



**VAHLE**

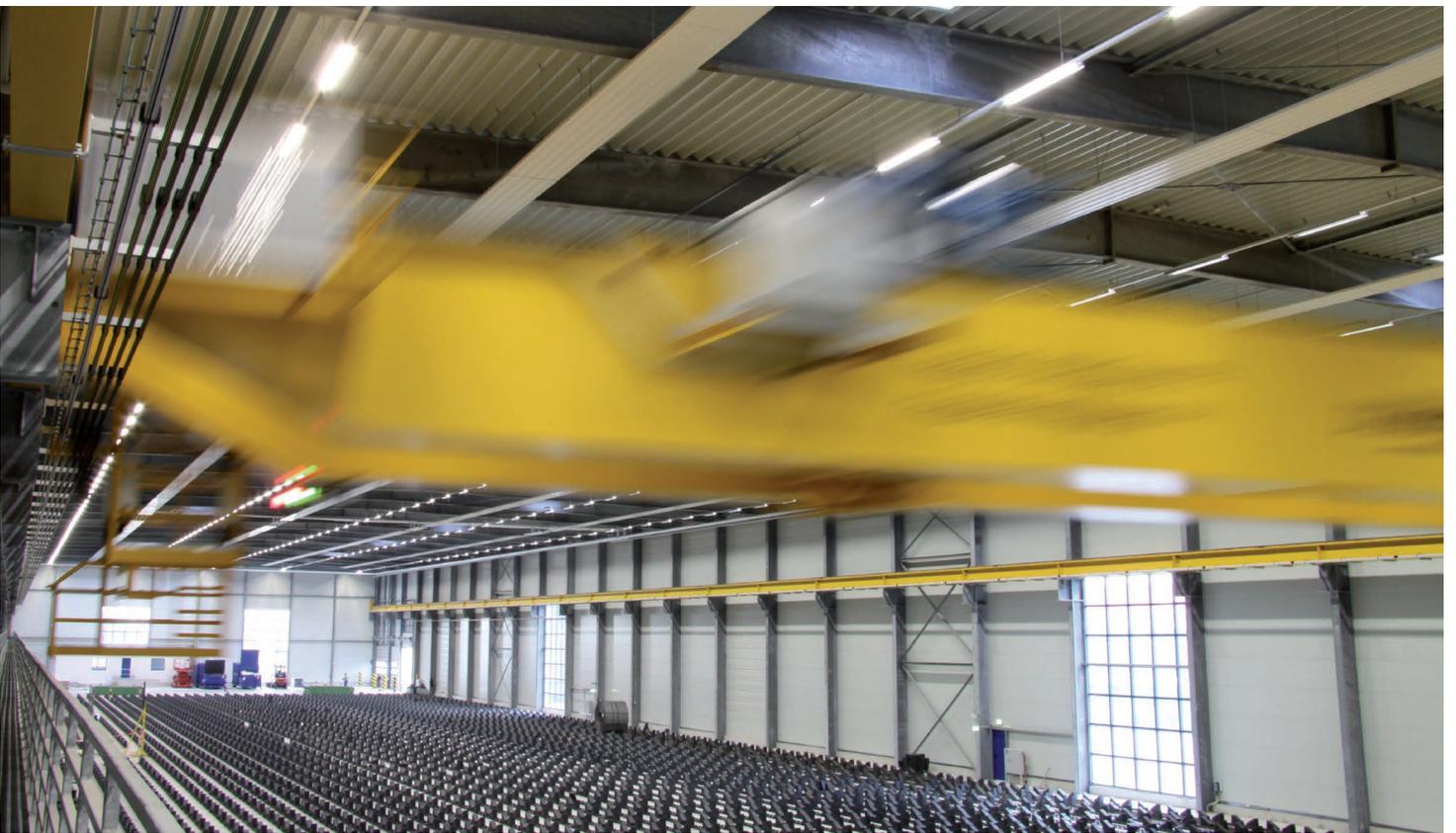
## Enclosed Conductor System KBH

**SYSTEMS IN MOTION**





KBH Installation - Overhead Crane



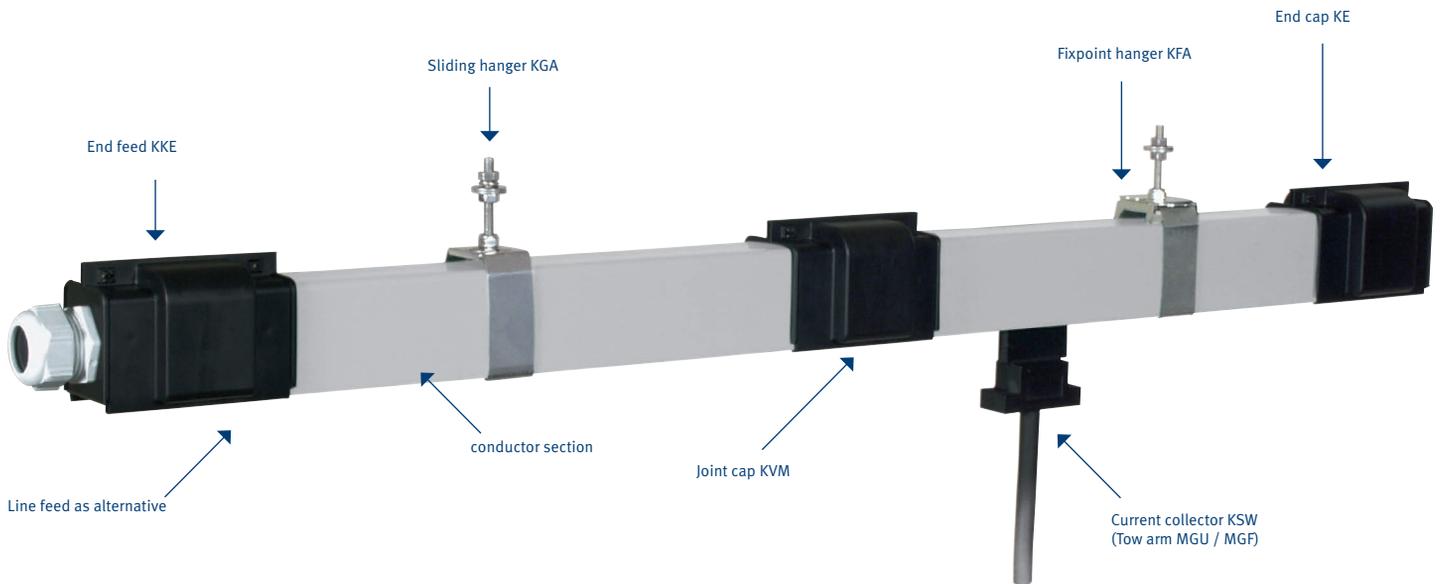
KBH Installation - Process Crane

# Enclosed Conductor System KBH

Content.....	Page
System Overview.....	3
System Data.....	4
KBH Order No & Specs.....	6,7
Joint Caps, Hangers & End Caps.....	8
Brackets .....	9
End Feeds, Joint Feeds.....	10
Line Feeds.....	11,12
Terminal Box .....	12
Curves, Sealing strip & Cable glands for feeds.....	13
Heating Cable .....	14,15
Contact sections, Turntables & Switches .....	16
Transfer funnels & Transfer guides .....	17

Content.....	Page
Transfer guides & Conductor dead section .....	18
Removal section.....	19
Anti-Condensation section .....	20
Expansion section.....	21
Single Current collector .....	22
Double collector & Tow arms.....	23
Flexible tow arm .....	24
Spare Parts List .....	25
Sample system order.....	26
Questionnaire .....	27

## System Identification



## System Overview

VAHLE KBH is a fully enclosed conductor bar solution for both outdoor and indoor applications. The "honeycomb" design housing can accommodate various copper profiles depending on amperage requirements.

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

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 benefits to the KBH. 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 a heating system. The conductor system with sealing strip is protected to IP 24 standards and EN 60529 (0470, part 1) regulation. Current collectors are touch proof only when fully entered into the conductor system.

# System Data

## Applications

For mobile power consumers, e.g. cranes, monorails, electric hoists, machine tools, automated storage and retrieval systems, lighting systems. Suitable for outdoor and indoor applications.

## Approvals

UL-Approved. (See specific product ratings.)

## Housing

Color gray, PVC housing for 4 or 5 conductors. Standard section 4 m. Custom length sections are available. The ground conductor is identified by green/yellow stripe. Safety key design of housing and collector prevent phase reversing due to improper installation. Higher number of conductors possible by combination of several KBH systems.

