSWA-SP	Carbon spring standard (for all carbons, pair)	600338
TR-DMSW/A-SF310	Rigid bar for DMSW and DMSWA	234515
SA-ZB-AS-MSWA-P-250	High speed set for collector MSWAS	236199
SA-ZB-DG-MSWA-S	Sealing strip slide plate for collectors MSWA	236625

Cleaning accessories on request

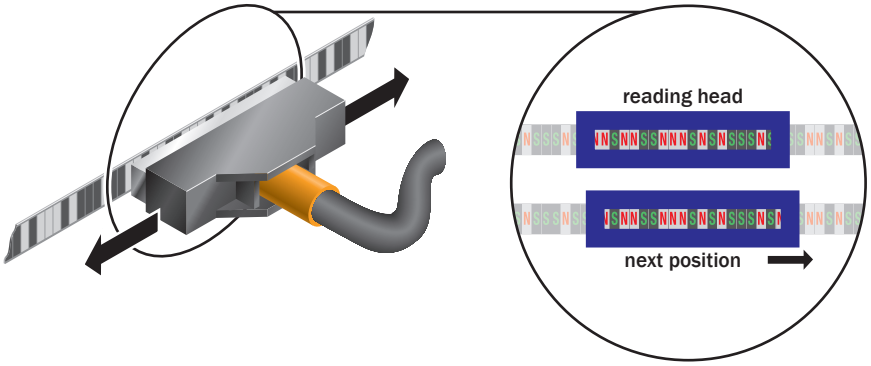
(1) Also suitable for former version with 40 A

APOS POSITIONING SYSTEM

were developed for automated handling systems in material flow technology.

The control system can constantly query the absolute position of the mobile consumer.

The APOS Positioning system can be used in connection with the VAHLE Powercom® data transmission system.



Features

- absolute position determination up to and 262 m
- Systems for exceeded lengths on request
- Space-saving solutions for integration into the powerail system or for installation in parallel to the runway
- retrofittable
- absolute position immediately available when switching on or after a power failure
- reliable position detection even in humid or dusty environments
- trouble-free functionality even in poor lighting conditions
- travel speed up to 250 m/min
- no wear (contactless)

For more information see our catalog VAHLE APOS® (7a)

VAHLE POWERCOM®

VAHLE Powercom®-Data transmission systems in conjunction with VAHLE conductor bars or sliprings were developed for automated handling systems in material flow technology. They enable the uninterrupted and cost effective data transfer between the central control system and the accompanying automation devices on the conveying vehicles. The VAHLE Powercom® data transmission system can be used in connection with the VAHLE Powercom® Data Transmission System.

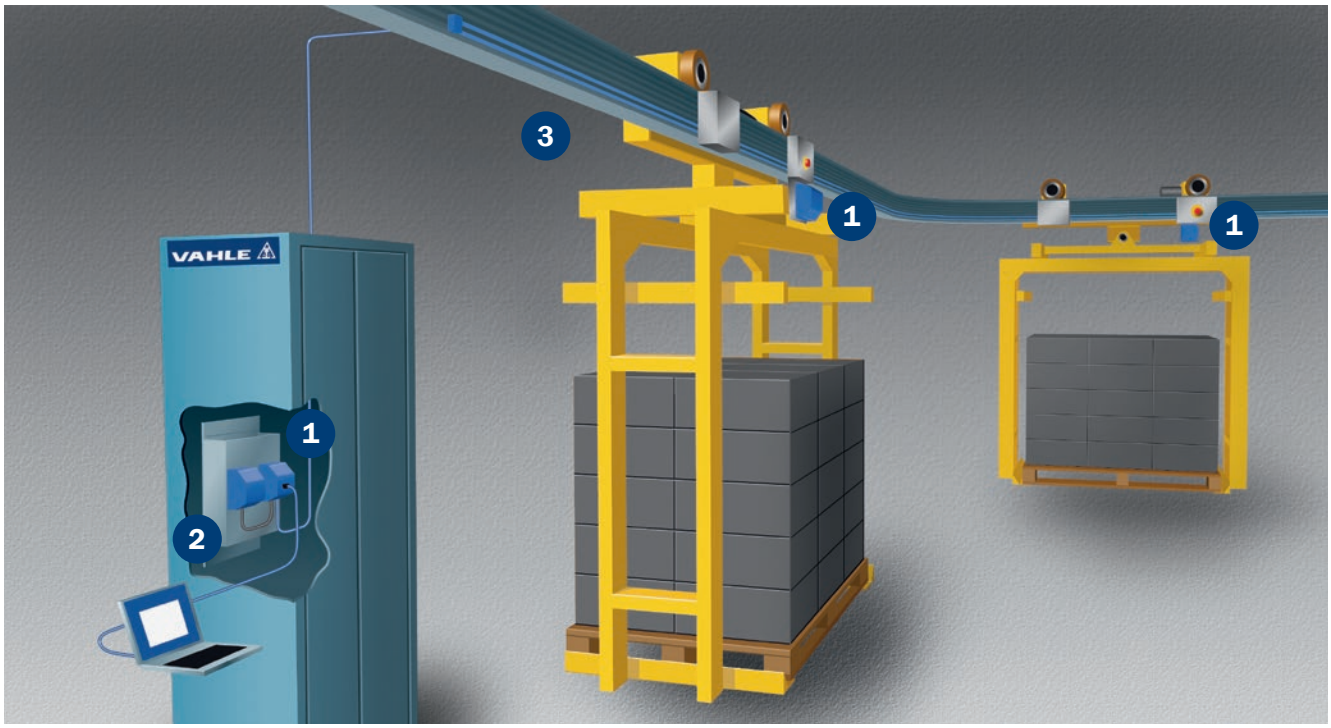
19.2 kbps

VAHLE Powercom® 485

- RS 485 Interface (transparent protocol)
- to be used in various BUS-Systems.
- Transfer rate 19.2 kbps

For more information see our catalog VAHLE POWERCOM® (6a)

Example of use



1 VAHLE Powercom®
2 VAHLE Powercom® Double filter
3 VAHLE Powercom® Terminal resistance

QUESTIONNAIRE

Company: _____ Date: _____

Phone: _____ Fax: _____

Email: _____ Website: _____

1. Number of wiper line systems: _____
2. Type of crane or device to be fed: _____
3. Operating voltage: _____ volt Phases: _____ frequency: _____ Hz

   ☐ Three-phase voltage ☐ AC voltage ☐ DC voltage
4. Line length: _____
5. Number of phase rails: _____ N-rails: _____ Control rails: _____ Ground conductor: _____
6. Installation position of the wiper line:

   ☐ Hanging wiper line / current collector cable downwards

   ☐ Hanging wiper line / current collector cable lateral entry (1)

   ☐ Hanging distance _____ m (max. 2 m) ☐ Other: _____
7. Number of cranes or devices in a wiper line system: _____
8. ☐ Indoor system ☐ Outdoor system
9. Special operating conditions (moisture, dust, chemical influences, etc) _____
10. Ambient temperature: _____ °C min. _____ °C max.
11. Hall expansion joints _____ pieces _____ expansion max.
12. Position and number of feeds (1): _____
13. Position and number of disconnecting points (e. g. for repair zones) (1): _____
14. Where is the wiper line to be positioned? (1): _____
15. Screw consoles to be supplied: ☐ yes ☐ no Distance middle of carrier – middle of wiper line _____

    Flange width of carrier: _____
16. Travel speed for longitudinal travel: _____ in bends: _____ at transfers: _____
17. Current consumption of the individual electricity consumers: _____

    (Please use the table below.)
18. Max. voltage drop from conductor rail feed to the current collectors and considering the start-up currents:

    3 % ☐ or _____ % in relation to nominal current.

Motor data	Crane/device 1							Crane/device 2						
	Power kW	Nominal current			Start-up current		Drive type (2)	Power kW	Nominal current			Start-up current		Drive type (2)
		A	cos φ_N	% duty	A	cos φ_A			A	cos φ_N	% duty	A	cos φ_A	
Lifting device														
Auxiliary lifting device														
Carriage														
Trolley traveling winch														

Mark motors that can be switched on at the same time with an *.

Mark motors that can start up at the same time with Δ.

Further information: _____

_____

Signature:

(1) Outline drawing required for offer preparation
(2) Enter drive type: K for squirrel-cage rotor, S for slip ring rotor, F for frequency-controlled motor
We reserve the right to make changes due to further technical development.

Paul Vahle GmbH & Co. KG
Westicker Str. 52
59174 Kamen
Germany

+49 2307 7040
info@vahle.com
vahle.com

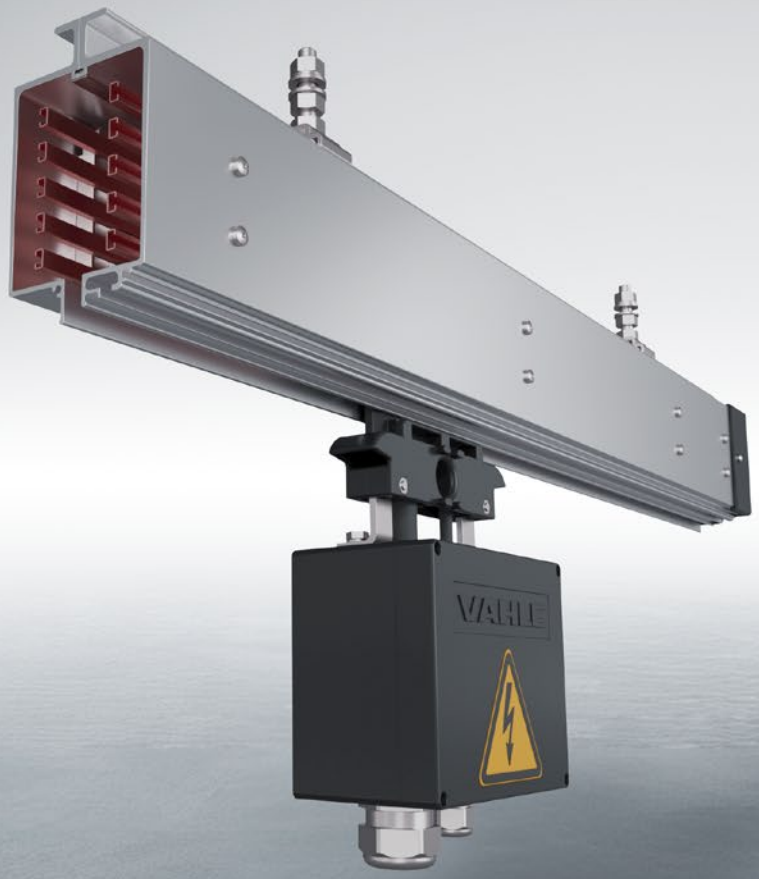
You can find your local contact at:
vahle.com/contact

W1017546/00 | Rev. 03 | 03/24 | Errors and technical modifications subject to change.

VAHLE

LSV | LSVG

ENCLOSED CONDUCTOR SYSTEMS



4D | EN 2010

INDEX

Type LSV

Type LSV with Plastic shielding “FP”

Type LSVG

Type LSVG with sealing strip “D”

Technical Data

Max. continuous current: 300 A (with 80% duty cycle)
Nominal voltage: 690 V
Collector rating: 40 A up to 80 A
min. Bending Radius: LSV 750 mm/ LSVG 1500 mm

Impedance:	16	25	35	50	70	mm² copper
	1.17	0.72	0.53	0.38	0.28	Ohm/1000 m

Temperature Resistance:
Powerail – 40 °C up to + 100 °C (120 °C)(1)
Sealing strip “D” up to + 80 °C
Plastic shielding “FP” up to + 55 °C
Collector – 40 °C/+ 70 °C (120 °C)(1)

Resistance:	16	25	35	50	70	mm² copper
	1.16	0.71	0.51	0.36	0.26	Ohm/1000 m

Consider the voltage drop calculation to maintain the limits established by the motor manufacturers:

Formulas:

AC: $\Delta U = \sqrt{3} \times I \times l \times Z$

DC: $\Delta U_1 = 2l \times I \times R$

$$\Delta U_2 = \frac{\Delta U_1 \cdot 100}{V}$$

Effective length:

l = L power feed located at the end of the system
l = L/2 power feed located at the mid-point of the system
l = L/4 power feed located at both ends of the system
l = L/6 power feed located at L/6 from each end of the system

ΔU_1 = Voltage drop [V]
ΔU_2 = Voltage drop in %
I = Ampere load [A]
V = System Voltage
l = Power feed length [m]
L = System length [m]
Z= Impedance in Ohm/1000 m
R= Resistance in Ohm/1000 m

The total ampere load is determined from the nominal rated current of all motors working simultaneously on the same feed section of your electrification system.
The number of feed points should be increased in case the drop is exceeding the limitations – or it may be necessary to provide booster cables.

(1) Consult factory for higher temperature applications.

General

The Vahle Aluminium enclosed powerails LSV and LSVG are compact and safe prefabricated Electrification Systems.

These systems are ideal for **indoor and outdoor** use, for all types of installations requiring a moving or movable source of electrical power: cranes, monorails, hoists, electric power tools, machine tools, storage and retrieval systems and many other mobile machinery applications. LSV and LSVG are especially well suited for higher ambient temperatures.

The principal advantages of these systems are maximum electrical and personnel safety, compactness, dependability and minimal maintenance expense. They fully meet all safety requirements; VDE 0470 part 1; Protection IP 23, with sealing strip IP 24 per EN 60529 applies.

In special cases the plastic shielding FP provides additional safety. For the collectors applies protection against contact only if the brushes are complete in the conductor rail.

Conductor rails in the hand area in which the collectors leave the powerail under normal service conditions, must have a protection agaist contact on site e.g. through barriers or disconnection. This is only necessary at voltages above 25 V AC or 60 V DC.
Other cross sections than shown on page 4 are possible. If the cross section of the neutral conductor is smaller than the outer conductor cross section, it is necessary to protect it against overcurrent and short-circuit, design according to IEC60364-4-43 (HD 60364-4-43).
The aluminium enclosed LSV 4-pole and the PVC enclosed KLS 4-pole (see cat. 4a) can be combined by means of a transfer piece.

Housing

The system consists of two prefabricated, standardized aluminium profiles which are bolted together. The polarizing long and short lip profiles prevent accidental reversal and avoid phase reversing of collectors (see pages 5 & 6). The lateral arrangement of insulators and copper conductors allows 4-7 conductors in the LSV and 6-11 conductors in the LSVG housing.

The 5, 7, 9 and 11-pole systems use an uninsulated ground conductor (see page 5).

Curved track sections to contour to almost any job requirement can be furnished to order.

We do recommend the anodized version for installations in coastal areas, river valleys or other humid and aggressive environments. Heating systems for icing conditions are available.

All LSV and LSVG housings can be equipped with a Neoprene sealing strip or a Plastic shielding as shown on page 6 of this catalog.

Standard duct sections are 1, 2, 3 or 4 m long; other sections to coincide with your runway requirements are available.

End caps close the open powerail ends.

Couplings

The 60, 100 and 140 Amp. systems use side fish plates for joining adjacent sections;

The 200 and 300 Amp. systems exclusively use bolted joints (see mounting information).

Feed Sets

End feeds or line feeds are available.

End feed boxes 4-11-pole are designed for max. 60 Amperes; line feed boxes rate from 60 to 300 Amperes. Space-saving line feeds with 2 m connection cables are available.

The factory assembled 1 m feed-in tracks integrate in your system length.

Brackets & Hangers

We do recommend to use our standard supporting brackets, page 8 for monorail and hoist applications.
Standard support spacing is 2 m. Up to 3 m support spacing is possible when using joint covers for connecting the duct sections. Use one fix point hanger; all others are sliding hangers (see installation instructions).

Expansion Joint Sections

These expansion joints can compensate for expansion and contraction difference between aluminium housing and copper conductors. They do not interrupt electric current flow.

Telescope & Anti-condensation sections

The telescope devices serve for length-compensation in high temperature fluctuations, for runs exceeding 200 m. For combined indoor/outdoor applications use the anti-condensation section. A separate feeding on both sides of these units is required.

Contact Sections, Turntables, Switches

Powerails for working areas and transfer applications see page 12.

Sectionalizing

Conductor dead sections are electrical interrupts of the conductor. Under normal operating conditions a cross over with collectors to switch the voltage off or on is only allowed with low power ratings (control current).
Available as air gap version (5 mm), where the collector carbon bridges the gap, e.g. for mains.
Also available as insulating piece version (30 mm). In this case the insulating piece is longer than the carbon and each powerail section can be separated electrically, e.g. for control.

Collectors

The collectors are made of impact resistant pvc.
The power will be transfered through spring supported brushes. The connection takes place through connecting cables or connection boxes. The mechanical connection to the consumer are provided by towing arms.

With following system requirements double collectors have to be used:

- Transfers with switches and turntables
- low voltages, frequency controlled drives
- Transmission of data- and/or emergency stop signals
- high electrical loads

The length of the connecting cable should not exeed 3 m, if the fuse is not laid out for this rating. See DIN VDE 0100, part 430 and DIN EN 60204-32.
(Note: A.m. appears often in systems with more than one collector.)
The provided connecting cables are sufficient for the quoted nominal current. For the different layout systems have the reduction factor according to DIN VDE 0298-4 be considered.

Safery notice

Please ensure that the arrangement of the collectors
(conductor rail) and collector arms made by the customer is according to the safety distance of min. 0.5 m to prevent the danger of crushing.

Note:
In case of use in galvanising plants, pickle shops, aggressive environments, Installations in firedamp areas or underneath a drainage area and if low voltage is required we recommend to send us your enquiry with full details (see questionnaire on page 29/30).
For the preperation of quotes and orders we require drawings if the conductor has curves, dead sections, turntables or switches.