## Couplings

Spring loaded plug in style joints or bolted style joints.

## Feed Sets

63A or 90A end feeds, 63-200A line feeds.

## Hangers

Easy install sliding and fixpoint hangers. Max. support distance of the conductor at following ambient temperatures:

- Indoor systems and roofed outdoor systems:  $\leq 35^{\circ}\text{C} = 2,00\text{ m}$
- Indoor and outdoor systems with and without heating:  $\leq 35^{\circ}\text{C} = 1,33\text{ m}$
- Cold storage:  $\leq 0^{\circ}\text{C} = 1.33\text{ m}$

## Expansion During Temperature Fluctuation

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 are compensated at each joint.

## Anti-Condensation Sections

These sections are used at the transfer of the conductor bar 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 18.

## 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 separated 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.

## Collectors

The current collectors are made of re-enforced polyester fiberglass, for high strength and light weight. Spring loaded carbon brushes maintain uniform contact. 1m connecting cables included. Longer lengths available on request.

With the following system requirements double collectors must 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 collector cable may not exceed 3 m if the added overcurrent protection device is not designed for the load capacity of this cable. Please refer to regulations VDE 0100, part 430 and EN 60204-32.

(Note: this might happen in case of several collectors running in one system).

## Proper Spacing - Installation

Ensure proper spacing is followed during assembly. Minimum of 250mm spacing between hangers, joints, feeds, etc. must be followed to ensure proper function. See the KBH installation instructions for details.

## Curves

Customer curves and length available on request. Minimum bending radius applies. See page 13 for details.

*Please note:* For use in galvanizing and pickling plants, under aggressive conditions and low voltage applications we would appreciate receiving detailed information, especially of the environmental conditions. For quotations and order processing including conductor systems with curves, dead sections, turntables, switches etc. we require system layout drawings. Please use our questionnaire on page 27.

# Technical Data

## Electrical Values:

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 $5 \times 10^{15} \Omega/\text{cm}$	IEC 60093 $10^{13} \Omega$	EN 60112 CTI 400-2,7

## Mechanical Properties:

Type	Flexible strength	Tensile strength	Temperature range (ambient):	Combustibility:	Resistance to chemicals: (at 45 °C)
KBH	75 N/mm <sup>2</sup> ± 10%	40 N/mm <sup>2</sup> ± 10%	-30 °C up to +60 °C	flame retardant DIN 4102 part 1 class B1; self extinguishing	Gasoline, Mineral Oil, Grease, acid sulfur up to 50%, caustic soda up to 50% and hydrochloric acid up to 25%, concentrated

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

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

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

$$\Delta U_1 = \text{Voltage drop [V]} \quad R = \text{Resistance } [\Omega/1000 \text{ m}]$$

$$\Delta U_2 = \text{Voltage drop in \%} \quad l = \text{Power feed length [m]}$$

$$I = \text{Ampere load [A]} \quad L = \text{System length [m]}$$

$$l = L \quad \text{power feed located at the end of the system}$$

$$l = L/2 \quad \text{power feed located at the center of the system}$$

$$l = L/4 \quad \text{power feed located at both ends of the system}$$

$$l = L/6 \quad \text{power feed located at } L/6 \text{ from each end of the system}$$

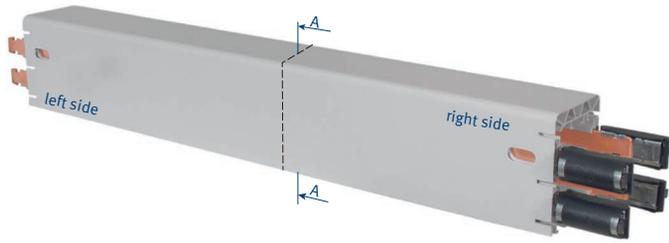
$$Z = \text{Impedance } [\Omega/1000 \text{ m}]$$

$$V = \text{Voltage rating [V]}$$

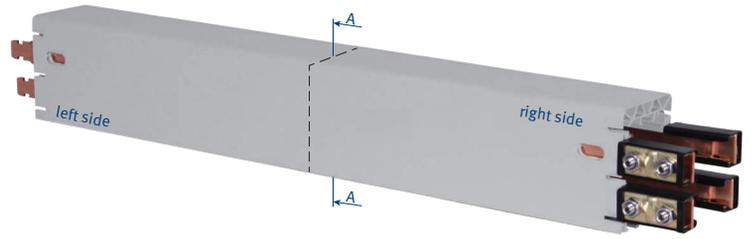
The total ampere load is determined from the nominal rated current of all motors working simultaneously on the same feed section of your electrification system. A diversity factor of 0.5-0.9 can be considered.

The conductor size and/or number of feed points should be increased or booster cables should be used in parallel in case the drop is exceeding the limitations.

# KBH Conductor Bar - Order No & Specifications



KBHF with spring loaded connectors



KBHS with bolted joints

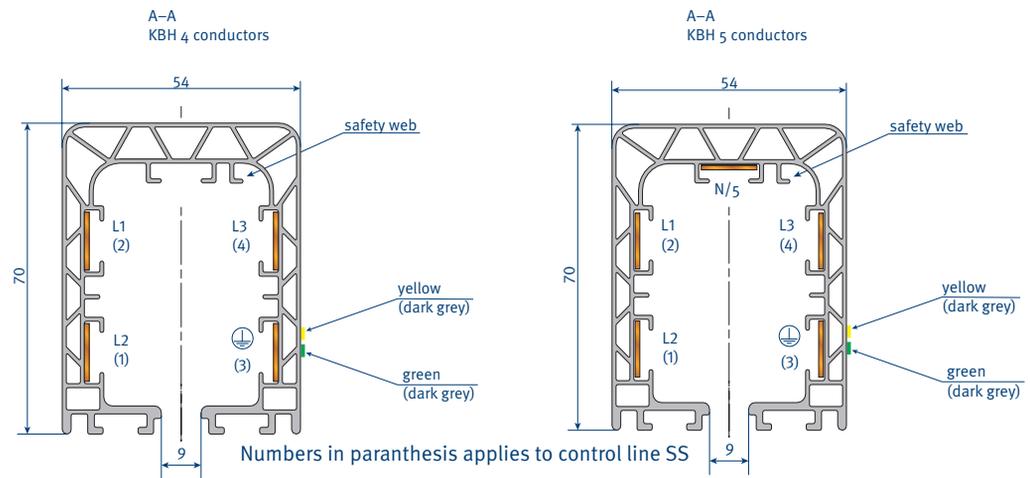
New rating "63" or "80" compatible with old style "40" & "63" respectively.