TYPES, ENGINEERING DATA AND CATALOG NUMBERS

LSV

Type	HS w PE / SS w/o PE	No. of Poles	Ampacity at 80 % ED L1, L2, L3 A	No. of conductors x copper section mm² L1, L2, L3	⏚ (2)	N	Control-Line
LSV 4/ 60 HS		4	60	3 x 16	1 x 16	–	–
LSV 4/ 60 SS	Control line	4	60	–	–	–	4 x 16
LSV 4/100 HS		4	100	3 x 25	1 x 16	–	–
LSV 4/140 HS		4	140	3 x 35	1 x 16	–	–
LSV 4/200 HS(1)		4	200	3 x 50	1 x 25	–	–
LSV 4/300 HS(1)		4	300	3 x 70	1 x 50	–	–
LSV 5/ 60 HS		5	60	3 x 16	1 x 16	1 x 16	–
LSV 5/100 HS		5	100	3 x 25	1 x 16	1 x 25	–
LSV 5/140 HS		5	140	3 x 35	1 x 16	1 x 35	–
LSV 5/200 HS(1)		5	200	3 x 50	1 x 16	1 x 50	–
LSV 5/300 HS(1)		5	300	3 x 70	1 x 16	1 x 70	–
LSV 6/ 60 HS		6	60	3 x 16	1 x 16	–	2 x 16
LSV 6/ 60 SS	Control line	6	60	–	–	–	6 x 16
LSV 6/100 HS		6	100	3 x 25	1 x 16	–	2 x 16
LSV 6/140 HS		6	140	3 x 35	1 x 16	–	2 x 16
LSV 6/200 HS(1)		6	200	3 x 50	1 x 25	–	2 x 16
LSV 7/ 60 HS		7	60	3 x 16	1 x 16	1 x 16	2 x 16
LSV 7/100 HS		7	100	3 x 25	1 x 16	1 x 25	2 x 16
LSV 7/140 HS		7	140	3 x 35	1 x 16	1 x 35	2 x 16
LSV 7/200 HS(1)		7	200	3 x 50	1 x 16	1 x 50	2 x 16

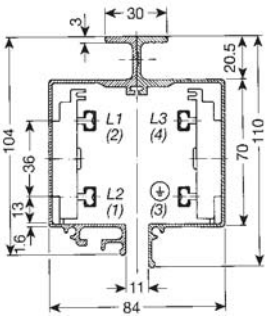
LSVG

Type	HS w PE / SS w/o PE	No. of Poles	Ampacity at 80 % ED L1, L2, L3 A	No. of conductors x copper section mm² L1, L2, L3	⏚ (2)	N	Control-Line
LSVG 6/ 60 HS		6	60	3 x 16	1 x 16	–	2 x 16
LSVG 6/ 60 SS	Control line	6	60	–	–	–	6 x 16
LSVG 6/100 HS		6	100	3 x 25	1 x 16	–	2 x 16
LSVG 6/140 HS		6	140	3 x 35	1 x 16	–	2 x 16
LSVG 6/200 HS(1)		6	200	3 x 50	1 x 25	–	2 x 16
LSVG 6/300 HS(1)		6	300	3 x 70	1 x 50	–	2 x 20
LSVG 7/ 60 HS		7	60	3 x 16	1 x 16	1 x 16	2 x 16
LSVG 7/100 HS		7	100	3 x 25	1 x 16	1 x 25	2 x 16
LSVG 7/140 HS		7	140	3 x 35	1 x 16	1 x 35	2 x 16
LSVG 7/200 HS(1)		7	200	3 x 50	1 x 16	1 x 50	2 x 16
LSVG 7/300 HS(1)		7	300	3 x 70	1 x 16	1 x 70	2 x 20
LSVG 8/ 60 HS		8	60	3 x 16	1 x 16	–	4 x 16
LSVG 8/ 60 SS	Control line	8	60	–	–	–	8 x 16
LSVG 8/100 HS		8	100	3 x 25	1 x 16	–	4 x 16
LSVG 8/140 HS		8	140	3 x 35	1 x 16	–	4 x 16
LSVG 8/200 HS(1)		8	200	3 x 50	1 x 25	–	4 x 16
LSVG 9/ 60 HS		9	60	3 x 16	1 x 16	1 x 16	4 x 16
LSVG 9/100 HS		9	100	3 x 25	1 x 16	1 x 25	4 x 16
LSVG 9/140 HS		9	140	3 x 35	1 x 16	1 x 35	4 x 16
LSVG 9/200 HS(1)		9	200	3 x 50	1 x 16	1 x 50	4 x 16
LSVG 10/ 60 HS		10	60	3 x 16	1 x 16	–	6 x 16
LSVG 10/ 60 SS	Control line	10	60	–	–	–	10 x 16
LSVG 10/100 HS		10	100	3 x 25	1 x 16	–	6 x 16
LSVG 10/140 HS		10	140	3 x 35	1 x 16	–	6 x 16
LSVG 10/200 HS(1)		10	200	3 x 50	1 x 25	–	6 x 16
LSVG 11/ 60 HS		11	60	3 x 16	1 x 16	1 x 16	6 x 16
LSVG 11/100 HS		11	100	3 x 25	1 x 16	1 x 25	6 x 16
LSVG 11/140 HS		11	140	3 x 35	1 x 16	1 x 35	6 x 16
LSVG 11/200 HS(1)		11	200	3 x 50	1 x 16	1 x 50	6 x 16

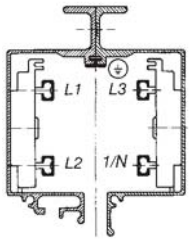
(1) With bolted joints only other types can be delivered with bolted joints without surcharge (on request).

(2) The ground conductor ⏚ = PE is always connected to the powerail housing and marked accordingly. The ground bar is uninsulated in the case of 5-, 7-, 9- and 11-pole systems. Mounting configurations see pages 8, 11, 23, 28.

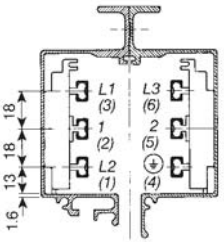
Nominal Voltage V	Leakage Path mm	Weight kg/m	Order- No.	Configurations
690	45	3,000	190 00 •	
690	45	3,000	190 10 •	
690	45	3,400	190 04 •	
690	45	3,700	190 08 •	
690	45	4,300	190 61 •	
690	35	5,000	190 60 •	
690	45	3,150	190 01 •	
690	45	3,550	190 03 •	
690	45	3,850	190 05 •	
690	45	4,450	190 62 •	
690	35	5,150	190 63 •	
690	45	3,300	190 02 •	
690	45	3,300	190 11 •	
690	45	3,700	190 06 •	
690	45	4,000	190 64 •	
690	45	4,480	195 52 •	
690	45	3,450	190 07 •	
690	45	3,850	190 09 •	
690	45	4,250	190 65 •	
690	45	4,730	195 60 •	



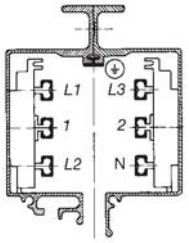
LSV 4-pole, 60-300 A



LSV 5-pole, 60-300 A

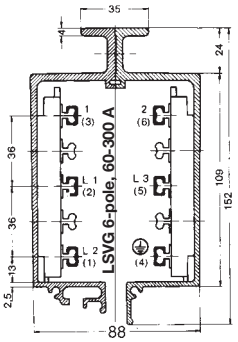


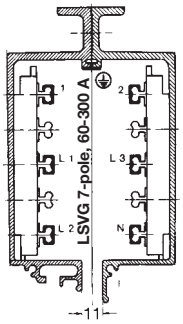
LSV 6-pole, 60-200 A

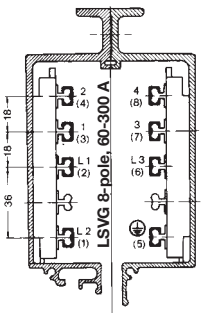


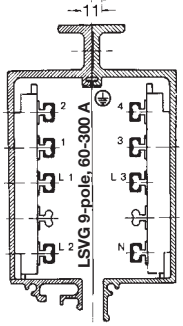
LSV 7-pole, 60-200 A

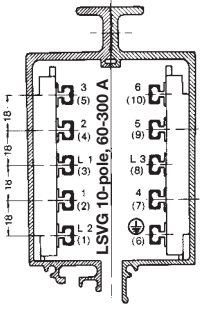
Nominal Voltage V	Leakage Path mm	Weight kg/m	Order- No.	Configurations
690	45	5,150	180 00 •	
690	45	5,150	180 22 •	
690	45	5,450	180 01 •	
690	45	5,750	180 02 •	
690	45	6,300	180 03 •	
690	35	7,250	180 04 •	
690	45	5,300	180 05 •	
690	45	5,700	180 06 •	
690	45	6,100	180 07 •	
690	45	6,700	180 08 •	
690	35	7,400	180 09 •	
690	45	5,450	180 10 •	
690	45	5,450	180 23 •	
690	45	5,750	180 11 •	
690	45	6,050	180 12 •	
690	45	6,530	184 58 •	
690	45	5,600	180 13 •	
690	45	6,000	180 14 •	
690	45	6,400	180 15 •	
690	45	6,940	184 59 •	
690	45	5,750	180 16 •	
690	45	5,750	180 24 •	
690	45	6,050	180 17 •	
690	45	6,350	180 18 •	
690	45	6,830	184 60 •	
690	45	5,900	180 19 •	
690	45	6,300	180 20 •	
690	45	6,700	180 21 •	
690	45	7,240	184 61 •	

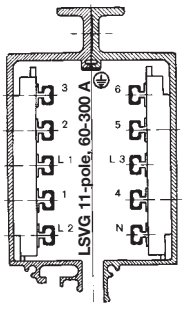












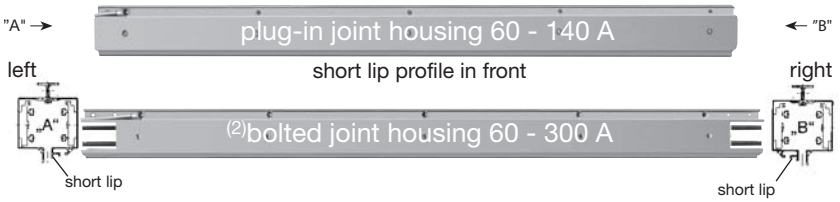
• Add last number (1, 2, 3, 4 m length suffix) in accordance to bars required.

Numbers in parenthesis are used for control circuit applications.

STANDARD SECTION MAX. 4 M

CURVED SECTION

LSV

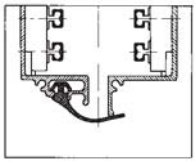


Extra finish of LSV; surcharge Order- No.

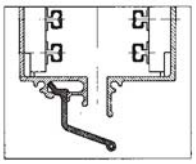
Type	Index E anodized housing Order- No.	Index I copper conductors with stainless steel cap Order- No. 60 A	Order- No. 200 A
LSV 4-pole	190 660	194 754	194 755
LSV 5-pole	190 670	194 756	194 757
LSV 6-pole	190 660	194 758	–
LSV 7-pole	190 670	194 760	–

Supplements for LSV:

Illustration see page 2	Type	Weight kg/m	Order- No.
Neoprene sealing strip	**D**	0,225	254 751
Fastener for sealing strip (pair)			258 432
Coupling for sealing strip for length exceeding 50 m			258 300
Mounting trolley for sealing strip			258 345
Plastic shielding(1) incl locking pin for plastic shielding	**FP**	0,260	196 574

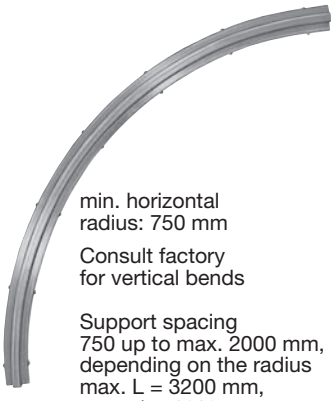


Neoprene sealing strip



Plastic shielding

Custom built



min. horizontal radius: 750 mm

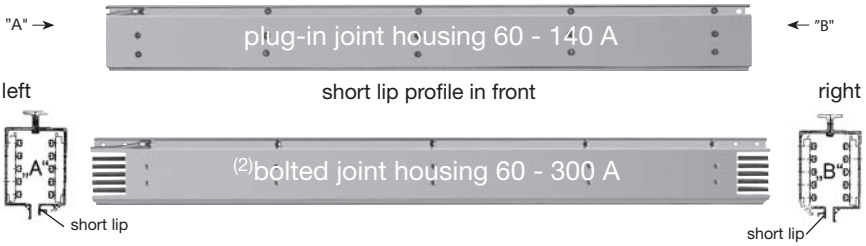
Consult factory for vertical bends

Support spacing 750 up to max. 2000 mm, depending on the radius max. L = 3200 mm, max. ⊀ = 120°

surcharge	Order- No.
horizontal curve L max. 1.8 m	194 420
horizontal curve L from 1.8 m to max. 3.2 m	195 285

Long lip side of powerail should always be mounted towards the track (see page 28). Notify exceptions for replacements and/or extensions and determine correct curves.

LSVG

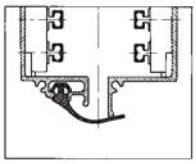


Extra finish of LSVG; surcharge Order- No.

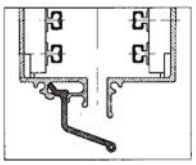
Type	Index E anodized housing Order- No.	Index I copper conductors with stainless steel cap Order- No. 60 A	Order- No. 200 A
LSVG 6-pole	180 250	183 871	183 872
LSVG 7-pole	180 260	183 873	183 874
LSVG 8-pole	180 250	183 875	–
LSVG 9-pole	180 260	183 877	–
LSVG 10-pole	180 250	183 879	–
LSVG 11-pole	180 260	183 881	–

Supplements for LSV:

Illustration see page 2	Type	Weight kg/m	Order- No.
Neoprene sealing strip	**D**	0,225	254 751
Fastener for sealing strip (pair)			258 432
Coupling for sealing strip for length exceeding 50 m			258 300
Mounting trolley for sealing strip			184 033
Plastic shielding(1) incl. locking pin for plastic shielding	**FP**	0,260	196 574

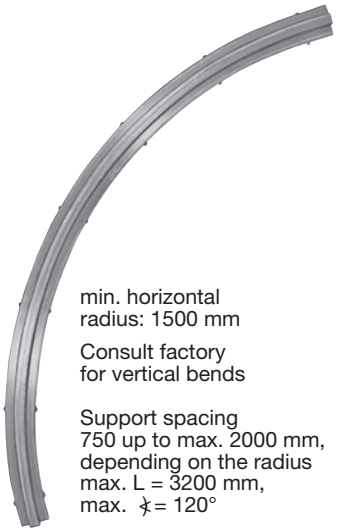


Neoprene sealing strip



Plastic shielding

Custom built



min. horizontal radius: 1500 mm

Consult factory for vertical bends

Support spacing 750 up to max. 2000 mm, depending on the radius max. L = 3200 mm, max. ⊀ = 120°

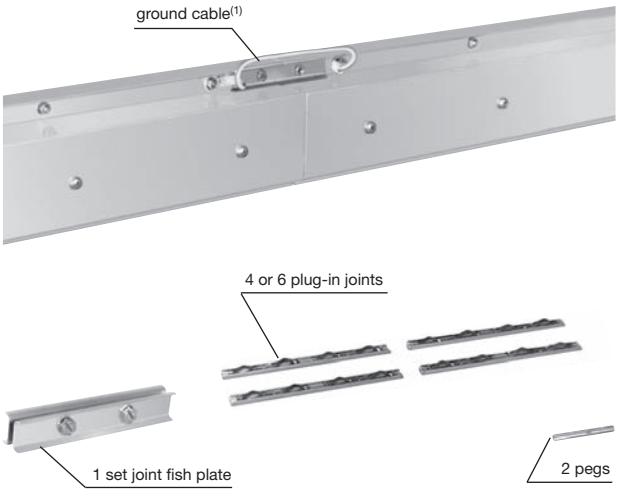
surcharge	Order- No.
horizontal curve L max. 1.8 m	183 810
horizontal curve L from 1.8 m to max. 3.2 m	184 170

Long lip side of powerail should always be mounted towards the track (see page 28).
Notify exceptions for replacements and/or extensions and determine correct curves.

(1) Plastic shielding FP not for curves.
(2) All other types are to be delivered with bolted joints w/o surcharge.

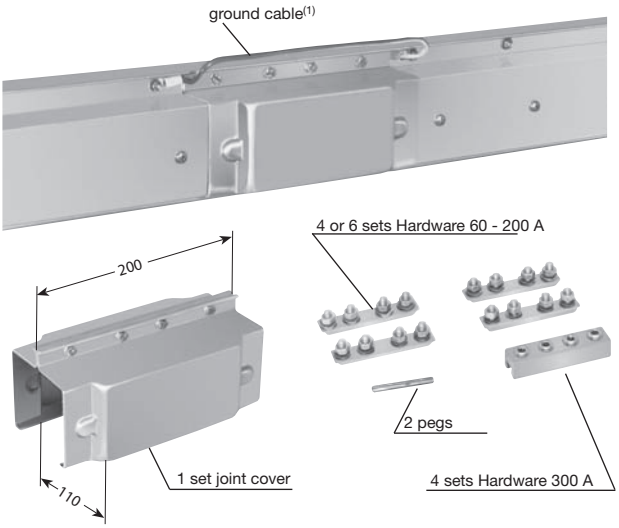
LSV

Plug-in joints 60-140 A



Type		Weight kg	Order- No.
VBL 4/5	for 4- and 5-pole	0,110	195 244
VBL 6/7	for 6- and 7-pole	0,140	195 246

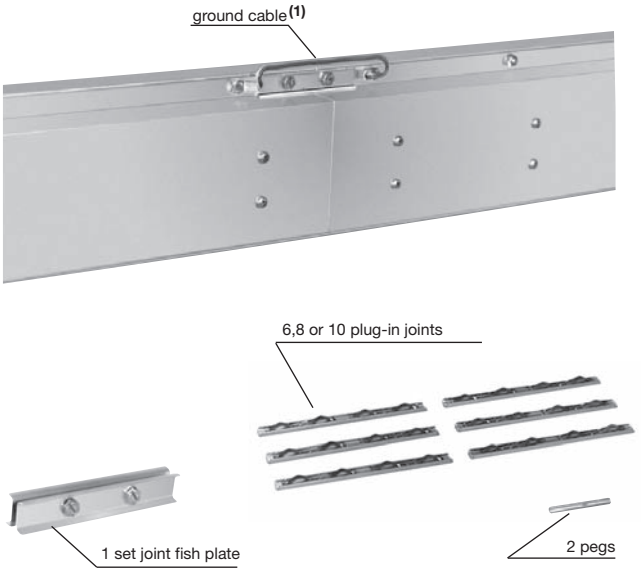
Bolted joints 60-300 A



Type		Weight kg	Order- No.	Order- No. anodized
VBLS 4/5	for 4- and 5-pole	0,450	195 248	–
VBLS/E 4/5	60-200 Amp.	0,450	–	195 255
VBLS 6/7	for 6- and 7-pole	0,505	195 250	–
VBLS/E 6/7	60-200 Amp.	0,505	–	195 259
VBLSG 4/5	for 4- and 5-pole	0,605	195 252	–
VBLSG/E 4/5	300 Amp.	0,605	–	195 256

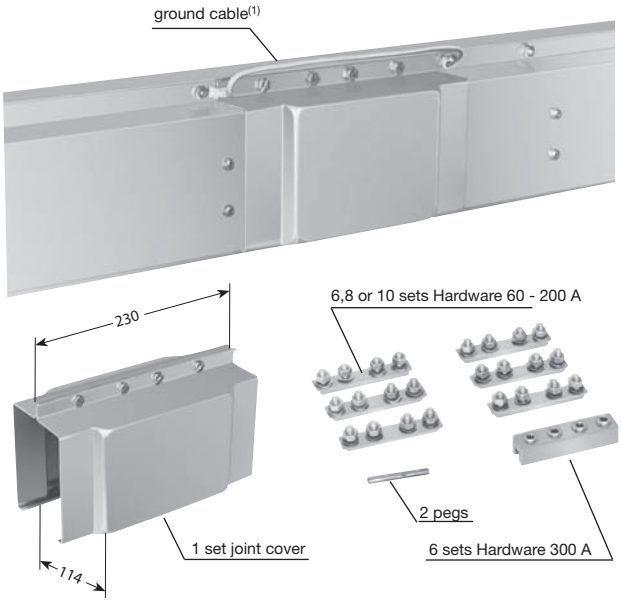
LSVG

Plug-in joints 60-140 A



Type		Weight kg	Order- No.
VLG 6/7	for 6- and 7-pole	0,135	184 107
VLG 8/9	for 8- and 9-pole	0,165	184 109
VLG 10/11	for 10- and 11-pole	0,195	184 111

Bolted joints 60-300 A



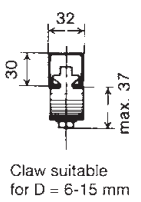
Type		Weight kg	Order- No.	Order- No. anodized
VLGS 6/7	for 6- and 7-pole	0,665	184 113	–
VLGS/E 6/7	60-200 Amp.	0,665	–	184 121
VLGS 8/9	for 8- and 9-pole	0,720	184 115	–
VLGS/E 8/9	60-200 Amp.	0,720	–	184 125
VLGS 10/11	for 10- and 11-pole	0,770	184 117	–
VLGS/E 10/11	60-200 Amp.	0,770	–	184 127
VLGSG 6/7	for 6- and 7-pole	0,890	184 119	–
VLGSG/E 6/7	300 Amp.	0,890	–	184 122

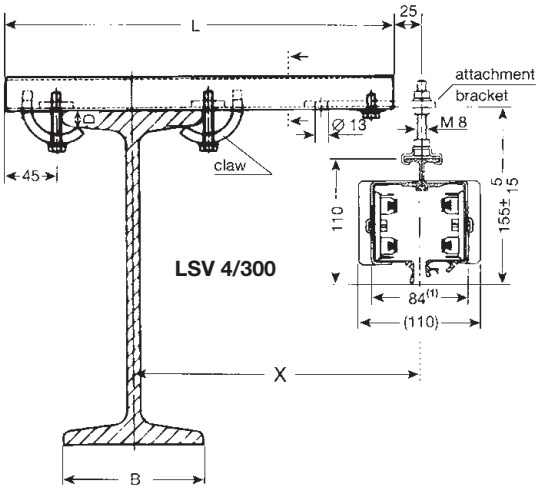
(1) Yellow/green ground cable factory pre-assembled.
(2) No joints required for uninsulated top conductors 5, 7, 9 and 11. Equel for power line and control line.