Type <sup>(1)</sup>	# of conductors	Max.continuous current A at 95°F			Copper cross section mm <sup>2</sup>				Nominal voltage V <sup>(4)</sup> (UL)	
		L1 L2 L3	60 % DC	100% DC	Rating per UL	L1 L2 L3		N / 5 <sup>(2)</sup>		contro line
<b>KBHF</b>										
KBHF 4 / 63 ... HS	4	81	63	40	3 x 10	10	-	-	690 (600)	
KBHF 4 / 63 ... SS <sup>(5)</sup>	4	81	63	40	-	-	-	4 x 10	690 (600)	
KBHF 4 / 80 ... HS	4	103	80	63	3 x 17	17	-	-	690 (600)	
KBHF 4 / 100 ... HS	4	129	100	100	3 x 26	26	-	-	690 (600)	
KBHF 5 / 63 ... HS	5	81	63	40	3 x 10	10	10	-	690 (600)	
KBHF 5 / 63 ... SS <sup>(5)</sup>	5	81	63	40	-	-	-	5 x 10	690 (600)	
KBHF 5 / 80 ... HS	5	103	80	63	3 x 17	17	17	-	690 (600)	
KBHF 5 / 100 ... HS	5	129	100	100	3 x 26	26	26 <sup>(3)</sup>	-	690 (600)	
<b>KBHS</b>										
KBHS 4 / 63 ... HS	4	81	63	40	3 x 10	10	-	-	690 (600)	
KBHS 4 / 63 ... SS <sup>(5)</sup>	4	81	63	40	-	-	-	4 x 10	690 (600)	
KBHS 4 / 80 ... HS	4	103	80	63	3 x 17	17	-	-	690 (600)	
KBHS 4 / 100 ... HS	4	129	100	100	3 x 26	26	-	-	690 (600)	
KBHS 4 / 125 ... HS	4	161	125	125	3 x 33	26	-	-	690 (600)	
KBHS 4 / 160 ... HS	4	207	160	160	3 x 51	26	-	-	690 (600)	
KBHS 4 / 200 ... HS	4	258	200	200	3 x 70	42	-	-	690 (600)	
KBHS 5 / 63 ... HS	5	81	63	40	3 x 10	10	10	-	690 (600)	
KBHS 5 / 63 ... SS <sup>(5)</sup>	5	81	63	40	-	-	-	5 x 10	690 (600)	
KBHS 5 / 80 ... HS	5	103	80	63	3 x 17	17	17	-	690 (600)	
KBHS 5 / 100 ... HS	5	129	100	100	3 x 26	26	26 <sup>(3)</sup>	-	690 (600)	
KBHS 5 / 125 ... HS	5	161	125	125	3 x 33	26	26 <sup>(3)</sup>	-	690 (600)	
KBHS 5 / 160 ... HS	5	207	160	160	3 x 51	26	26 <sup>(3)</sup>	-	690 (600)	
KBHS 5 / 200 ... HS	5	258	200	200	3 x 70	42	26 <sup>(3)</sup>	-	690 (600)	

(1) KBHF - Plug in joints, KBHS - Bolted joints, SS - Control only  
 (2) In case of using a conductor as N please note: VDE 0100 part 430  
 (3) 5th. Conductor max. 80 A at 100% DC.  
 (4) Nominal voltage UL= 600 V  
 (5) Control line

# KBH Conductor Bar - Order No & Specifications

- Standard order length is 4 meters.
- Cut lengths available on request.

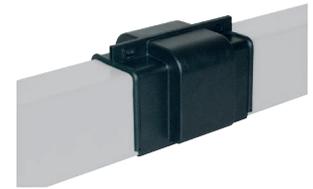
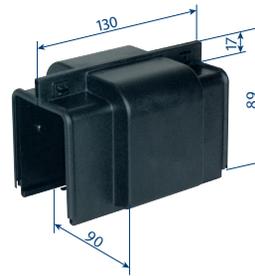


Leakage distance mm	Impedance at 50 Hertz and 70 °F $\Omega / 1000 \text{ m}$	Resistance at 70 °F $\Omega / 1000 \text{ m}$	Weight kg(lb)/m	Order-No. <sup>(1)</sup>
33	1.724	1.717	1.351(3)	600 974
33	1.724	1.717	1.351(3)	600 994
33	1.258	1.249	1.487(3.5)	600 984
33	0.702	0.687	1.903(4)	600 024
33	1.724	1.717	1.452(3.5)	601 004
33	1.724	1.717	1.452(3.5)	601 024
33	1.258	1.249	1.622(3.5)	601 014
33	0.702	0.687	2.142(4.5)	600 124
33	1.724	1.717	1.481(3.5)	601 034
33	1.724	1.717	1.481(3.5)	601 054
33	1.258	1.249	1.617(3.5)	601 044
33	0.702	0.687	2.033(4.5)	600 064
33	0.568	0.549	2.207(5)	600 074
30	0.376	0.351	2.699(5)	600 084
27	0.283	0.255	3.357(7.5)	600 314
33	1.724	1.717	1.614(3.5)	601 064
33	1.724	1.717	1.614(3.5)	601 084
33	1.258	1.249	1.784 (4)	601 074
33	0.702	0.687	2.304 (5)	600 164
33	0.568	0.549	2.479 (5.5)	600 174
30	0.376	0.351	2.970 (6.5)	600 184
27	0.283	0.255	3.628 (8)	600 324

(1) The last digit of the order no. specifies the section length. Please change the suffix of the order number with 1, 2, 3, 4 depending on length required.

⊥ Ground = PE

# Joint Caps, Hangers & End Caps



Installed

## Joint Cap, self locking

Type	Weight kg (lb)	Order-No.
KVM	.096 (.4)	600 005



Installed

## Sliding Hanger

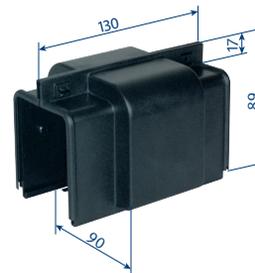
Type <sup>(1)</sup>	Weight kg (lb)	Order-No.
KGA	.100 (.5)	600 000
KGA / K	.100 (.5)	600 397



Installed

## Fixpoint Hanger

Type <sup>(1)</sup>	Weight kg (lb)	Order-No.
KFA	.132 (.5)	600 007
KFA / K	.132 (.5)	600 398



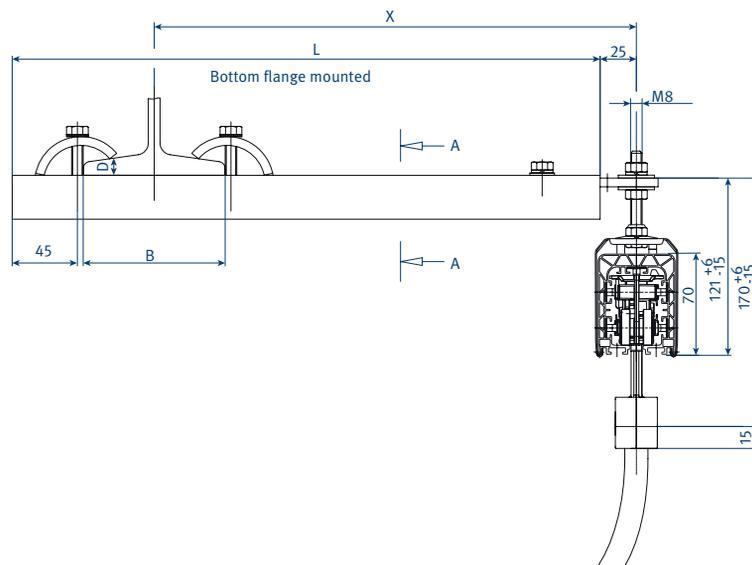
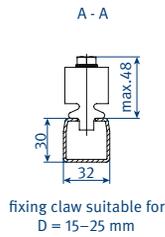
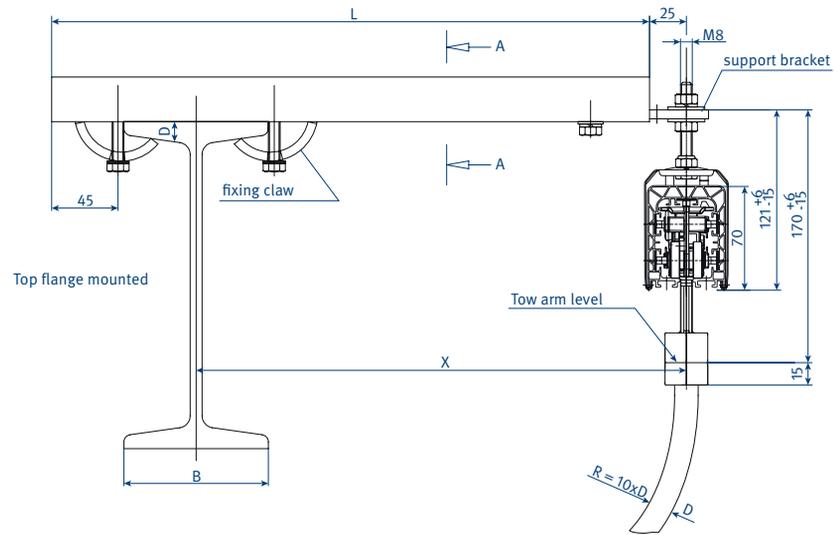
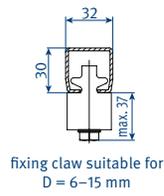
Installed

## End Cap left and right version

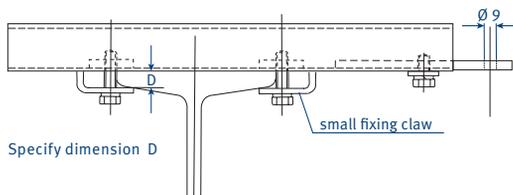
Type	Weight kg (lb)	Order-No.
KE	.120 (.4)	600 008

(1) /K = stainless steel

# Brackets



## 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 170mm up to 300 mm.

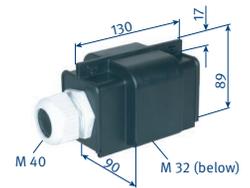
□ - rail of EHK is identical to type S 1, Cat. 8 a

Type	X mm	L mm	B max. mm	Weight kg (lb)	Order-No. standard version	Order-No. with small fixing claw
EHK 250	250	350	170	1.070 (2)	251 600	251 720
EHK 300	300	400	170	1.150 (2.5)	251 610	251 730
EHK 400	400	500	170	1.300 (2.5)	251 620	251 740
EHK 500	500	600	170	1.450 (3)	251 630	251 750
EHK 600	600	700	170	1.600 (3.5)	251 640	251 760
EHK 700	700	800	170	1.750 (4)	251 650	251 770
EHK 750	750	850	170	1.820 (4)	251 660	251 780
EHK 800	800	900	170	1.900 (4.5)	251 670	251 790

# End Feeds & Joint Feeds

## End Feed (up to 80 A)

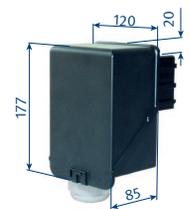
- End feed comes loose without conductor section
- It can be mounted on the left or right hand side
- Electrical connection with customer supplied cable shoes to M6 terminals
- Max. connecting cross section 10 mm<sup>2</sup>