BRACKETS

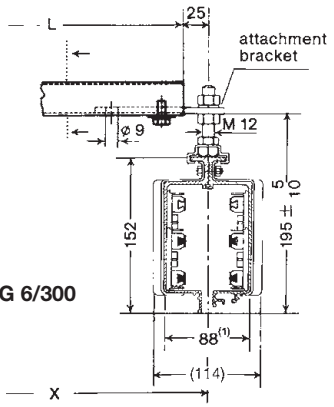
These brackets are easily bolted to any type of standard I-beam.

View without I-beam



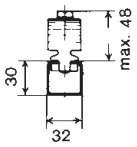


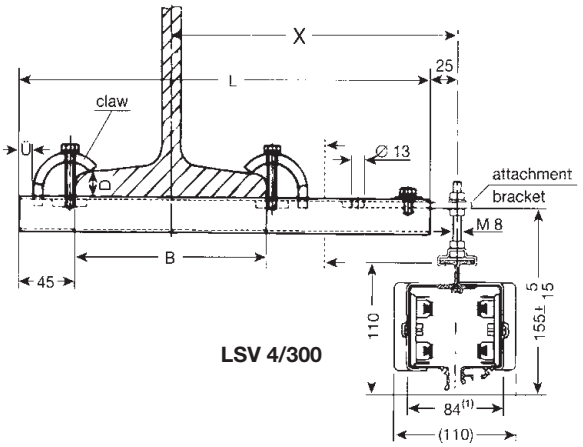
LSV 4/300



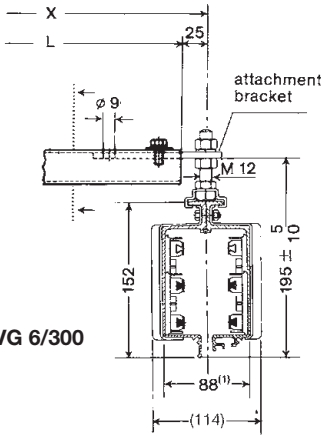
LSVG 6/300

View without I-beam



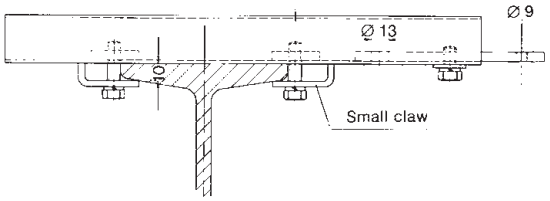


LSV 4/300



LSVG 6/300

EHKL small claw version



Attention:
Make sure that hoist wheels have enough clearance. Use small claw if necessary!

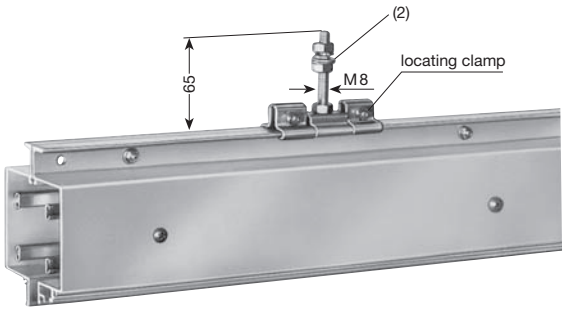
C-rail of EHKL is identical to type S 1, Order- No.

Select next larger size bracket when your I-beam dimension B is more than 170 mm and up to 300 mm.

		Type	X mm	L mm	B max. mm	Weight kg	Order- No. for std. brackets	Order- No. with small claw
LSV	LSVG	**EHK 250**	250	350	170	1,070	251 600	251 720
		EHK 300	300	400	170	1,150	251 610	251 730
		EHK 400	400	500	170	1,300	251 620	251 740
		EHK 500	500	600	170	1,450	251 630	251 750
		EHK 600	600	700	170	1,600	251 640	251 760
	X	**EHK 700**	700	800	170	1,750	251 650	251 770
	X	**EHK 750**	750	850	170	1,820	251 660	251 780
	X	**EHK 800**	800	900	170	1,900	251 670	251 790

(1) max. width 84 mm resp. 88 mm for plug-in joints w/o joint plates.
Dim. in parenthesis refer to bolted joints with joint plates (see illustration).

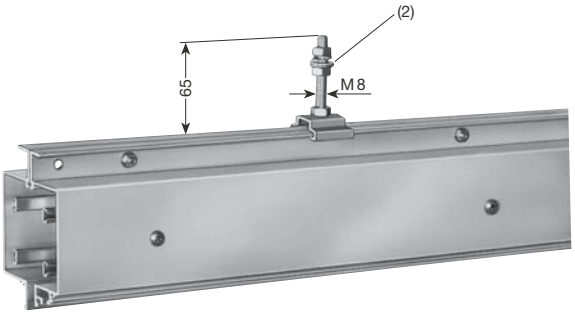
FIXPOINT HANGER[1]



Type	Weight kg	Order- No.
FAL	0,150	190 120

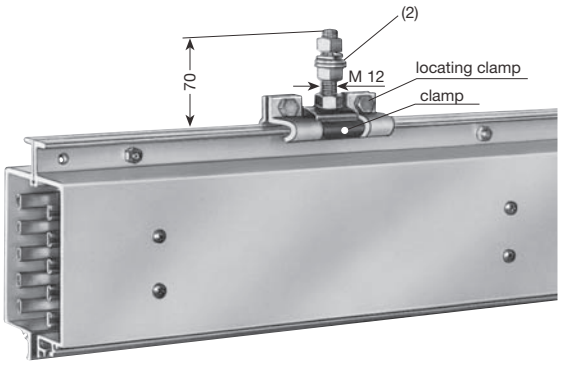
All steel parts made of stainless steel.

SLIDING HANGER[1]



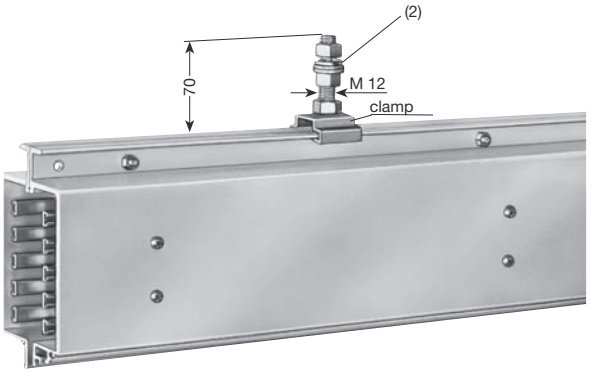
Type	Weight kg	Order- No.
GAL	0,080	190 130

All steel parts made of stainless steel.



Type	Weight kg	Order- No.
SAFG	0,410	180 310

Steel parts galvanized, clamp made of stainless steel.



Type	Weight kg	Order- No.
SAS	0,175	200 160

Steel parts galvanized, clamp made of stainless steel.

[1] Illustrations show hangers mounted to powerail.
[2] Flat washers only to be used in slotted holes.

END CAP[1]

END FEED[2]
c/w 1 m powerail

LSV

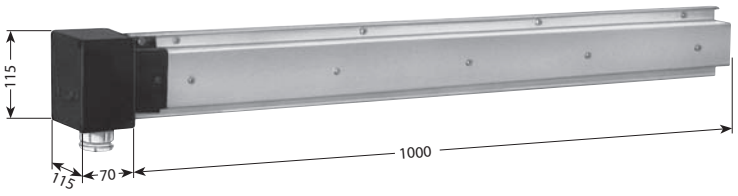
Plastic cap with plug-in joints

Type	Weight kg	Order- No.
EKL	0,080	190 220

Aluminium cap with bolted joints

Type	Weight kg	Order- No.
EKLS	0,300	195 149
EKLS/E	0,300	195 303

L = LH version, R = RH version
(see page 6)



Cable glands (cable Ø see table page 28):
4 & 5-pole 1 x M 32
6 & 7-pole 1 x M 32
and 1 x M 255

Type [3]	Order- No.	Type [3]	A	Weight kg	Order- No.
Power line **HS** with PE		Power line **HS** with PE			
KEL 4/60 L	192 150	**KEL 4/60 R**	60	3.35	190 140
KEL 5/60 L	192 160	**KEL 5/60 R**	60	3.55	190 150
KEL 6/60 L	192 170	**KEL 6/60 R**	60	3.75	190 160
KEL 7/60 L	192 180	**KEL 7/60 R**	60	3.95	190 170
Control line **SS** without PE		Control line **SS** without PE			
KEL 4/60 L	190 240	**KEL 4/60 R**	60	3.35	190 250
KEL 6/60 L	190 260	**KEL 6/60 R**	60	3.75	190 390

LSVG

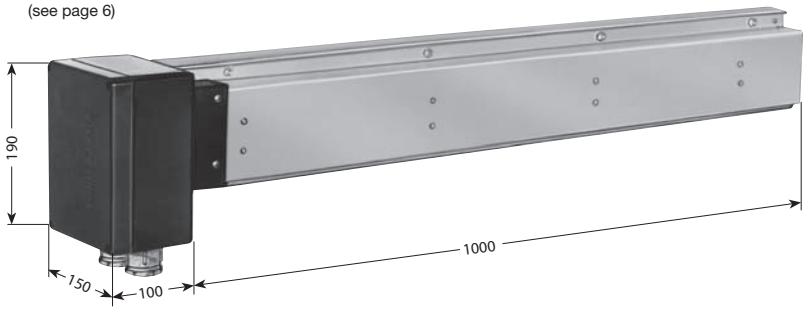
Plastic cap with plug-in joints

Type	Weight kg	Order- No.
EKLG	0,120	180 320

Aluminium cap with bolted joints

Type	Weight kg	Order- No.
EKLGS	0,450	184 100
EKLGS/E	0,450	184 177

L = LH version [1], R = RH version
(see page 6)



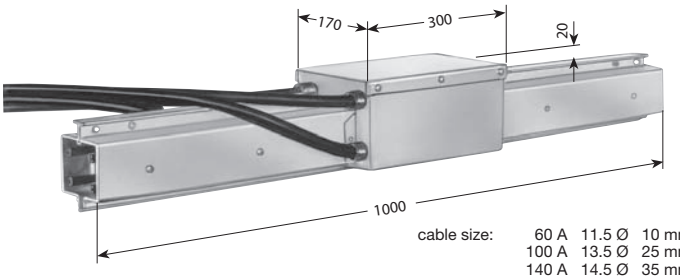
Cable glands (cable Ø see table page 28):
all types 1 x M 32
and 1 x M 25

Type [3]	Order- No.	Type [3]	A	Weight kg	Order- No.
Power line **HS** with PE		**Power line HS with PE**			
KELG 6/60 L	180 330	**KELG 6/60 R**	60	6.05	180 340
KELG 7/60 L	180 350	**KELG 7/60 R**	60	6.25	180 360
KELG 8/60 L	180 370	**KELG 8/60 R**	60	6.40	180 380
KELG 9/60 L	180 430	**KELG 9/60 R**	60	6.60	180 440
KELG 10/60 L	180 450	**KELG 10/60 R**	60	6.80	180 460
KELG 11/60 L	180 470	**KELG 11/60 R**	60	7.00	180 480
Control line **SS** without PE		Control line **SS** without PE			
KELG 6/60 L	180 390	**KELG 6/60 R**	60	6.05	180 400
KELG 8/60 L	180 410	**KELG 8/60 R**	60	6.40	180 420
KELG 10/60 L	180 490	**KELG 10/60 R**	60	6.80	180 500

(1) Illustration shows end cap with standard section.
(2) Above sections come ready assembled on 1m section and are part of the system length (see examples for ordering pages 26 and 27).
(3) Suffix types e.g. KEL 4/60 L w/ PE → KEL 4/60 L **HS** Order- No. 192 150.

LINE FEED[1]

c/w 2 m feed-in cable and 1 m powerail

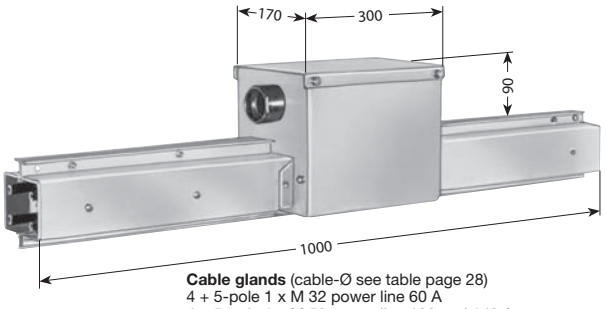


cable size:

60 A	11.5 Ø	10 mm²
100 A	13.5 Ø	25 mm²
140 A	14.5 Ø	35 mm²
200 A	18.0 Ø	50 mm²

LINE FEED[1]

c/w terminal box and 1 m powerail



Cable glands (cable-Ø see table page 28)
4 + 5-pole 1 x M 32 power line 60 A
4 + 5-pole 1 x M 50 power line 100 und 140 A
4 + 5-pole 1 x M 50 power line 200 A
4 + 5-pole 1 x M 63 power line 300 A
6 + 7-pole 1 x M 32 and 1 x M 25 power line 60 A
6 + 7-pole 1 x M 50 and 1 x M 25 power line 100 und 140 A
6 + 7-pole 1 x M 50 and 1 x M 25 power line 200 A
4 + 6-pole 1 x M 32 control line 60 A

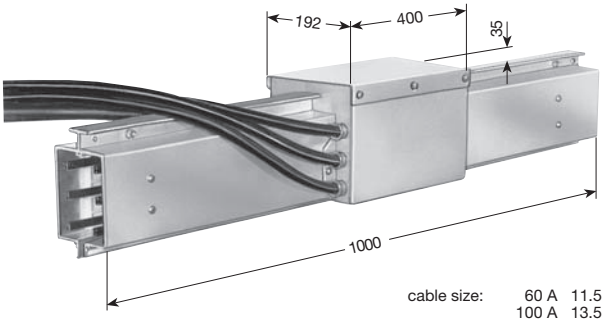
LSV

Type[2]	A	Weight kg	Order- No.
Power line **HS** with PE			
LAL 4/ 60	60	5,65	195 060
LAL 4/100	100	6,55	195 061
LAL 4/140	140	7,40	195 062
LAL 4/200	200	8,00	195 637
LAL 4/300	300	8,75	196 460
LAL 5/ 60	60	6,10	195 064
LAL 5/100	100	7,00	195 065
LAL 5/140	140	8,25	195 066
LAL 5/200	200	8,85	195 638
LAL 5/300	300	9,75	196 682
Control line **SS** without PE			
LAL 4/ 60	60	5,65	195 063
LAL 6/ 60	60	6,65	195 070

Type[2]	A	Weight kg	Order- No.
Power line **HS** with PE			
LAL 6/ 60	60	6,65	195 067
LAL 6/100	100	7,80	195 068
LAL 6/140	140	8,45	195 069
LAL 6/200	200	8,95	195 639
LAL 7/ 60	60	7,15	195 071
LAL 7/100	100	9,00	195 072
LAL 7/140	140	9,25	195 073
LAL 7/200	200	9,80	195 640

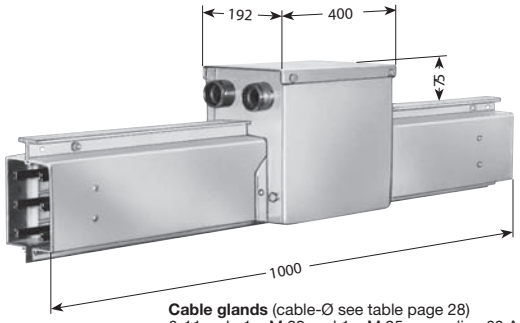
Type[2]	A	Weight kg	Order-No.
Power line **HS** with PE			
NKL 4/ 60	60	4,40	195 074
NKL 4/100	100	4,80	195 075
NKL 4/140	140	5,10	195 076
NKL 4/200	200	5,80	195 077
NKL 4/300	300	6,50	195 078
NKL 5/ 60	60	4,60	195 080
NKL 5/100	100	5,00	195 081
NKL 5/140	140	5,30	195 082
NKL 5/200	200	6,00	195 083
NKL 5/300	300	6,70	195 084

Type[2]	A	Weight kg	Order-No.
Power line **HS** with PE			
NKL 6/ 60	60	4,80	195 085
NKL 6/100	100	5,20	195 086
NKL 6/140	140	5,50	195 087
NKL 6/200	200	6,00	195 567
NKL 7/ 60	60	5,00	195 089
NKL 7/100	100	5,40	195 090
NKL 7/140	140	5,70	195 091
NKL 7/200	200	6,30	195 568
Control line **SS** without PE			
NKL 4/ 60	60	4,40	195 079
NKL 6/ 60	60	4,80	195 088



cable size:

60 A	11.5 Ø	10 mm²
100 A	13.5 Ø	25 mm²
140 A	14.5 Ø	35 mm²
200 A	18.0 Ø	50 mm²



Cable glands (cable-Ø see table page 28)
6-11-pole 1 x M 32 and 1 x M 25 power line 60 A
6-11-pole 1 x M 50 and 1 x M 25 power line 100 und 140 A
6+ 7-pole 1 x M 50 and 1 x M 25 power line 200 A
6+ 7-pole 1 x M 63 and 1 x M 25 power line 300 A
6, 8 and 10-pole 2 x M 25 control line 60 A

LSVG

Type[2]	A	Weight kg	Order-No.
Power line **HS** with PE			
LALG 6/ 60	60	8,60	183 949
LALG 6/100	100	9,40	183 950
LALG 6/140	140	10,30	183 951
LALG 6/200	200	10,80	184 661
LALG 6/300	300	11,95	185 713
LALG 7/ 60	60	9,10	183 953
LALG 7/100	100	10,10	183 954
LALG 7/140	140	11,10	183 955
LALG 7/200	200	11,65	184 662
LALG 7/300	300	12,85	185 714
LALG 8/ 60	60	9,60	183 956
LALG 8/100	100	10,45	183 957
LALG 8/140	140	11,30	183 958
LALG 8/200	200	11,80	184 663
Control line **SS** without PE			
LALG 6/60	60	8,60	183 952
LALG 8/60	60	9,60	183 959
LALG 10/60	60	10,65	183 966