Type	Weight kg (lb)	Cable gland (Dimensions see page 13)	Order-No.
KKE 4 / 63–80 HS	.218 (.5)	M 40	600 010
KKE 5 / 63–80 HS	.230 (.5)	M 40	600 107
KKE 4 / 63 SS	.196 (.4)	M 32	600 015
KKE 5 / 63 SS	.208 (.5)	M 32	600 108

## 90° End Feed (up to 100 A)

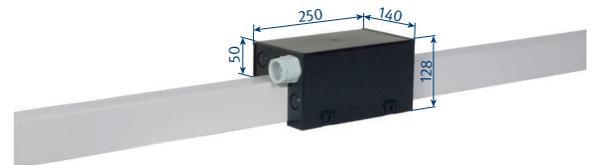
- End feed comes loose without conductor section
- It can be mounted on the left or right hand side
- Electrical connection with customer supplied cable shoes to M6 terminals
- Max. connecting cross section 35 mm<sup>2</sup>



Type	Weight kg (lb)	Cable gland (Dimensions see page 13)	Order-No.
KKE 4 / 63–100 HS	.570 (1.2)	M 32 & M 50 <sup>(1)</sup>	600 422
KKE 5 / 63–100 HS	.610 (1.3)	M 32 & M 50 <sup>(1)</sup>	600 423

## Joint Feed (up to 63 A)

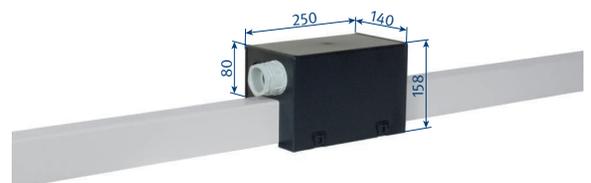
- KSE type comes loose without conductor section
- It can be mounted at any joint
- Electrical connection with customer supplied cable shoes to M6 terminals



Type	Weight kg (lb)	Cable gland (Dimensions see page 13)	Order-No.
KSE 4 / 63 HS	.776 (1.7)	M 32	600 035
KSE 5 / 63 HS	.832 (1.8)	M 32	600 038
KSE 4 / 63 SS	.756 (1.6)	M 25	600 028
KSE 5 / 63 SS	.812 (1.8)	M 25	600 029

## Joint Feed (up to 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



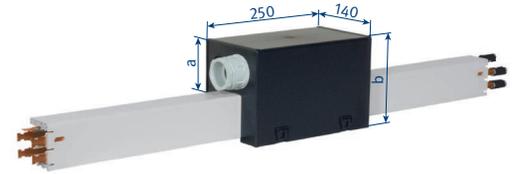
Type	Weight kg (lb)	Cable gland (Dimensions see page 13)	Order-No.
KSE 4 / 80-100 HS	.908 (2)	M 50	600 036
KSE 5 / 80-100 HS	.964 (2.1)	M 50	600 039

Feeds in the curve area on request.  
(1) Both cable glands are included.

# Line Feeds

## Line Feed

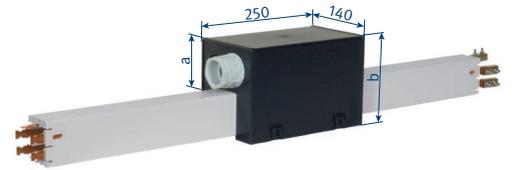
- Includes 1 m section, 63–100 A
- With plug in joints
- Electrical connection with customer supplied cable shoes to M6 terminals



Type	Weight kg (lb)	Dimension mm		Cable gland (Dimensions see page 13)	Order-No.
		a	b		
KEF 4 / 63 HS	2.099 (4.6)	50	128	M 32	600 975
KEF 4 / 80 HS	2.255 (5)	80	158	M 50	600 976
KEF 5 / 63 HS	2.256 (5)	50	128	M 32	600 977
KEF 5 / 80 HS	2.446 (5.4)	80	158	M 50	600 978
KEF 4 / 100 HS	2.803 (6)	80	158	M 50	600 201
KEF 5 / 100 HS	3.098 (6.8)	80	158	M 50	600 209
KEF 4 / 63 SS	2.099 (4.6)	50	128	M 32	600 979
KEF 5 / 63 SS	2.256 (5)	50	128	M 32	600 980

## Line Feed

- Includes 1 m section, 63–125 A
- With bolted joints
- Electrical connection with customer supplied cable shoes to M6 terminals for 100 A, with M8 terminals for 125 A



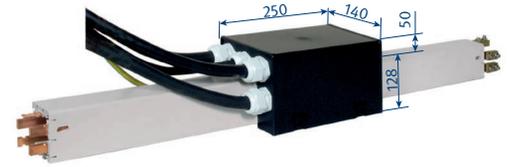
Type	Weight kg (lb)	Dimension mm		Cable gland (Dimensions see page 13)	Order-No.
		a	b		
KES 4 / 63 HS	2.229 (5)	50	128	M 32	600 985
KES 4 / 80 HS	2.385 (5.3)	80	158	M 50	600 986
KES 5 / 63 HS	2.413 (5.3)	50	128	M 32	600 987
KES 5 / 80 HS	2.608 (5.7)	80	158	M 50	600 988
KES 4 / 100 HS	2.933 (6.5)	80	158	M 50	600 225
KES 4 / 125 HS	3.251 (7.2)	80	158	M 50	600 045
KES 5 / 100 HS	3.260 (7.2)	80	158	M 50	600 233
KES 5 / 125 HS	3.606 (8)	80	158	M 50	600 049
KES 4 / 63 SS	2.229 (5)	50	128	M 32	600 989
KES 5 / 63 SS	2.418 (5.3)	50	128	M 32	600 227

Feeds in the curve area on request.

# Line Feed & Terminal Box

## Line Feed

- Includes 1m section (125 - 200 A) with 2m single cores
- With bolted joints
- Electrical connection with customer supplied cable shoes to M 6 terminals. See below

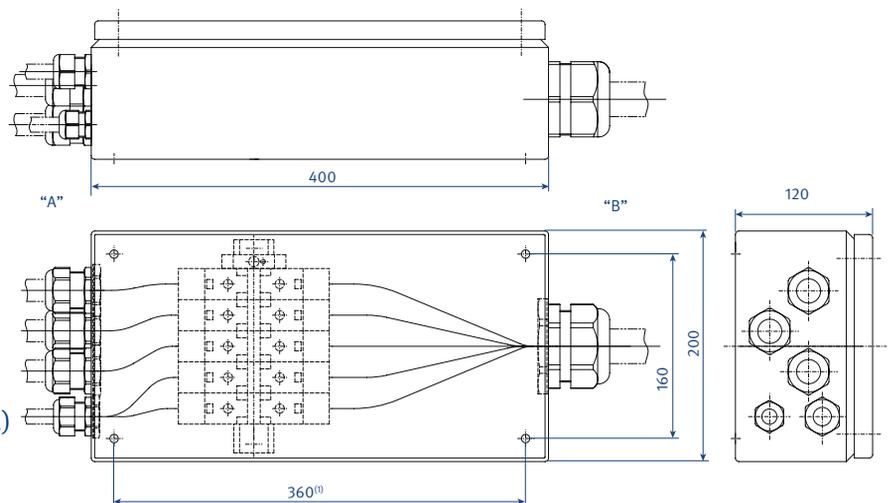


Type	Weight kg (lb)	Cable cross section in mm <sup>2</sup> / Diameter in mm			Order-No.
		L1-L3	Ground	N / 5	
KELS 4 / 125 HS	8.560 (18.9)	35 / 16	25 / 10	-	600 069
KELS 4 / 160 HS	9.784 (21.5)	50 / 18	25 / 10	-	600 075
KELS 4 / 200 HS	11.400 (25)	70 / 21	35 / 11	-	600 385
KELS 5 / 125 HS	9.372 (20.6)	35 / 16	25 / 10	25 / 15	600 077
KELS 5 / 160 HS	10.596 (23.4)	50 / 18	25 / 10	25 / 15	600 079
KELS 5 / 200 HS	12.212 (27)	70 / 21	35 / 11	25 / 15	600 387

## Terminal Box

(for KELS, 125–200 A)

- Connection with customer supplied cable
- Clamping range 16-95 mm<sup>2</sup>
- View A Input of the single cores of the KELS (a.m.)
- View B with M 63 (Dimensions see page 13)



Type	Weight kg (lb)	for line feed	Order-No.
ZK 1	5.030 (11)	KELS 4 / 125 HS	600 389
ZK 2	5.040 (11)	KELS 4 / 160–200 HS	600 390
ZK 3	5.370 (11.8)	KELS 5 / 125 HS	600 391
ZK 4	5.380 (11.8)	KELS 5 / 160–200 HS	600 392

Feeds in the bow area on request.

(1) Fixing borings  $\varnothing$  7 mm at the bottom of the box.

# Curves, Sealing Strip & Cable Glands for Feeds

## Curves

Production corresponding to customer layout

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

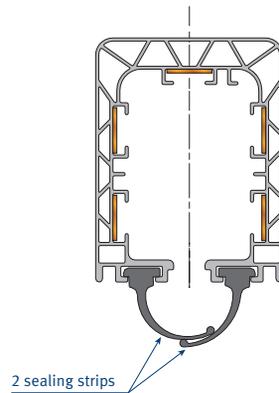
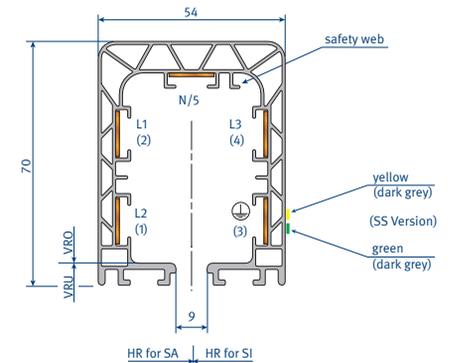
## Horizontal curve designate SI and SA

SI = Safety-web inside  
SA = Safety web outside

## Vertical curve designate VRO and VRU

VRU = Vertical radius downwards  
VRO = Vertical radius upwards

Safety web will be mounted in direction of track.  
Changes in measurements of curves have to be specified for replacement orders.



## Sealing Strip & accessories

- (1) Strip sold in 10m increments. Max continuous length is 40m
- (1) Strip for KBH works in pairs. Example: 40m system length requires 80m sealing strip.