Type[2]	A	Weight kg	Order-No.
Power line **HS** with PE			
LALG 9/ 60	60	10,15	183 960
LALG 9/100	100	11,05	183 961
LALG 9/140	140	12,15	183 962
LALG 9/200	200	12,70	184 664
LALG 10/ 60	60	10,65	183 963
LALG 10/100	100	11,45	183 964
LALG 10/140	140	12,30	183 965
LALG 10/200	200	12,80	184 665
LALG 11/ 60	60	11,15	183 967
LALG 11/100	100	12,10	183 968
LALG 11/140	140	13,15	183 969
LALG 11/200	200	13,70	184 666

Type[2]	A	Weight kg	Order-No.
Power line **HS** with PE			
NKLG 6/ 60	60	6,75	184 983
NKLG 6/100	100	7,05	184 985
NKLG 6/140	140	7,35	185 029
NKLG 6/200	200	7,90	185 031
NKLG 6/300	300	8,85	185 079
NKLG 7/ 60	60	6,95	185 033
NKLG 7/100	100	7,25	185 035
NKLG 7/140	140	7,55	185 037
NKLG 7/200	200	8,10	185 039
NKLG 7/300	300	9,05	185 081
NKLG 8/ 60	60	7,15	185 041
NKLG 8/100	100	7,45	185 043
NKLG 8/140	140	7,75	185 045
NKLG 8/200	200	8,25	185 047

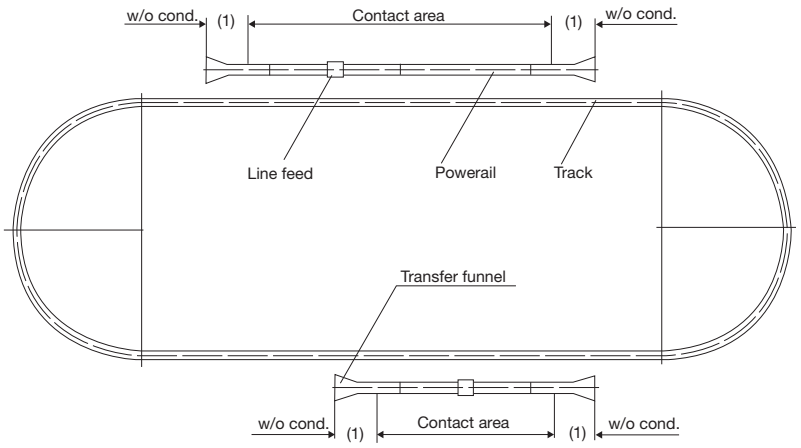
Type[2]	A	Weight kg	Order-No.
Power line **HS** with PE			
NKLG 9/ 60	60	7,35	185 049
NKLG 9/100	100	7,65	185 051
NKLG 9/140	140	7,95	185 053
NKLG 9/200	200	8,50	185 055
NKLG 10/ 60	60	7,55	185 057
NKLG 10/100	100	7,85	185 059
NKLG 10/140	140	8,15	185 061
NKLG 10/200	200	8,65	185 063
NKLG 11/ 60	60	7,75	185 065
NKLG 11/100	100	8,05	185 067
NKLG 11/140	140	8,35	185 069
NKLG 11/200	200	8,90	185 071
Control line **SS** without PE			
NKLG 6/ 60	60	6,75	185 073
NKLG 8/ 60	60	7,15	185 075
NKLG 10/ 60	60	7,55	185 077

[1] Above sections come ready assembled on 1 m powerail section and are a part of the system length (see examples for ordering on pages 26 and 27).

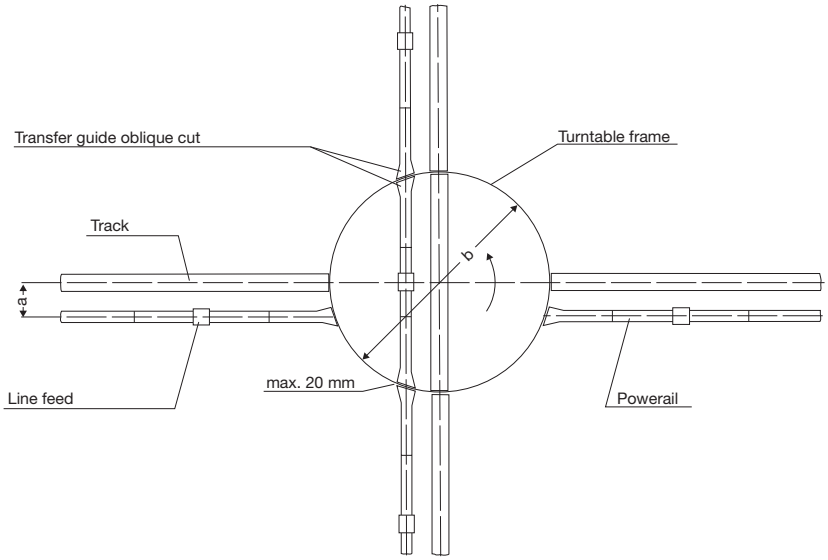
[2] Suffix types e.g. LAL 4/60 w/ PE → LAL 4/60 **HS** Order- No. 195 060.

TRANSFER AND SWITCH ARRANGEMENTS

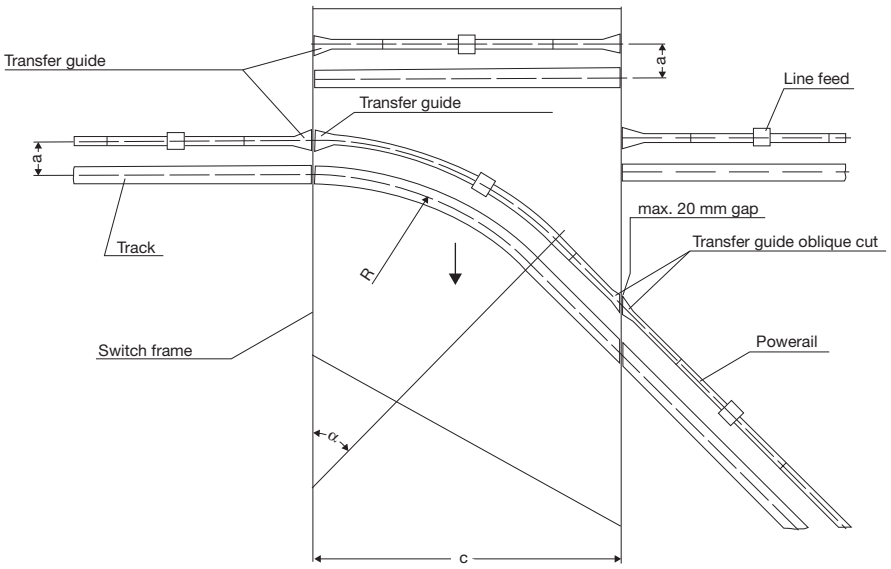
Contact section[1]



Turntable



Sliding switch



Please submit drawings of transfer applications. Specify dimenions a, b, c, R and angle α (α max. 50°)

[1] Transfer funnels must not be activated before collectors are fully engaged.
Flexible support type tow arms (see page 22) for collectors are essential with contact sections.

TRANSFER FUNNEL[2]

c/w 0.5 m powerail and joint material

Towing arms KFM or KFML (see page 22) required. Lateral tolerance upto max. 15 mm, vertical tolerance upto max. 10 mm.
Max. entry speed collector unit: 60 m/min.
Connect the conductor to mains only if all carbons of the collector have full contact to the conductor rail.
Arrangement see page 12.

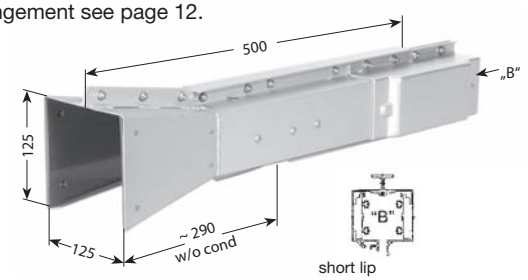


Illustration shows L. H. version
short lip in front
(see page 6)

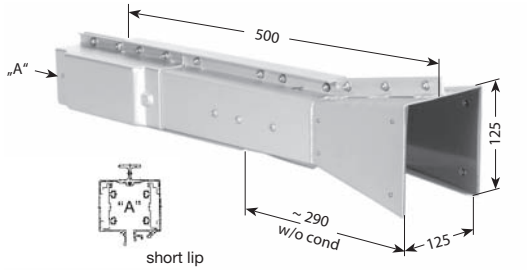


Illustration shows R. H. version
short lip in front
(see page 6)

Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE			Power line **HS** with PE			Power line **HS** with PE		
ETL 4/ 60 L	1,450	192 890	**ETL 6/ 60 L**	1,500	192 990	**ETL 4/ 60 R**	1,450	193 070	**ETL 6/ 60 R**	1,500	193 170
ETL 4/100 L	1,500	192 900	**ETL 6/100 L**	1,600	193 000	**ETL 4/100 R**	1,500	193 080	**ETL 6/100 R**	1,600	193 180
ETL 4/140 L	1,600	192 910	**ETL 6/140 L**	1,650	193 010	**ETL 4/140 R**	1,600	193 090	**ETL 6/140 R**	1,650	193 190
ETL 4/200 L	1,700	192 920	**ETL 6/200 L**	1,750	195 610	**ETL 4/200 R**	1,700	193 100	**ETL 6/200 R**	1,750	195 611
ETL 4/300 L	1,800	192 930	**ETL 7/ 60 L**	1,550	193 020	**ETL 4/300 R**	1,800	193 110	**ETL 7/ 60 R**	1,550	193 200
			ETL 7/100 L	1,600	193 030				**ETL 7/100 R**	1,600	193 210
ETL 5/ 60 L	1,500	192 940	**ETL 7/140 L**	1,700	193 040	**ETL 5/ 60 R**	1,500	193 120	**ETL 7/140 R**	1,700	193 220
ETL 5/100 L	1,550	192 950	**ETL 7/200 L**	1,820	195 612	**ETL 5/100 R**	1,550	193 130	**ETL 7/200 R**	1,820	195 613
ETL 5/140 L	1,650	192 960	Control line **SS** without PE			**ETL 5/140 R**	1,650	193 140	Control line **SS** without PE		
ETL 5/200 L	1,750	192 970	**ETL 4/ 60 L**	1,450	193 050	**ETL 5/200 R**	1,750	193 150	**ETL 4/ 60 R**	1,450	193 230
ETL 5/300 L	1,900	192 980	**ETL 6/ 60 L**	1,500	193 060	**ETL 5/300 R**	1,900	193 160	**ETL 6/ 60 R**	1,500	193 240

Towing arms KFM or KFML (see page 22) required. Lateral tolerance upto max. 15 mm, vertical tolerance upto max. 10 mm.
Max. entry speed collector unit: 60 m/min.
Connect the conductor to mains only if all carbons of the collector have full contact to the conductor rail.
Arrangement see page 12.

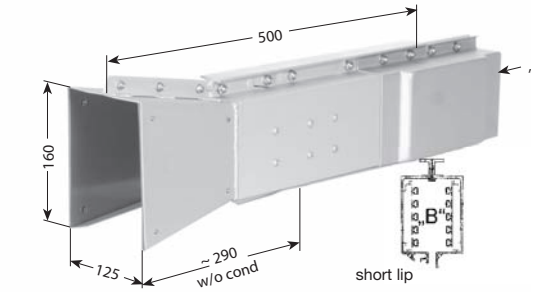


Illustration shows L. H. version
short lip in front
(see page 6)

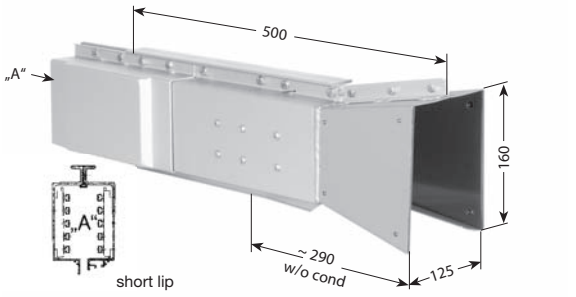


Illustration shows R. H. version
short lip in front
(see page 6)

Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.
Power line **HS** witht PE			Power line **HS** with PE			Power line **HS** with PE			Power line **HS** with PE		
ETLG 6/ 60 L	2,500	181 970	**ETLG 9/ 60 L**	2,600	182 230	**ETLG 6/ 60 R**	2,500	181 980	**ETLG 9/ 60 R**	2,600	182 240
ETLG 6/100 L	2,550	181 990	**ETLG 9/100 L**	2,700	182 250	**ETLG 6/100 R**	2,550	182 000	**ETLG 9/100 R**	2,700	182 260
ETLG 6/140 L	2,650	182 010	**ETLG 9/140 L**	2,750	182 270	**ETLG 6/140 R**	2,650	182 020	**ETLG 9/140 R**	2,750	182 280
ETLG 6/200 L	2,750	182 030	**ETLG 9/200 L**	2,870	184 621	**ETLG 6/200 R**	2,750	182 040	**ETLG 9/200 R**	2,870	184 625
ETLG 6/300 L	2,950	182 050	**ETLG 10/ 60 L**	2,650	182 290	**ETLG 6/300 R**	2,950	182 060	**ETLG 10/ 60 R**	2,650	182 300
			ETLG 10/100 L	2,700	182 310				**ETLG 10/100 R**	2,700	182 320
ETLG 7/ 60 L	2,550	182 070	**ETLG 10/140 L**	2,750	182 330	**ETLG 7/ 60 R**	2,550	182 080	**ETLG 10/140 R**	2,750	182 340
ETLG 7/100 L	2,600	182 090	**ETLG 10/200 L**	2,850	184 622	**ETLG 7/100 R**	2,600	182 100	**ETLG 10/200 R**	2,850	184 626
ETLG 7/140 L	2,700	182 110	**ETLG 11/ 60 L**	2,650	182 350	**ETLG 7/140 R**	2,700	182 120	**ETLG 11/ 60 R**	2,650	182 360
ETLG 7/200 L	2,800	182 130	**ETLG 11/100 L**	2,750	182 370	**ETLG 7/200 R**	2,800	182 140	**ETLG 11/100 R**	2,750	182 380
ETLG 7/300 L	2,950	182 150	**ETLG 11/140 L**	2,800	182 390	**ETLG 7/300 R**	2,950	182 160	**ETLG 11/140 R**	2,800	182 400
			ETLG 11/200 L	2,920	184 623				**ETLG 11/200 R**	2,920	184 627
ETLG 8/ 60 L	2,600	182 170	Control line **SS** without PE			**ETLG 8/ 60 R**	2,600	182 180	Control line **SS** without PE		
ETLG 8/100 L	2,650	182 190	**ETLG 6/ 60 L**	2,500	182 410	**ETLG 8/100 R**	2,650	182 200	**ETLG 6/ 60 R**	2,500	182 420
ETLG 8/140 L	2,700	182 210	**ETLG 8/ 60 L**	2,600	182 430	**ETLG 8/140 R**	2,700	182 220	**ETLG 8/ 60 R**	2,600	182 440
ETLG 8/200 L	2,800	184 620	**ETLG 10/ 60 L**	2,650	182 450	**ETLG 8/200 R**	2,800	184 624	**ETLG 10/ 60 R**	2,650	182 460

(1) All transfer funnels are 0.5 m long and are a part of the system length.
(2) Suffix types e.g. ETL 4/60 w/ PE → ETL 4/60 **HS** Order- No. 192 890.

TRANSFER GUIDE, STRAIGHT CUT[1]

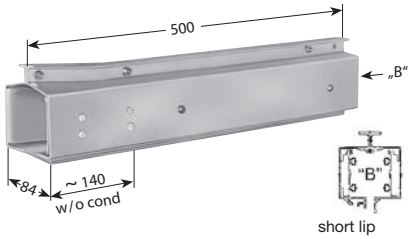
c/w 0.5 m powerail

LSV

for turntables, switches and spurlines,

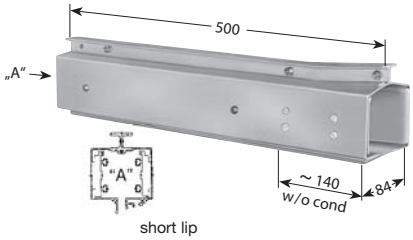
staggered arrangement of the transfer guides to each other: horizontal max. 5 mm, vertical max. 3 mm
Max. travel speed collector unit: 80m/min.

applications see page 12



short lip

Illustration shows L. H. version
short lip in front
(see page 6)



short lip

Illustration shows R. H. version
short lip in front
(see page 6)

Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜL 4/ 60 L	1,400	192 190	**AÜL 6/ 60 L**	1,500	192 390
AÜL 4/100 L	1,550	192 210	**AÜL 6/100** L	1,650	192 410
AÜL 4/140 L	1,650	192 230	**AÜL 6/140 L**	1,750	192 430
AÜL 4/200 L	1,800	192 250	**AÜL 6/200 L**	1,900	195 614
AÜL 4/300 L	2,050	192 270	**AÜL 7/ 60 L**	1,550	192 450
			AÜL 7/100 L	1,700	192 470
AÜL 5/ 60 L	1,450	192 290	**AÜL 7/140 L**	1,850	192 490
AÜL 5/100 L	1,600	192 310	**AÜL 7/200 L**	2,020	195 616
AÜL 5/140 L	1,750	192 330	Control line **SS** without PE		
AÜL 5/200 L	1,950	192 350	**AÜL 4/ 60 L**	1,400	192 510
AÜL 5/300 L	2,150	192 370	**AÜL 6/ 60 L**	1,500	192 530

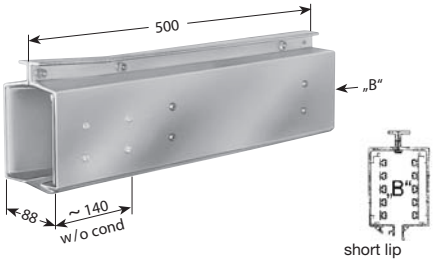
Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜL 4/ 60 R	1,400	192 200	**AÜL 6/ 60 R**	1,500	192 400
AÜL 4/100 R	1,550	192 220	**AÜL 6/100 R**	1,650	192 420
AÜL 4/140 R	1,650	192 240	**AÜL 6/140 R**	1,750	192 440
AÜL 4/200 R	1,800	192 260	**AÜL 6/200 R**	1,900	195 615
AÜL 4/300 R	2,050	192 280	**AÜL 7/ 60 R**	1,550	192 460
			AÜL 7/100 R	1,700	192 480
AÜL 5/ 60 R	1,450	192 300	**AÜL 7/140 R**	1,850	192 500
AÜL 5/100 R	1,600	192 320	**AÜL 7/200 R**	2,020	195 617
AÜL 5/140 R	1,750	192 340	Control line **SS** without PE		
AÜL 5/200 R	1,950	192 360	**AÜL 4/ 60 R**	1,400	192 520
AÜL 5/300 R	2,150	192 380	**AÜL 6/ 60 R**	1,500	192 540

LSVG

for turntables, switches and spurlines,

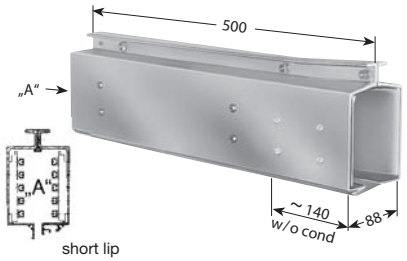
staggered arrangement of the transfer guides to each other: horizontal max. 5 mm, vertical max. 3 mm
Max. travel speed collector unit: 80m/min.

applications see page 12



short lip

Illustration shows L. H. version
short lip in front
(see page 6)



short lip

Illustration shows R. H. version
short lip in front
(see page 6)

Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜLG 6/ 60 L	2,500	180 970	**AÜLG 9/ 60 L**	2,700	181 230
AÜLG 6/100 L	2,600	180 990	**AÜLG 9/100 L**	2,800	181 250
AÜLG 6/140 L	2,700	181 010	**AÜLG 9/140 L**	2,950	181 270
AÜLG 6/200 L	2,900	181 030	**AÜLG 9/200 L**	3,120	184 629
AÜLG 6/300 L	3,250	181 050	**AÜLG 10/ 60 L**	2,750	181 290
			AÜLG 10/100 L	2,850	181 310
AÜLG 7/ 60 L	2,550	181 070	**AÜLG 10/140 L**	2,950	181 330
AÜLG 7/100 L	2,700	181 090	**AÜLG 10/200 L**	3,100	184 630
AÜLG 7/140 L	2,850	181 110	**AÜLG 11/ 60 L**	2,800	181 350
AÜLG 7/200 L	3,050	181 130	**AÜLG 11/100 L**	2,900	181 370
AÜLG 7/300 L	3,300	181 150	**AÜLG 11/140 L**	3,050	181 390
			AÜLG 11/200 L	3,220	184 631
AÜLG 8/ 60 L	2,600	181 170	Control line **SS** without PE		
AÜLG 8/100 L	2,700	181 190	**AÜLG 6/ 60 L**	2,500	181 410
AÜLG 8/140 L	2,850	181 210	**AÜLG 8/ 60 L**	2,600	181 430
AÜLG 8/200 L	3,000	184 628	**AÜLG 10/ 60 L**	2,750	181 450

Type[2]	Weight kg	Order- No.	Type[2]	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜLG 6/ 60 R	2,500	180 980	**AÜLG 9/ 60 R**	2,700	181 240
AÜLG 6/100 R	2,600	181 000	**AÜLG 9/100 R**	2,800	181 260
AÜLG 6/140 R	2,700	181 020	**AÜLG 9/140 R**	2,950	181 280
AÜLG 6/200 R	2,900	181 040	**AÜLG 9/200 R**	3,120	184 633
AÜLG 6/300 R	3,250	181 060	**AÜLG 10/ 60 R**	2,750	181 300
			AÜLG 10/100 R	2,850	181 320
AÜLG 7/ 60 R	2,550	181 080	**AÜLG 10/140 R**	2,950	181 340
AÜLG 7/100 R	2,700	181 100	**AÜLG 10/200 R**	3,100	184 634
AÜLG 7/140 R	2,850	181 120	**AÜLG 11/ 60 R**	2,800	181 360
AÜLG 7/200 R	3,050	181 140	**AÜLG 11/100 R**	2,900	181 380
AÜLG 7/300 R	3,300	181 160	**AÜLG 11/140 R**	3,050	181 400
			AÜLG 11/200 R	3,220	184 635
AÜLG 8/ 60 R	2,600	181 180	Control line **SS** without PE		
AÜLG 8/100 R	2,700	181 200	**AÜLG 6/ 60 R**	2,500	181 420
AÜLG 8/140 R	2,850	181 220	**AÜLG 8/ 60 R**	2,600	181 440
AÜLG 8/200 R	3,000	184 632	**AÜLG 10/ 60 R**	2,750	181 460

[1] All transfer guides are 0.5 m long and are a part of the system length (see examples for ordering pages 26 and 27).
Double collector or 2 single collectors required (see page 21).

[2] Suffix types e.g. AÜL 4/60 L w/ PE → AÜL 4/60 L **HS** Order- No. 192 190.

TRANSFER GUIDE, OBLIQUE CUT(1)

c/w 0.5 m powerail

for turntables, switches and spurlines,

staggered arrangement of the transfer guides to each other: horizontal max. 5 mm, vertical max. 3 mm
Max. travel speed collector unit: 80m/min.
applications see page 12

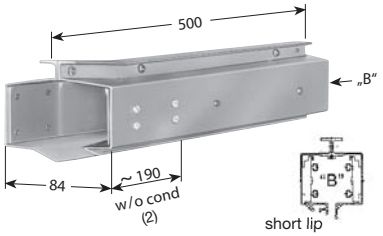


Illustration shows L. H. version
short lip in front
(see page 6)

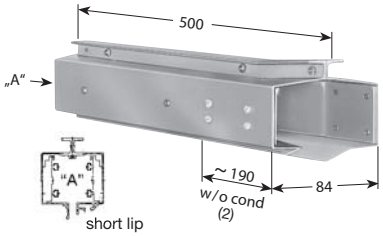


Illustration shows R. H. version
short lip in front
(see page 6)

Type(2)	Weight kg	Order- No.	Type(2)	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜLS 4/ 60 L	1,400	192 550	**AÜLS 6/ 60 L**	1,500	192 750
AÜLS 4/100 L	1,550	192 570	**AÜLS 6/100 L**	1,650	192 770
AÜLS 4/140 L	1,650	192 590	**AÜLS 6/140 L**	1,750	193 420
AÜLS 4/200 L	1,800	192 610	**AÜLS 6/200 L**	1,900	195 618
AÜLS 4/300 L	2,050	192 630	**AÜLS 7/ 60 L**	1,550	192 790
			AÜLS 7/100 L	1,700	192 810
AÜLS 5/ 60 L	1,450	192 650	**AÜLS 7/140 L**	1,850	192 830
AÜLS 5/100 L	1,600	192 670	**AÜLS 7/200 L**	2,020	195 620
AÜLS 5/140 L	1,750	192 690	Control line **SS** without PE		
AÜLS 5/200 L	1,950	192 710	**AÜLS 4/ 60 L**	1,400	192 850
AÜLS 5/300 L	2,150	192 730	**AÜLS 6/ 60 L**	1,500	192 870

Type(2)	Weight kg	Order- No.	Type(2)	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜLS 4/ 60 R	1,400	192 560	**AÜLS 6/ 60 R**	1,500	192 760
AÜLS 4/100 R	1,550	192 580	**AÜLS 6/100 R**	1,650	192 780
AÜLS 4/140 R	1,650	192 600	**AÜLS 6/140 R**	1,750	193 430
AÜLS 4/200 R	1,800	192 620	**AÜLS 6/200 R**	1,900	195 619
AÜLS 4/300 R	2,050	192 640	**AÜLS 7/ 60 R**	1,550	192 800
			AÜLS 7/100 R	1,700	192 820
AÜLS 5/ 60 R	1,450	192 660	**AÜLS 7/140 R**	1,850	192 840
AÜLS 5/100 R	1,600	192 680	**AÜLS 7/200 R**	2,020	195 621
AÜLS 5/140 R	1,750	192 700	Control line **SS** without PE		
AÜLS 5/200 R	1,950	192 720	**AÜLS 4/ 60 R**	1,400	192 860
AÜLS 5/300 R	2,150	192 740	**AÜLS 6/ 60 R**	1,500	192 880

for turntables, switches and spurlines,

staggered arrangement of the transfer guides to each other: horizontal max. 5 mm, vertical max. 3 mm
Max. travel speed collector unit: 80m/min.
applications see page 12

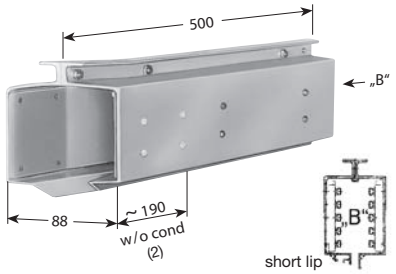


Illustration shows L. H. version
short lip in front
(see page 6)

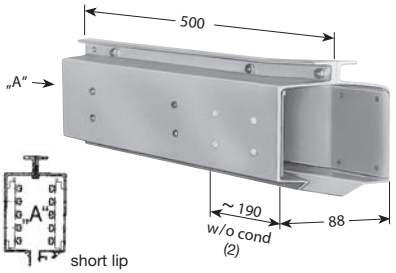


Illustration shows R. H. version
short lip in front
(see page 6)

Type(2)	Weight kg	Order- No.	Type(2)	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜLSG 6/ 60 L	2,500	181 470	**AÜLSG 9/ 60 L**	2,700	181 730
AÜLSG 6/100 L	2,600	181 490	**AÜLSG 9/100 L**	2,800	181 750
AÜLSG 6/140 L	2,700	181 510	**AÜLSG 9/140 L**	2,950	181 770
AÜLSG 6/200 L	2,900	181 530	**AÜLSG 9/200 L**	3,120	184 637
AÜLSG 6/300 L	3,250	181 550	**AÜLSG 10/ 60 L**	2,750	181 790
			AÜLSG 10/100 L	2,850	181 810
AÜLSG 7/ 60 L	2,550	181 570	**AÜLSG 10/140 L**	2,950	181 830
AÜLSG 7/100 L	2,700	181 590	**AÜLSG 10/200 L**	3,100	184 638
AÜLSG 7/140 L	2,850	181 610	**AÜLSG 11/ 60 L**	2,800	181 850
AÜLSG 7/200 L	3,050	181 630	**AÜLSG 11/100 L**	2,900	181 870
AÜLSG 7/300 L	3,300	181 650	**AÜLSG 11/140 L**	3,050	181 890
			AÜLSG 11/200 L	3,220	184 639
AÜLSG 8/ 60 L	2,600	181 670	Control line **SS** without PE		
AÜLSG 8/100 L	2,700	181 690	**AÜLSG 6/ 60 L**	2,500	181 910
AÜLSG 8/140 L	2,850	181 710	**AÜLSG 8/ 60 L**	2,600	181 930
AÜLSG 8/200 L	3,000	184 636	**AÜLSG 10/ 60 L**	2,750	181 950

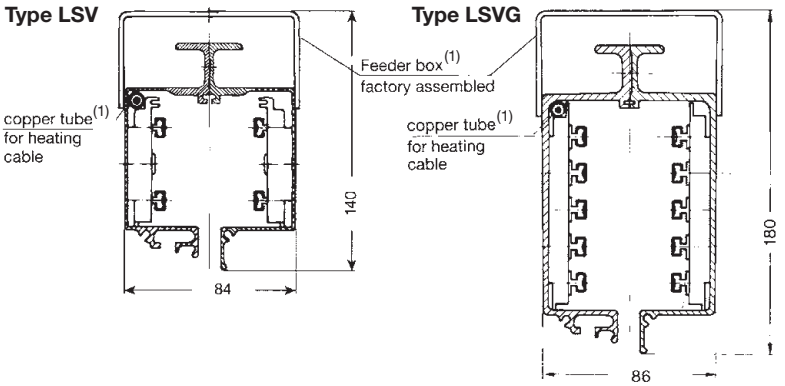
Type(2)	Weight kg	Order- No.	Type(2)	Weight kg	Order- No.
Power line **HS** with PE			Power line **HS** with PE		
AÜLSG 6/ 60 R	2,500	181 480	**AÜLSG 9/ 60 R**	2,700	181 740
AÜLSG 6/100 R	2,600	181 500	**AÜLSG 9/100 R**	2,800	181 760
AÜLSG 6/140 R	2,700	181 520	**AÜLSG 9/140 R**	2,950	181 780
AÜLSG 6/200 R	2,900	181 540	**AÜLSG 9/200 R**	3,120	184 641
AÜLSG 6/300 R	3,250	181 560	**AÜLSG 10/ 60 R**	2,750	181 800
			AÜLSG 10/100 R	2,850	181 820
AÜLSG 7/ 60 R	2,550	181 580	**AÜLSG 10/140 R**	2,950	181 840
AÜLSG 7/100 R	2,700	181 600	**AÜLSG 10/200 R**	3,100	184 642
AÜLSG 7/140 R	2,850	181 620	**AÜLSG 11/ 60 R**	2,800	181 860
AÜLSG 7/200 R	3,050	181 640	**AÜLSG 11/100 R**	2,900	181 880
AÜLSG 7/300 R	3,300	181 660	**AÜLSG 11/140 R**	3,050	181 900
			AÜLSG 11/200 R	3,220	184 643
AÜLSG 8/ 60 R	2,600	181 680	Control line **SS** without PE		
AÜLSG 8/100 R	2,700	181 700	**AÜLSG 6/ 60 R**	2,500	181 920
AÜLSG 8/140 R	2,850	181 720	**AÜLSG 8/ 60 R**	2,600	181 940
AÜLSG 8/200 R	3,000	184 640	**AÜLSG 10/ 60 R**	2,750	181 960

(1) All transfer guides are 0.5 m long and are a part of the system length (see examples for ordering pages 26 and 27).
2 single collectors required (see page 21).

(2) Suffix types e.g. AÜLS 4/60 L w/ PE → AÜLS 4/60 L **HS** Order- No. 192 550.

(3) Detailed drawings of switch, turntable etc. are required to manufacture oblique cut transfer guides and cut back conductors accordingly.

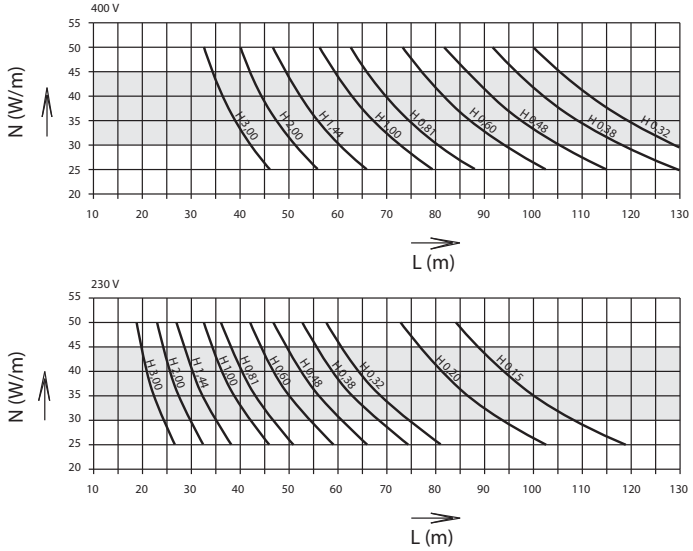
Arrangement of heating cables



Heating systems are recommended for outdoor powerail installations with icing conditions and for extremely humid environments. The heating is accomplished by heating conductors being arranged inside the powerail housing as shown in the adjacent drawings.

The heating cables are pulled througth the factory assembled copper tubes and connected to the terminal boxes during the installation process at site.

Selection of the heating cable



Composition of heating cable:
Conductor: material resistor CrNi. stranded
Insulation: PTFE-(Teflon) tinned copper braid
Sheath: PTFE-insulation
OD: 3.7 mm - 4.3 mm Øm

Determine a heating cable of 30-45 watt/m capacity.

For longer runs, not covered by the adjacent diagrams, divide the length of the system into two or more heating sections.

With shorter heating lengths please feed over a transformer with appropriate low secondary voltage or 2 copper protective pipes shall be provided and the heating lengths have to be connected in series.

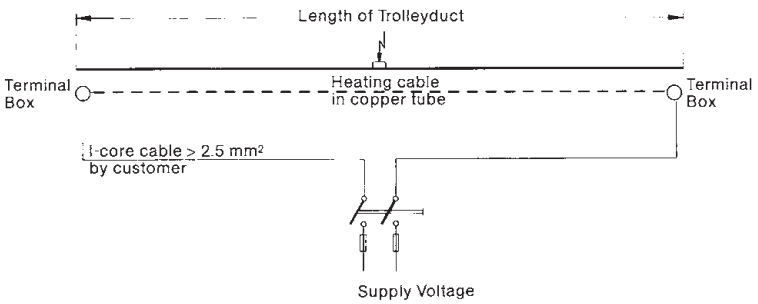
Heating capacity [Watt/m]: N' = $\frac{U^2}{R \cdot L^2}$

U = supply voltage [Volt]
R = resistance of heating cable [Ohm/m]
L = length of heating section [m]

Type	Resistor (2)	Order- No.
heating cable: H 0,15	0,15 Ohm/m	196 382
heating cable: H 0,20	0,20 Ohm/m	196 383
heating cable: H 0,32	0,32 Ohm/m	196 384
heating cable: H 0,38	0,38 Ohm/m	196 385
heating cable: H 0,48	0,48 Ohm/m	196 386
heating cable: H 0,60	0,60 Ohm/m	196 387
heating cable: H 0,81	0,81 Ohm/m	196 389
heating cable: H 1,00	1,00 Ohm/m	196 390
heating cable: H 1,44	1,44 Ohm/m	196 391
heating cable: H 2,00	2,00 Ohm/m	196 392
heating cable: H 3,00	3,00 Ohm/m	196 393

Type	Order- No.
Copper Pipe 8 x 1 mm	
- for 40 - 200 A	195 289
- for 300 A	195 557
Connecting box for heating	
- for LSV	195 119
- for LSVG	184 027
Connecting material for heating system (1 set per connecting box)	195 291

Layout of one heating section with feeder boxes at both endsn



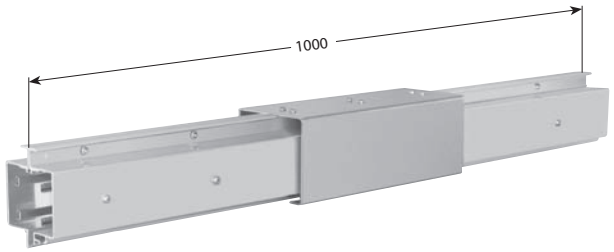
Switchgears and temperature control units available on request.

Example for ordering heating system for 60 m trolleyduct

1) 61 m heating cable type H 1.0
(60 m + 1 m safety length)
Supply voltage 400 V, 1 heating section
Heating capacity per above diagram approx. 40 W/m
with 60 m x 40 W/m approx. 2400 W = 2.40 kW
2) 60 m copper protection tube 8 x 1 mm factory assembled
3) 2 terminal boxes for heating system
4) 2 sets of connecting material

All switches, fuses, cable etc. by others!

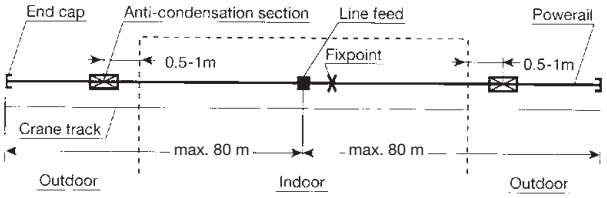
(1) Factory assembled on powerail.
(2) Deflection ± 2,5 %



Application of Anti-condensation section

This section consists of 1 m powerail with openings covered by a protection hood.

The anti-condensation section will be used where powerails are passing from indoor to outdoor, preventing the icing of the outside mounted powerail as the warm air can escape and does not condensate in the powerail.



Feeding

No extra feeds required as the powerail is not interrupted.

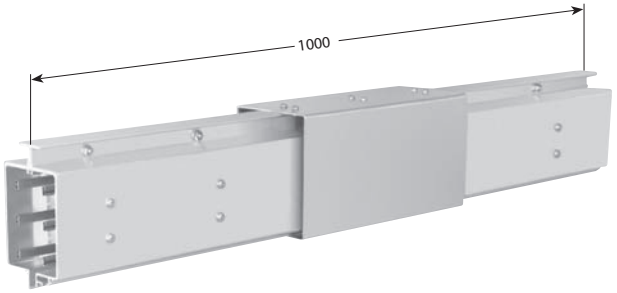
Collectors

No extra collectors required.

Installation

The anti-condensation section will be placed directly at the transfer point from indoor to outdoor service..

Type[2]	Order- No. Power line **HS** with PE	Order- No. Control line **SS** without PE
BTL 4/ 60	195 154	195 159
BTL 4/100	195 155	–
BTL 4/140	195 156	–
BTL 4/200	195 157	–
BTL 4/300	195 158	–
BTL 5/ 60	195 160	–
BTL 5/100	195 161	–
BTL 5/140	195 162	–
BTL 5/200	195 163	–
BTL 5/300	195 164	–
BTL 6/ 60	195 165	195 168
BTL 6/100	195 166	–
BTL 6/140	195 167	–
BTL 6/200	195 622	–
BTL 7/ 60	195 169	–
BTL 7/100	195 170	–
BTL 7/140	195 171	–
BTL 7/200	195 623	–



Type[2]	Order- No. Power line **HS** with PE	Order- No. Control line **SS** without PE
BTLG 6/ 60	184 049	184 073
BTLG 6/100	184 050	–
BTLG 6/140	184 051	–
BTLG 6/200	184 052	–
BTLG 6/300	184 053	–
BTLG 7/ 60	184 054	–
BTLG 7/100	184 055	–
BTLG 7/140	184 056	–
BTLG 7/200	184 057	–
BTLG 7/300	184 058	–
BTLG 8/ 60	184 059	184 062
BTLG 8/100	184 060	–
BTLG 8/140	184 061	–
BTLG 8/200	184 644	–
BTLG 9/ 60	184 063	–
BTLG 9/100	184 064	–
BTLG 9/140	184 065	–
BTLG 9/200	184 645	–
BTLG 10/ 60	184 066	184 069
BTLG 10/100	184 067	–
BTLG 10/140	184 068	–
BTLG 10/200	184 646	–
BTLG 11/ 60	184 070	–
BTLG 11/100	184 071	–
BTLG 11/140	184 072	–
BTLG 11/200	184 647	–

(1) Above sections come ready assembled on 1 m powerail and are a part of the system length (see example for ordering page 27).

(2) Suffix types e.g. BTL 4/60 w/ PE → BTL 4/60 L **HS** Order- No. 195 154.

TELESCOPE SECTIONS[1]

c/w 1 m powerail

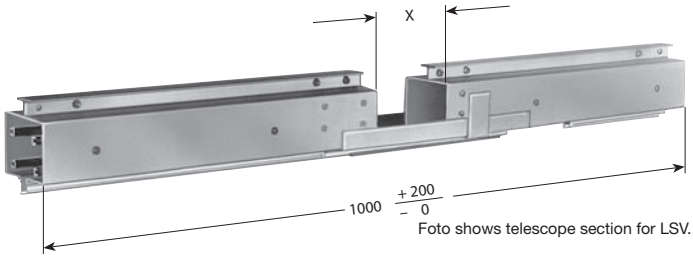


Foto shows telescope section for LSV.

The 1 m telescope sections of the Aluminium enclosed conductor rails LSV and LSVG cover the expansion of the housing in temperature fluctuation.

They consist of two transfer guides, which are aligned through two profiles. The connecting profile pieces serve as running and guiding track for the curret collector. The telescope section separats the track electrically. For spare parts please aovise type of rail and possible special versions.

LSV				LSVG					
Type ●	Order- No.	Type ●	Order- No.	Type ●	Order- No.	Type ●	Order- No.	Type ●	Order- No.
Power line **HS** with PE		Power line **HS** with PE		Power line **HS** with PE		Power line **HS** with PE		Power line **HS** with PE	
TSL 4/ 60	193 840	**TSL 6/ 60**	193 940	**TSLG 6/ 60**	183 310	**TSLG 8/ 60**	183 410	**TSLG 11/ 60**	183 500
TSL 4/100	195 096	**TSL 6/100**	195 104	**TSLG 6/100**	184 001	**TSLG 8/100**	184 009	**TSLG 11/100**	184 015
TSL 4/140	195 097	**TSL 6/140**	195 105	**TSLG 6/140**	184 002	**TSLG 8/140**	184 010	**TSLG 11/140**	184 016
TSL 4/200	195 098	**TSL 6/200**	195 624	**TSLG 6/200**	184 003	**TSLG 8/200**	184 648	**TSLG 11/200**	184 651
TSL 4/300	195 099			**TSLG 6/300**	184 004	**TSLG 9/ 60**	183 440	Control line **SS** without PE	
		TSL 7/ 60	193 970			**TSLG 9/100**	184 011		
TSL 5/ 60	193 890	**TSL 7/100**	195 106	**TSLG 7/ 60**	183 360	**TSLG 9/140**	184 012	**TSLG 6/ 60**	183 530
TSL 5/100	195 100	**TSL 7/140**	195 107	**TSLG 7/100**	184 005	**TSLG 9/200**	184 649	**TSLG 8/ 60**	183 540
TSL 5/140	195 101	**TSL 7/200**	195 625	**TSLG 7/140**	184 006	**TSLG 10/ 60**	183 470	**TSLG 10/ 60**	183 550
TSL 5/200	195 102	Control line **SS** without PE		**TSLG 7/200**	184 007	**TSLG 10/100**	184 013		
TSL 5/300	195 103	**TSL 4/ 60**	194 000	**TSLG 7/300**	184 008	**TSLG 10/140**	184 014		
		TSL 6/ 60	194 010			**TSLG 10/200**	184 650		

Application of Telescope section

1. With following max. system lengths:
   - Systems with low temperature differences (e.g. indoor) = 200 m
   - Systems with high temperature differences (e.g. outdoor) = 160 m

The measurement between the fixpoints with the centered assembled telescope sections should not be bigger as 160/200 m. (see Fig. 1)

2. For passing the powerail from indoor to outdoor, thus preventing the icing of the outside mounted powerail, as the warm air can escape and does not condensate in the powerail (see Fig. 2). – Alternative solution: Anti-condensation section (see page 17). We recommend a heating system for the outdoor section for extreme winter conditions (see page 16).
3. If the powerail length between two curves is more than 20 m and the temperature fluctuates considerably (see Fig. 3).

Fig.1

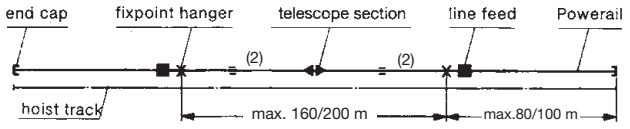


Fig.2

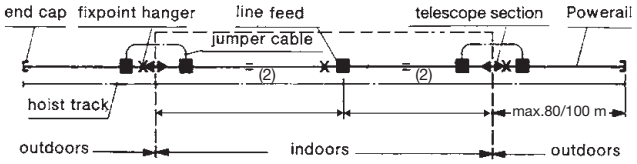
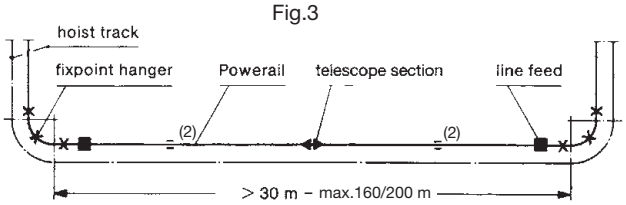


Fig.3



Feeding

The powerail is electrically separated into two parts by the telescope section. Each of these parts has to have a separate power feed.

In case of transfers to outdoor the main feed can be inside. In this case will be connecting boxes on the left and right hand side of the telescope section installed. This boxes are connected by flexible cables. (see fig. 2).

Collectors

One double collector, installed at least 500 mm apart, must be used to ensure continuous electrical contact while passing through the telescope section; use two double collectors arranged in the same manner when higher ampacity is required.

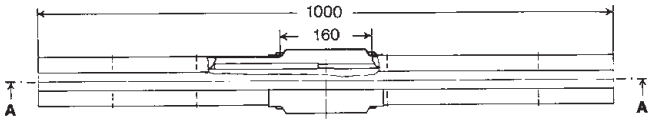
(1) Above sections come ready assembled on 1 m powerail and are a part of the system length.

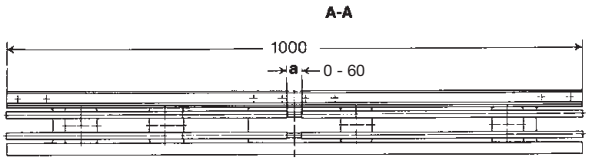
(2) DSL/DSLG with bolted joints only see page 19.

● Suffix types e.g. TSL 4/60 w/ PE → TSL 4/60 **HS** Order- No. 193 840.

EXPANSION JOINT SECTIONS(1)

c/w 1 m powerail





Drawings show expansion joint section for LSV

LSV				LSVG					
Type ●	Order- No.	Type ●	Order- No.	Type ●	Order- No.	Type ●	Order- No.	Type ●	Order- No.
Power line **HS** with PE		Power line **HS** with PE		Power line **HS** with PE		Power line **HS** with PE		Power line **HS** with PE	
DSL 4/ 60	194 020	**DSL 6/ 60**	194 120	**DSLG 6/ 60**	183 560	**DSLG 8/ 60**	183 660	**DSLG 11/ 60**	183 750
DSL 4/100	195 108	**DSL 6/100**	195 112	**DSLG 6/100**	184 017	**DSLG 8/100**	184 021	**DSLG 11/100**	184 024
DSL 4/140	195 056	**DSL 6/140**	195 058	**DSLG 6/140**	183 943	**DSLG 8/140**	183 945	**DSLG 11/140**	183 948
DSL 4/200	195 109	**DSL 6/200**	195 626	**DSLG 6/200**	184 018	**DSLG 8/200**	184 652	**DSLG 11/200**	184 655
DSL 4/300	194 060	**DSL 7/ 60**	194 150	**DSLG 6/300**	183 600	**DSLG 9/ 60**	183 690	Control line **SS** without PE	
		DSL 7/100	195 113			**DSLG 9/100**	184 022		
DSL 5/ 60	194 070	**DSL 7/140**	195 059	**DSLG 7/ 60**	183 610	**DSLG 9/140**	183 946	**DSLG 6/ 60**	183 780
DSL 5/100	195 110	**DSL 7/200**	195 627	**DSLG 7/100**	184 019	**DSLG 9/200**	184 653	**DSLG 8/ 60**	183 790
DSL 5/140	195 057	Control line **SS** without PE		**DSLG 7/140**	183 944	**DSLG 10/ 60**	183 720	**DSLG 10/ 60**	183 800
DSL 5/200	195 111			**DSLG 7/200**	184 020	**DSLG 10/100**	184 023		
DSL 5/300	194 110	**DSL 4/ 60**	194 180	**DSLG 7/300**	183 650	**DSLG 10/140**	183 947		
		DSL 6/ 60	194 190			**DSLG 10/200**	184 654		

The expansion joints of the VAHLE aluminium enclosed conductor systems LSV and LSVG serve to compernsate for the different expansion and contraction of the aluminium housing and the copper conductors in varying temperatures.

Epansion joints are only required for LSV and LSVG-systems using bolted joints.

Systems using **plug-in type connections** (Standard 60-140 A) are sliding inside the hollow conductors and automatically take care of this. The copper conductors are being ancholed in each standard powerail section.

Expansion joints will be installed between **two fixpoints** of the **copper conductors** with a distance >10 m. The max. length " L " mm has to be considered accordingly.

Design fixpoints are feedings, dead sections, transfer guides, transfer funnels and telescope sections (see fig. 1).

Additional fixpoints for copper conductors will be installed if the lengths between design fixpoints exceed the max. length "L". Then are two or more expansion joints necessary. (see fig. 2 and example on page 27).

The expansion of the aluminium housing will not be affected through the fixpoints of the copper conductors.

The fixpoint hangers of the aluminium housing will be installed in the middle of the system or close to the feed point. Transfer guide and transfer funnel.

The remaining conductor sections **have to be** arranged in sliding hangers.

In special cases the connecting cables at the line feeds have to be arranged flexible. Or the types LAL and or LALG (see page 11) have to be used not to interfere the expansion of the housing.

In the expansion section are the copper conductors electrically bridged.

Fig. 1

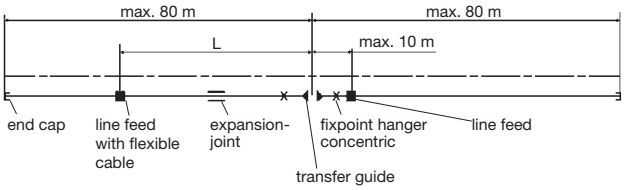
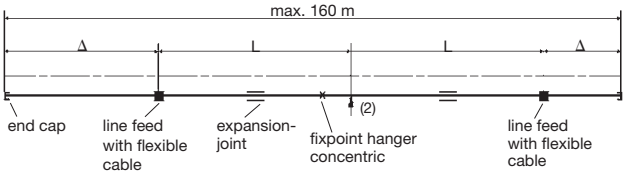


Fig. 2



Δ Excessive length

Max. length „**L**":

80 m at temperature up to **60 °C**

60 m at temperature up to **80 °C**

40 m at temperature up to **100 °C**

All valves apply from – 40 °C

Please sent us the filled in Questionnaire from pages 29 and 30 and you will receive a layout drawing.

For spare please advise rail type and possible special version.

Anchor points for copper conductors(2)

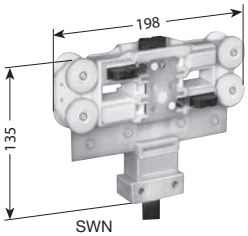
LSV			LSVG		
Type	No. of cond.	Order- No.	Typ	No. of cond.	Order- No.
FPL/Cu	4 & 5	194 530	**FPLG/Cu**	6 & 7	183 830
FPL/Cu	6 & 7	194 540	**FPLG/Cu**	8 & 9	183 840
			FPLG/Cu	10 & 11	183 850

(1) Above sections come ready assembled on 1 m powerail and are a part of the system length (see example for ordering page 27).

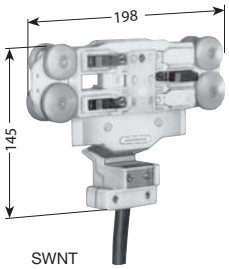
● Suffix types e.g. DSL 4/60 w/ PE → DSL 4/60 L **HS** Order- No. 194 020.

LSV

SWK



SWN



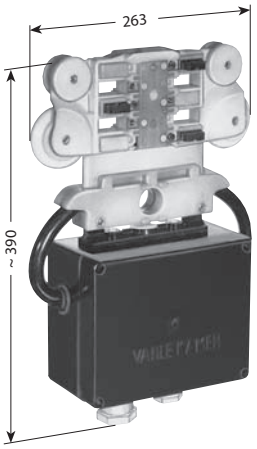
SWNT

	Type[2]	A[1]	Order- No.	Type[2]	A[1]	Order- No.	Poles	Weight kg	max. speed m/min. nor- mal	max. speed m/min. trans- fer	General
	for Power **HS** with PE			for Control **ST** without PE							
LSV	**SWK 4/25-1**	25	250 230	**SWK 4/25-1**	25	250 240	4	0,760	80	60	for straight runs and curves R > 2.5 m for LSV 4/60 and LSV 4/100
LSV	**SWK 4/40-1**	40	257 394	–	–	–	4	0,860	80	60	for straight runs and curves R > 2.5 m for LSV 4/60 and LSV 4/100
LSV	**SWN 4/40-1**	40	194 691	**SWN 4/25-1**	25	194 692	4	0,850	180	80	for straight runs and curves R > 1.5 m with ball bearing wheels
LSV	**SWN 5/40-1**	40	194 693				5	0,950	180	80	for straight runs and curves R > 1.5 m with ball bearing wheels
LSV	**SWN 6/40-1**	40	194 694	**SWN 6/25-1**	25	194 695	6	1,200	180	80	for straight runs and curves R > 1.5 m with ball bearing wheels
LSV	**SWN 7/40-1**	40	194 696				7	1,300	180	80	for straight runs and curves R > 1.5 m with ball bearing wheels
LSV with Kurven	**SWN 4/40 K-1**	40	195 197	**SWN 4/25 K-1**	25	195 194	4	0,830	180	80	for curves R 0.75 – 1.5 m ball bearing wheels
LSV with Kurven	**SWN 5/40 K-1**	40	195 196				5	0,930	180	80	for curves R 0.75 – 1.5 m ball bearing wheels
LSV with Kurven	**SWN 6/40 K-1**	40	196 171	**SWN 6/25 K-1**	25	195 195	6	1,180	180	80	for curves R 0.75 – 1.5 m ball bearing wheels
LSV with Kurven	**SWN 7/40 K-1**	40	195 987				7	1,280	180	80	for curves R 0.75 – 1.5 m ball bearing wheels
LSV+D or FP	**SWNT 4/40-1**	40	194 772	**SWNT 4/25-1**	25	194 773	4	0,850	100	60	for straight runs and curves R > 1.0 m with ball bearing wheels
LSV+D or FP	**SWNT 5/40-1**	40	194 774				5	0,950	100	60	for straight runs and curves R > 1.0 m with ball bearing wheels
LSV+D or FP	**SWNT 6/40-1**	40	194 775	**SWNT 6/25-1**	25	194 776	6	1,200	100	60	for straight runs and curves R > 1.0 m with ball bearing wheels
LSV+D or FP	**SWNT 7/40-1**	40	194 777				7	1,300	100	60	for straight runs and curves R > 1.0 m with ball bearing wheels

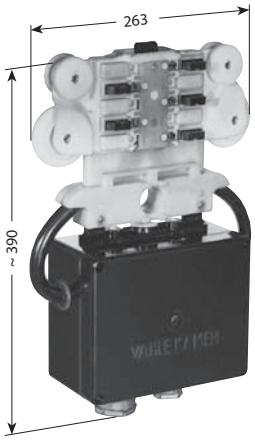
Trolley connecting cable 1 m long (longer cable available); copper cross section 2.5 mm^2 per core for 25 A and 4 mm^2 per core for 40 A.

Cleaning trolleys and trolleys for higher speed on request.

LSVG



SWNG 6-pole



SWNG 11-pole

	Type[2]	A[1]	Order- No.	Type[2]	A[1]	Order- No.	Poles	Weight kg	max. speed m/min. nor- mal	max. speed m/min. trans- fer	General
	Hauptstrom **HS** mit PE			Steuerstrom **ST** ohne PE							
LSVG	**SWNG 6/40**	40	183 883	**SWNG 6/25**	25	183 884	6	2,100	200	100	for straight runs and curves with ball bearing wheels and guide rollers
LSVG	**SWNG 7/40**	40	183 885				7	2,150	200	100	for straight runs and curves with ball bearing wheels and guide rollers
LSVG	**SWNG 8/40**	40	183 886	**SWNG 8/25**	25	183 887	8	2,200	200	100	for straight runs and curves with ball bearing wheels and guide rollers
LSVG	**SWNG 9/40**	40	183 888				9	2,250	200	100	for straight runs and curves with ball bearing wheels and guide rollers
LSVG	**SWNG 10/40**	40	183 889	**SWNG 10/25**	25	183 890	10	2,300	200	100	for straight runs and curves with ball bearing wheels and guide rollers
LSVG	**SWNG 11/40**	40	183 891				11	2,350	200	100	for straight runs and curves with ball bearing wheels and guide rollers
LSVG	**SWNG 6/40 FM**	40	183 901	**SWNG 6/25 FM**	25	183 902	6	2,100	200	80	like above however, **for transfer** applications
LSVG	**SWNG 7/40 FM**	40	183 903				7	2,150	200	80	like above however, **for transfer** applications
LSVG	**SWNG 8/40 FM**	40	183 904	**SWNG 8/25 FM**	25	183 905	8	2,200	200	80	like above however, **for transfer** applications
LSVG	**SWNG 9/40 FM**	40	183 906				9	2,250	200	80	like above however, **for transfer** applications
LSVG	**SWNG 10/40 FM**	40	183 907	**SWNG 10/25 FM**	25	183 908	10	2,300	200	80	like above however, **for transfer** applications
LSVG	**SWNG 11/40 FM**	40	183 909				11	2,350	200	80	like above however, **for transfer** applications
LSVG mit D+FP	**SWNGT 6/40**	40	183 892	**SWNGT 6/25**	25	183 893	6	2,100	100	60	for straight runs and curves with ball bearing wheels and guide rollers
LSVG mit D+FP	**SWNGT 7/40**	40	183 894				7	2,150	100	60	for straight runs and curves with ball bearing wheels and guide rollers
LSVG mit D+FP	**SWNGT 8/40**	40	183 895	**SWNGT 8/25**	25	183 896	8	2,200	100	60	for straight runs and curves with ball bearing wheels and guide rollers
LSVG mit D+FP	**SWNGT 9/40**	40	183 897				9	2,250	100	60	for straight runs and curves with ball bearing wheels and guide rollers
LSVG mit D+FP	**SWNGT 10/40**	40	183 898	**SWNGT 10/25**	25	183 899	10	2,300	100	60	for straight runs and curves with ball bearing wheels and guide rollers
LSVG mit D+FP	**SWNGT 11/40**	40	183 900				11	2,350	100	60	for straight runs and curves with ball bearing wheels and guide rollers

Collectors come with terminal box and each with 1 x M 32 and 1 x M 25.

Collectors and terminal boxes are wired.

Cross section: collector 25 A – 2,5 mm^2
collector 40 A – 4 mm^2

Cleaning trolleys on request.

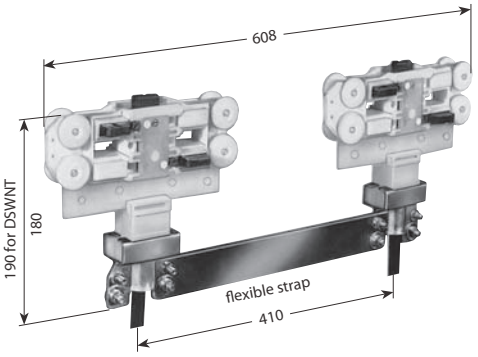
(1) All ampere data for 60 % intermittent duty.

(2) For full Type designation add Power or Control, suffix e.g. SWK 4/25-1 w/ PE **HS** for Order- No. 250 230
SWNG 6/25 w/o PE **ST** for Order- No. 183 884.

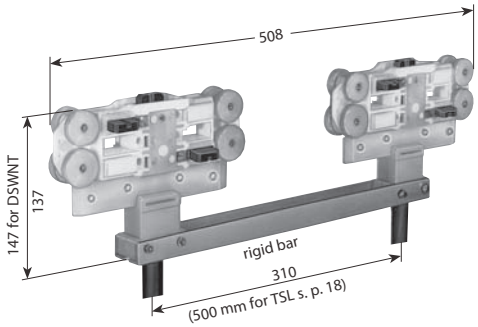
LSV

F = flexible strap connection for curves
S = rigid bar connection for straight runs

Type[2]	A[1]	Order- No.	Type[2]	A[1]	Order- No.	Poles	Weight kg
for Power **HS** with PE			for Control **ST** without PE				
			LSV				
DSWK 4/50 F-1	50	250 320	**DSWK 4/50 F-1**	50	250 330	4	1,900
DSWK 4/80 F-1	80	252 580	–	–	–	4	2,100
DSWK 4/50 S-1	50	258 383	**DSWK 4/50 S-1**	50	258 384	4	1,900
DSWK 4/80 S-1	80	252 590	–	–	–	4	2,100
DSWN 4/80 F-1	80	194 703	**DSWN 4/50 F-1**	50	194 704	4	2,150
DSWN 5/80 F-1	80	194 705	–	–	–	5	2,350
DSWN 6/80 F-1	80	194 706	**DSWN 6/50 F-1**	50	194 707	6	3,000
DSWN 7/80 F-1	80	194 708	–	–	–	7	3,250
DSWN 4/80 S-1	80	194 808	**DSWN 4/50 S-1**	50	194 809	4	2,150
DSWN 5/80 S-1	80	194 810	–	–	–	5	2,350
DSWN 6/80 S-1	80	194 811	**DSWN 6/50 S-1**	50	194 812	6	3,000
DSWN 7/80 S-1	80	194 813	–	–	–	7	3,250
			LSV + D or FP				
DSWNT 4/80 F-1	80	194 778	**DSWNT 4/50 F-1**	50	194 779	4	2,150
DSWNT 5/80 F-1	80	194 780	–	–	–	5	2,350
DSWNT 6/80 F-1	80	194 781	**DSWNT 6/50 F-1**	50	194 782	6	3,000
DSWNT 7/80 F-1	80	194 783	–	–	–	7	3,250
DSWNT 4/80 S-1	80	194 814	**DSWNT 4/50 S-1**	50	194 815	4	2,150
DSWNT 5/80 S-1	80	194 816	–	–	–	5	2,350
DSWNT 6/80 S-1	80	194 817	**DSWNT 6/50 S-1**	50	194 818	6	3,000
DSWNT 7/80 S-1	80	194 819	–	–	–	7	3,250



DSWN 5-pole F



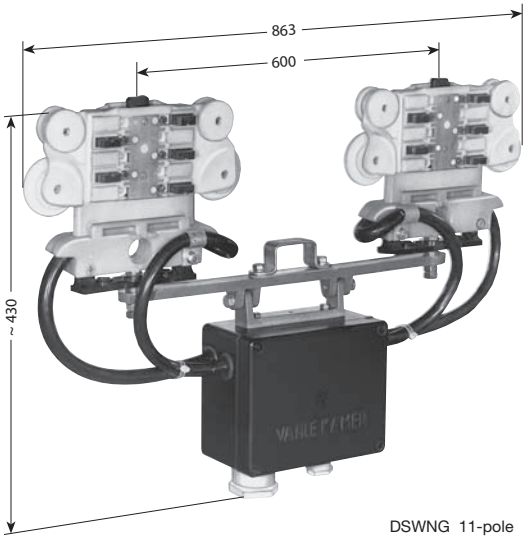
DSWN 5-pole S

Double collector for 50 A with cross section 2 x 2,5 mm^2.
Double collector for 80 A with cross section 2 x 4 mm^2.
Connecting cable 1 m long, longer cable available.

Don't use double collectors, but 2 singles for curves with less than 1.5 m radius and for transfer guides more than 45 degr. oblique cut.

LSVG

	Type[2]	A[1]	Order- No.	Type[2]	A[1]	Order- No.	Poles	Weight kg
	for Power **HS** with PE			for Control **ST** without PE				
LSVG	**DSWNG 6/80**	80	183 910	**DSWNG 6/50**	50	183 911	6	4,150
	DSWNG 7/80	80	183 912				7	4,250
	DSWNG 8/80	80	183 913	**DSWNG 8/50**	50	183 914	8	4,350
	DSWNG 9/80	80	183 915				9	4,450
	DSWNG 10/80	80	183 916	**DSWNG 10/50**	50	183 917	10	4,550
	DSWNG 11/80	80	183 918				11	4,650
LSVG with D + FP	**DSWNGT 6/80**	80	183 919	**DSWNGT 6/50**	50	183 920	6	4,150
	DSWNGT 7/80	80	183 921				7	4,250
	DSWNGT 8/80	80	183 922	**DSWNGT 8/50**	50	183 923	8	4,350
	DSWNGT 9/80	80	183 924				9	4,450
	DSWNGT 10/80	80	183 925	**DSWNGT 10/50**	50	183 926	10	4,550
	DSWNGT 11/80	80	183 927				11	4,650



DSWNG 11-pole

Double collectors come with terminal boxes.
Power line: je 1 x M 50 and 1 x M 25
Control line: je 1 x M 32 and 1 x M 25

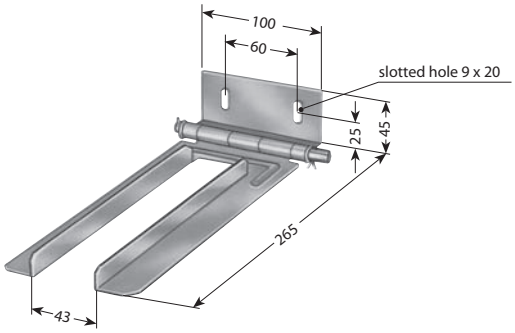
Collectors and ternminal boxes are wired.

Cross section: double collector 50 A – 2 x 2,5 mm^2
double collector 80 A – 2 x 4 mm^2

[1] All ampere data for 60 % intermittent duty.
[2] For full Type designation add Power or Control, suffix e.g. DSWK 4/50 F-1 **HS** for Order- No. 250 320
DSWNG 6/50 **ST** for Order- No. 183 911.

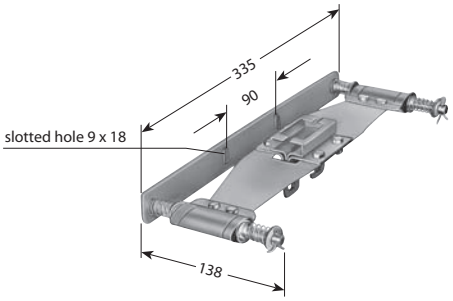
LSV

for single and double collector



Type	Weight kg	Order- No.
KWS	0,480	250 380
KWS/K(1)	0,480	252 340

flexible support type with single collector
for tranfer funnel ETL; see pages 13 & 23

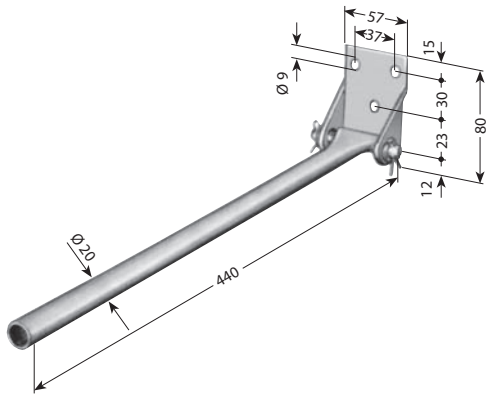


If you are going to use the flexible towing arm in system with curves please contact us.

Type	Weight kg	Order- No.
KFMN for SWK	1,160	250 390
KFML for SWN and SWNT	1,170	252 970

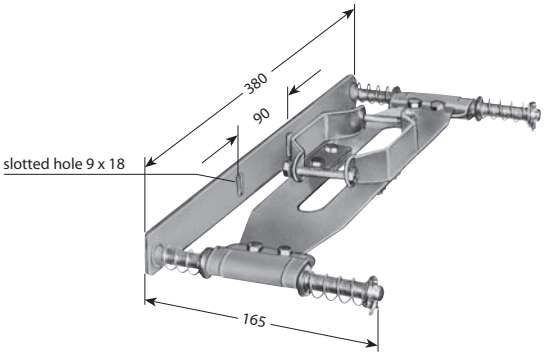
LSVG

for single and double collector



Type	Weight kg	Order- No.
GKM	0,620	260 350
GKM/K(1)	0,620	261 560

flexible support type with single collector
for tranfer funnel ETLG; see pages 13 & 23

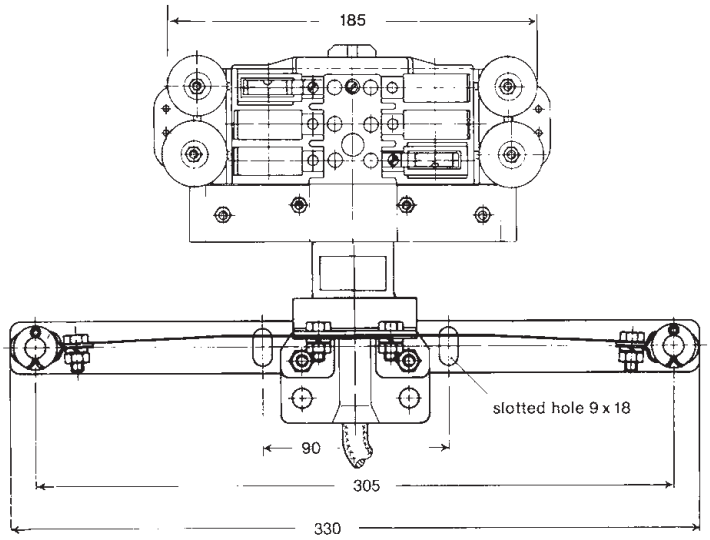


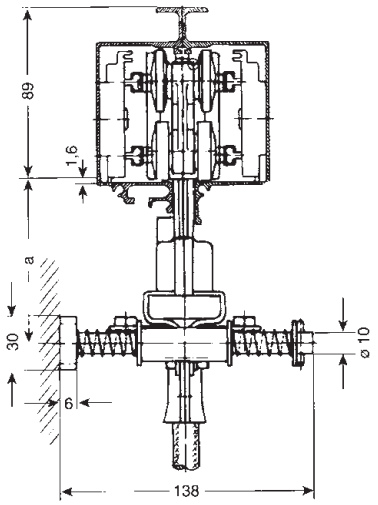
Type	Weight kg	Order- No.
GFM for SWNG/FM	1,300	260 360

(1) stainless steel

LSV

SWN 5/40 collector and KFML tow arm



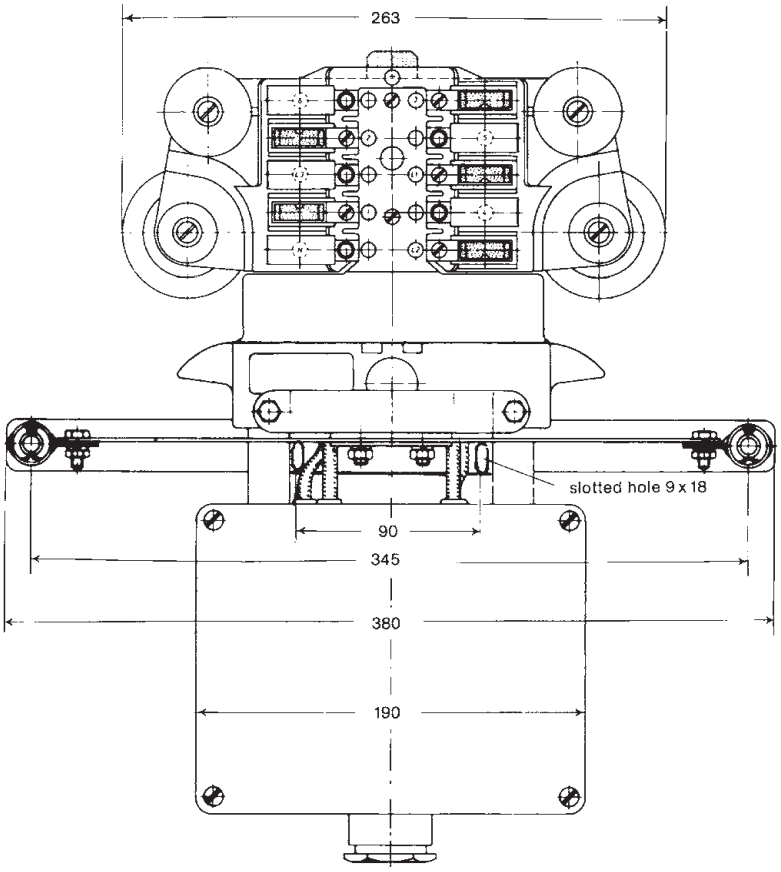


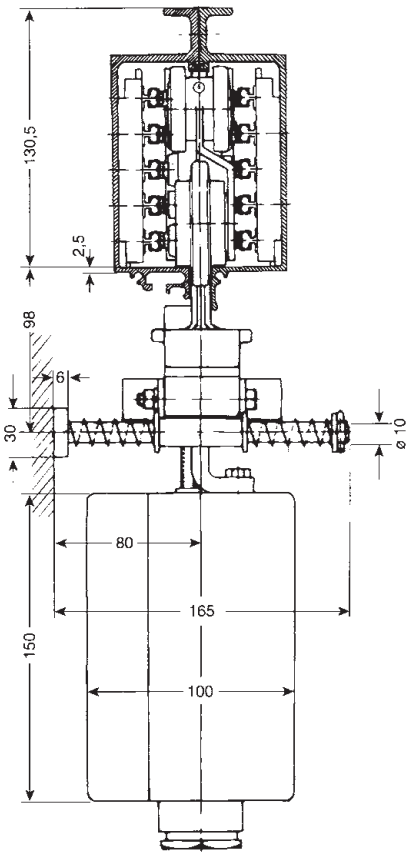
max. horizontal offset 15 mm
max. vertical offset 10 mm

with collector	SWK	SWN	SWNT
Dim. a/mm	85	95	105

LSVG

SWNG 11/40 FM collector and GFM tow arm





max. horizontal offset 15 mm
max. vertical offset 10 mm

(1) adjust during installation

LSV

for powerail		Order-No.
joint fish plate (stainless), pair		191 830
joint cover, pair		191 840
joint cover anodized, pair		190 470
peg to fix housing		190 510
copper conductor 16 mm², 5th and 7th pole (top)		195 190
copper conductor rail 16 mm² (lateral)		191 880
copper conductor rail 25 mm² (lateral)		191 900
copper conductor rail 35 mm² (lateral)		191 910
copper conductor rail 50 mm² (lateral)		191 920
copper conductor rail 50 mm² (lateral for ground 300 A only)		201 170
copper conductor rail 70 mm² (lateral for Phase 300 A only)		191 930
2-pole insulator	for 60-200 A systems	195 699
2-pole insulator	for 300 A systems	195 700
3-pole insulator	for 60-200 A systems	195 701
plug-in connector	for 60-140 A systems	191 800
bolted joint connector	for 60-200 A systems (for 200 A only)	191 810
bolted joint connector	for 300 A systems	201 120
locking pin for plastic shielding		280 500
coupling for sealing strip		258 300
fastener for sealing strip		258 432
mounting trolley for sealing strip		258 345

for Collectors	Type	SWK[1]	SWN	SWNT
		Order- No.	Order- No.	Order- No.
carbon brush phase, incl. brush holder (lateral)		250 470	254 890	254 890
carbon brush ground 5th and 7th pole (top), incl. brush holder		–	254 891	254 891
carbon brush ground, incl. brush holder (lateral)		250 480	254 892	254 892
carbon pressure spring		250 490	258 757	258 757
carbon pressure spring, reinforced		258 759	258 760	258 760
collector neck (pair)		–	254 893	254 898
glider plate for sealing strip		–	–	258 370
wheel (bottom)		251 690	254 895	254 895
guide roller (top)		251 700	254 903	254 903
connecting strap for double collectors		258 379	258 379	258 379
connecting bar for double collectors		258 430	258 431	258 431
attachment clamp KWZ		250 310	–	–
attachment clamp KWZ/K, stainless		252 639	–	–
attachment clamp KWZL		–	254 897	254 897

Conductor dead section[2]

factory assembled
(300 Amp. systems with air gap only)

Illustration shows STA 3

Type	with air gap 5 mm Order- No.	Type	with insul. section 30 mm Order- No.
STA 1	193 440	**STI 1**	193 500
STA 2	193 450	**STI 2**	193 510
STA 3	193 460	**STI 3**	193 520
STA 4	193 470	**STI 4**	193 530
STA 5	193 480	**STI 5**	193 540
STA 6	193 490	**STI 6**	193 550

LSVG

for powerail		Order- No.
joint fish plate (stainless), pair		183 060
joint cover, pair		183 080
joint cover anodized, pair		183 090
peg to fix housing		190 510
copper conductor rail 16 mm² (lateral)		191 880
copper conductor 16 mm², 7th, 9th and 11th pole (top)		195 190
copper conductor rail 25 mm² (lateral)		191 900
copper conductor rail 35 mm² (lateral)		191 910
copper conductor rail 50 mm² (lateral)		191 920
copper conductor rail 50 mm² (lateral for PE 300 A only)		201 170
copper conductor rail 70 mm² (lateral)		191 930
5-pole insulator	for 60-200 A systems	184 812
2-pole insulator	for 300 A systems	195 700
plug-in connector	for 60-140 A systems	191 800
bolted joint connector	for 60-200 A systems	191 810
bolted joint connector	for 300 A systems	201 210
locking pin for plastic shielding		280 500
coupling for sealing strip		258 300
fastener for sealing strip		258 432
mounting trolley for sealing strip		184 033

for Collectors	Typ	SWNG	SWNGT
		Order- No.	Order- No.
carbon brush phase, incl. brush holder (lateral)		254 890	254 890
carbon brush ground 7th, 9th and 11th pole (top)		254 891	254 891
carbon brush ground, incl. brush holder (lateral)		254 892	254 892
carbon pressure spring		258 757	258 757
carbon pressure spring, reinforced		258 760	258 760
collector neck (pair)		183 280	183 865
wheel (bottom)		183 290	183 290
guide roller (top)		183 300	183 300

Conductor dead section[2]

factory assembled
(300 Amp. systems with air gap only)

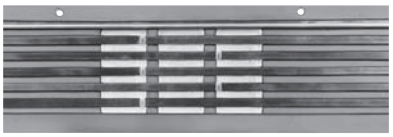


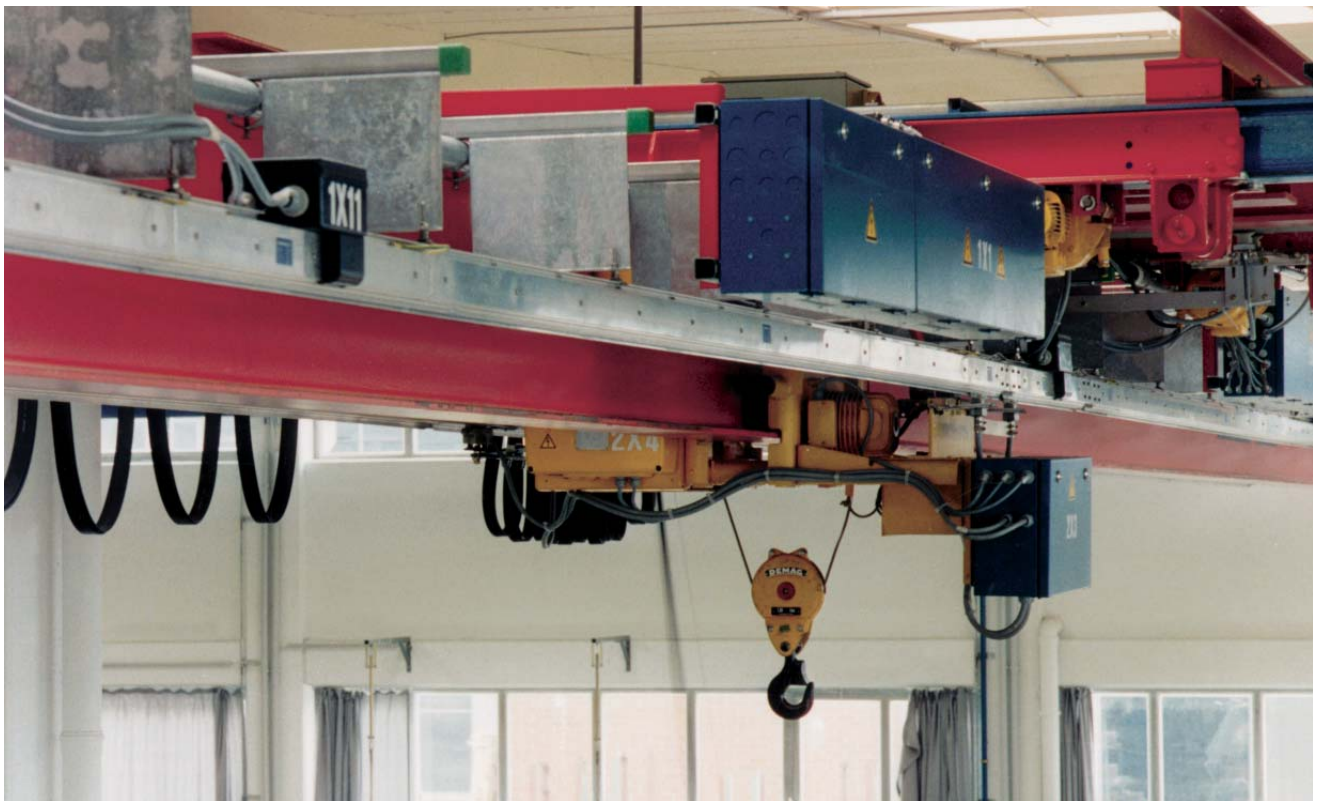
Illustration shows STAG 5

Type	with air gap 5 mm Order- No.	Type	with insul. section 30 mm Order- No.
STAG 1	182 860	**STIG 1**	182 960
STAG 2	182 870	**STIG 2**	182 970
STAG 3	182 880	**STIG 3**	182 980
STAG 4	182 890	**STIG 4**	182 990
STAG 5	182 900	**STIG 5**	183 000
STAG 6	182 910	**STIG 6**	183 010
STAG 7	182 920	**STIG 7**	183 020
STAG 8	182 930	**STIG 8**	183 030
STAG 9	182 940	**STIG 9**	183 040
STAG 10	182 950	**STIG 10**	183 050

[1] SWK carbon brush without brush holder.

[2] Please indicate which conductors are to be interrupted.

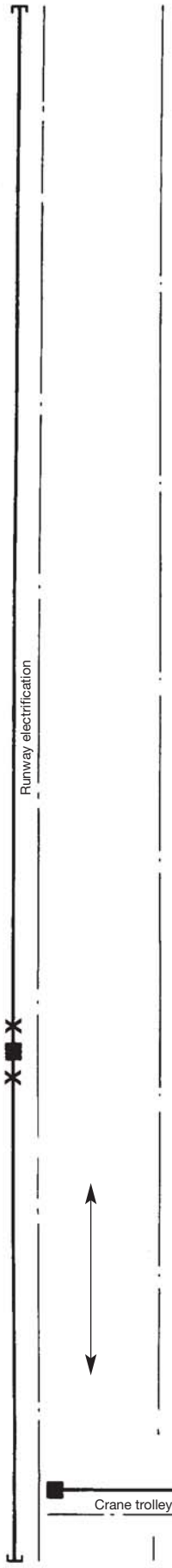
Aluminium enclosed conductor system for crane electrifications.



Aluminium enclosed conductor system LSVG on crane bridge.

EXAMPLES FOR ORDERING

with Plug-in joints



Runway electrification · 40 m

Qty		Type	Order- No.	Type	Order- No.
9	Powerails, 4 m long	LSV 4/60-4 **HS**	190 004	LSVG 10/60-4 **HS**	180 164
1	Powerail, 3 m long	LSV 4/60-3 **HS**	190 003	LSVG 10/60-3 **HS**	180 163
1	Line feed, 1 m long	NKL 4/60 **HS**	195 074	NKLG 10/60 **HS**	185 057
10	Joint materials	VBL 4/5	195 244	VLG 10/11	184 111
19	Sliding hangers	GAL	190 130	SAS	200 160
1	Fixpoint hanger	FAL	190 120	SAFG	180 310
2	End caps	EKL	190 220	EKLG	180 320
1	Double collector	DSWN 4/80 S-1 **HS**	194 808	DSWNG 10/80 **HS**	183 916
1	Tow arm	KWS	250 380	GKM	260 350

Crane trolley electrification · 12 m

2	Powerails, 4 m long	LSV 7/60-4 **HS**	190 074	LSVG 11/60-4 **HS**	180 194
1	Powerail, 3 m long (cut in 2.5 m)	LSV 7/60-3 **HS**	190 073	LSVG 11/60-3 **HS**	180 193
1	End feed, 1 m long	KEL 7/60 R **HS**	190 170	KELG 11/60 R **HS**	180 480
4	Joint materials	VBL 6/7	195 246	VLG 10/11	184 111
5	Sliding hangers	GAL	190 130	SAS	200 160
1	Fixpoint hanger	FAL	190 120	SAFG	180 310
1	Transfer guide, 0.5 m long	AÜL 7/60 L **HS**	192 450	AÜLG 11/60 L **HS**	181 350
1	Double collector	DSWN 7/80 S-1 **HS**	194 813	DSWNG 11/80 **HS**	183 918
1	Tow arm	KWS	250 380	GKM	260 350

Spur rail electrification · 30 m

7	Powerails, 4 m long	LSV 7/60-4 **HS**	190 074	LSVG 11/60-4 **HS**	180 194
1	Powerail, 1 m long (cut in 0.5 m)	LSV 7/60-1 **HS**	190 071	LSVG 11/60-1 **HS**	180 191
9	Joint materials	VBL 6/7	195 246	VLG 10/11	184 111
14	Sliding hangers	GAL	190 130	SAS	200 160
1	Fixpoint hanger	FAL	190 120	SAFG	180 310
1	Line feed, 1 m long	NKL 7/60 **HS**	195 089	NKLG 11/60 **HS**	183 992
1	Transfer guide, 0.5 m long	AÜL 7/60 R **HS**	192 460	AÜLG 11/60 R **HS**	181 360
1	End cap	EKL	190 220	EKLG	180 320

X = Fixpoint hanger; all other support points are sliding hangers**.**

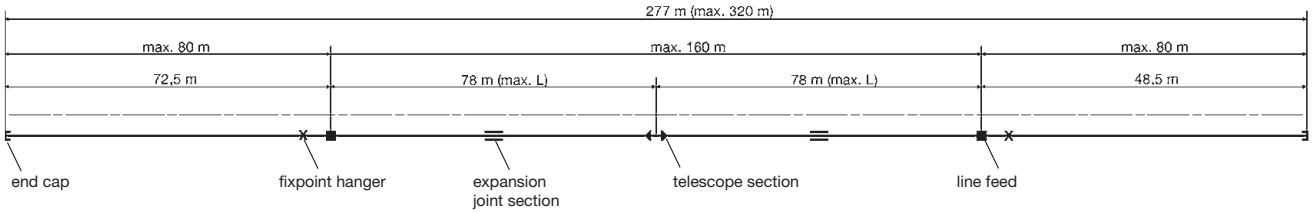
Sealing strip “D” and plastic shielding “FP” have to be ordered separately with the corresponding collectors (see pages 6 and 20). Heating system may be provided. (see page 16).

Consider supplements (p. 6 & 16) if required.

Straight track electrification · 277 m · with Line feed and Bolted joints

Anticipated max. temperature 60° C, L = max. 80 m;
277m total length of the system consisting of:

Qty		Type	Order- No.	Type	Order- No.
68	Powerails, 4 m long	LSV 4/200-4 **HS**	190 614	LSVG 6/200-4 **HS**	180 034
1	Line feed, 1 m long	NKL 4/200 **HS**	195 077	NKLG 6/200 **HS**	185 031
2	Expansion joint sections, 1 m long	DSL 4/200 **HS**	195 109	DSLG 6/200 **HS**	184 018
1	Telescope section	TSL 4/200 **HS**	195 098	TSLG 6/200 **HS**	184 003
72	Joint materials	VBLS 4/5	195 248	VLGS 6/7	184 113
1	Fixpoint hanger	FAL	190 120	SAFG	180 310
139	Sliding hangers	GAL	190 130	SAS	200 160
2	End caps	EKLS	195 149	EKLGS	184 100
2	Double collectors	DSWN 4/80 S-1 **HS**	194 808	DSWNG 6/80 **HS**	183 910
2	Tow arms	KWS	250 380	GKM	260 350

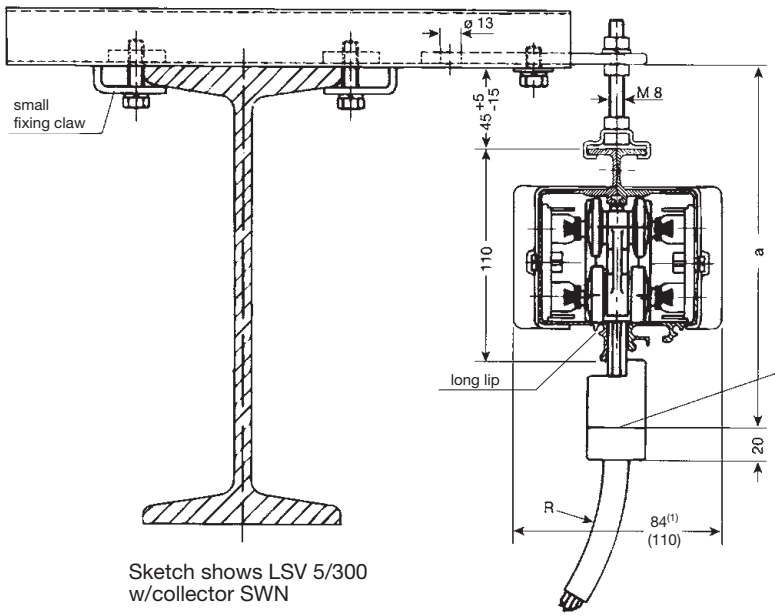


All other support points are sliding hangers, sealing strip „D“ and plastic shielding „FP“ have to be ordered separately with the corresponding collectors (see pages 6 and 20).
Heating system may be provided. (see page 16).

Aluminium enclosed conductor system on crane bridge.

BASIC DIMENSIONS

LSV

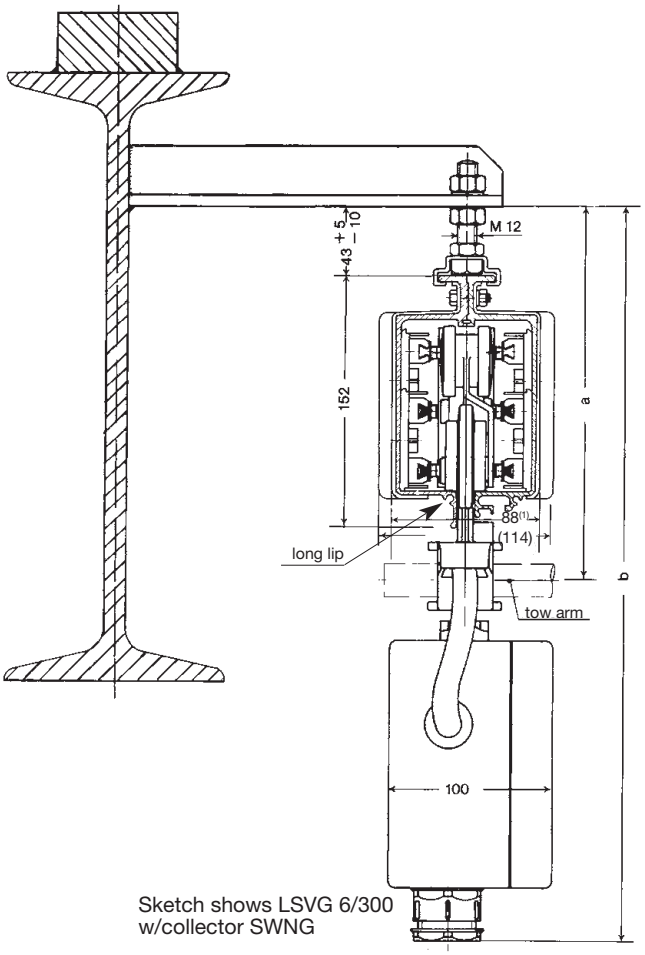


Sketch shows LSV 5/300
w/collector SWN

with collector	SWK	SWN	SWNT
Dim a mm	187 +5 –15	187 +5 –15	197 +5 –15

Dimensions also refer to corresponding double collectors.

LSVG



Sketch shows LSVG 6/300
w/collector SWNG

with collector	SWNG	DSWNG	SWNGT	DSWNGT
Dim a mm	225 +5 –10	255 +5 –10	243 +5 –10	268 +5 –10
Dim b mm	455 +5 –10	495 +5 –10	460 +5 –10	500 +5 –10

LSV LSVG

Cable glands for Feeds (see pages 10 and 11)

cable gland	for cable-Ø mm	ampacity A
M 25	9 - 19	60
M 32	17 - 27	60
M 50	23 - 33	100 + 140
M 50	29 - 39	200
M 63	35 - 64	300

(1) **For max. width see also pages 10 & 11 feed set configurations.**
Max. width 84 or 88 mm at plug-in joints w/o bonded blanks.
Dimensions in parenthesis at bolted joints are with bonded blanks (see illustration).

Company: _____ Date: _____

_____ _____

Tel: _____ Fax: _____

E-Mail: _____ Internet: (URL) _____

1. Number of powerail installations: _____
2. Type of equipment to be powered: _____
3. Operating voltage: _____ Volts, Phases: _____, Frequency: _____ Hz
   Three phase voltage: ☐ AC voltage: ☐ DC voltage: ☐
4. Track length: _____
5. Number of conductors: _____ (Neutral: _____ control: _____ ground: _____)
6. Mounted position of powerail:

   ☐ Powerail pendant, collector cable facing to the bottom
   ☐ Powerail pendant, collector cable lateral payout [1]
   ☐ Support distance _____ m (max. 2 m)
   ☐ Other: _____
7. Number of consumers per system: _____
8. Indoor: ☐ Outdoor: ☐
9. Other operating conditions (humidity, dust, chemical influence etc.)
   _____
10. Ambient temperature: _____ °C min. _____ °C max.
11. Position and number of feeding points[1]: _____
12. How will the conductor system be arranged?[1] _____
13. Brackets required: yes ☐ no ☐ c/c distance beam / powerail _____
    Flange width of beam _____
14. Position and number of isolating sections (e.g. for maintenance): _____
15. Travel speed: _____ in curves: _____ at transfers: _____
16. Power consumption of the individual consumer loads: _____
    (Please consult table on reverse side)
17. Max. Voltage drop from the powerail feed point to the consumer considering starting current:
    3% ☐ or _____ % ☐ referring to nominal voltage

Remarks: _____

[1] For curved tracks, powerail with isolating sections etc., we require sketches to enable us to prepare a quotation. pto!

QUESTIONNAIRE LSV–LSVG

To the nearest local VAHLE agency: Date:

Motor data	Crane 1							Crane 2						
	Power kW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motos[1]	Power KW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motos[1]
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

Motor data	Crane 3							Crane 4						
	Power kW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motos [1]	Power KW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motos[1]
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

Mark with * those motors which can run simultaneously.
Mark with Δ those motors which can start up simultaneously.

[1]Use:
K for squirrel cage motor
S for slipring motor
F for frequency controlled motor

Further remarks: _____

_____

_____

_____

Signature: _____

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You can find your local contact at:
vahle.com/contact

W1100120/00 | Rev. 01 | 03/24 | Errors and technical modifications subject to change.