Type	Order-No.
Sealing strip <sup>1</sup>	600 551
Fixing clamp (1 per end)	600 354
Joint coupling (2 for each joint, required every 40m)	258 300
Installation tool for sealing strip	600 109
Slide plate for collectors (KSW)	600 640

## Cable glands for feeds

for type	Cable gland	for cable diam. in mm	Power rating in A	Page
KKE	M 50	27–35	63 –100 HS	10
KKE	M 40	17–28	63 / 80 HS	10
KKE	M 32	15–21	63 SS	10
KSE/KEF/KES	M 32	17-26	63 HS	10 and 11
KSE/KEF/KES	M 50	23–24	80-100 HS	10 and 11
KES	M 50	29–40	125 HS	11
ZK 1–4 (Seite B)	M 63	27–48	125 / 160 / 200 HS	12

# Heating Cable

Type	Resistance <sup>(2)</sup>	Order-No.
Heating cable: H 0.10	0.10 Ω/m	196 381
Heating cable: H 0.15	0.15 Ω/m	196 382
Heating cable: H 0.20	0.20 Ω/m	196 383
Heating cable: H 0.32	0.32 Ω/m	196 384
Heating cable: H 0.38	0.38 Ω/m	196 385
Heating cable: H 0.48	0.48 Ω/m	196 386
Heating cable: H 0.60	0.60 Ω/m	196 387
Heating cable: H 0.81	0.81 Ω/m	196 389
Heating cable: H 1.00	1.00 Ω/m	196 390
Heating cable: H 1.44	1.44 Ω/m	196 391
Heating cable: H 2.00	2.00 Ω/m	196 392
Heating cable: H 3.00	3.00 Ω/m	196 393
Heating cable: H 4.00	4.00 Ω/m	196 394
Heating cable: H 4.40	4.40 Ω/m	196 395
Heating cable: H 5.16	5.16 Ω/m	196 396
Heating cable: H 5.60	5.60 Ω/m	196 397

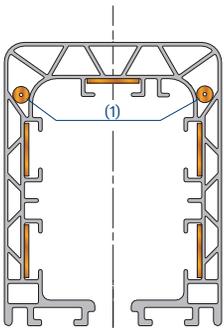
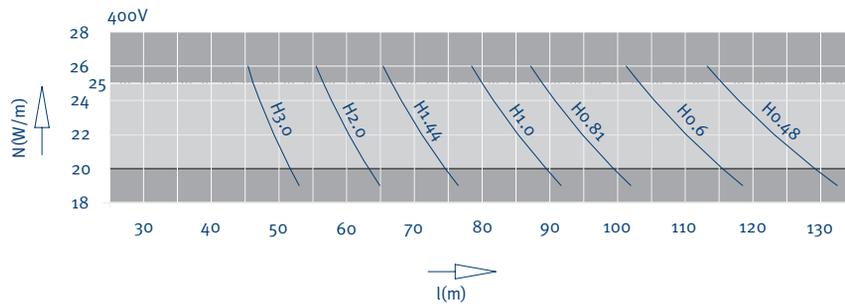


Fig. 1A

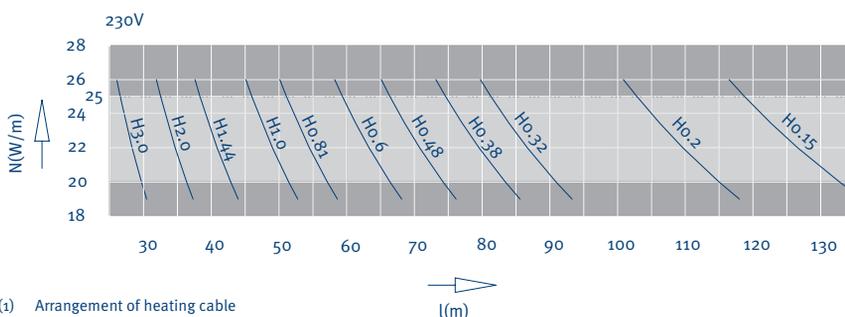
We recommend a heating system for exposed (uncovered) cold outdoor installations and in high humidity plants. The heating consists of two heating cables which are arranged according to fig. 1A. System and application specifics must be considered when ordering heating systems. Contact VAHLE directly for additional details and quotations.

Construction of the heating cable: Heating resistor made of CrNi (different conductors)  
 Isolation of heating cable PTFE (Teflon)  
 Nickel-plated copper netting  
 Sheath PTFE-Isolation  
 Outer diameter: 3.7mm - 4.3 mm



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

U = Supply voltage (Volt)  
 R = Resistance of heating cable (Ohm/m)  
 L = Length of heating section (m)

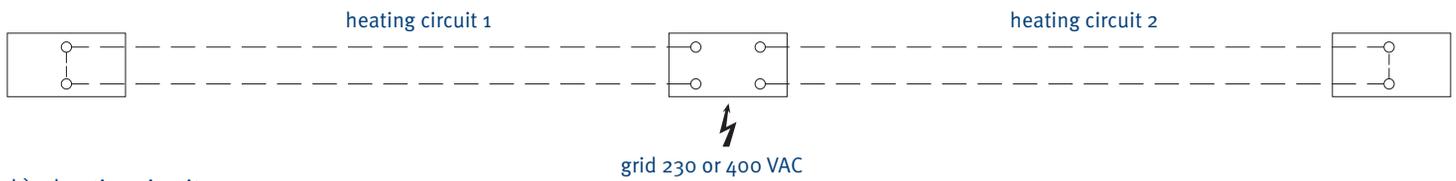


(1) Arrangement of heating cable  
 (2) Deflection ± 2.5%

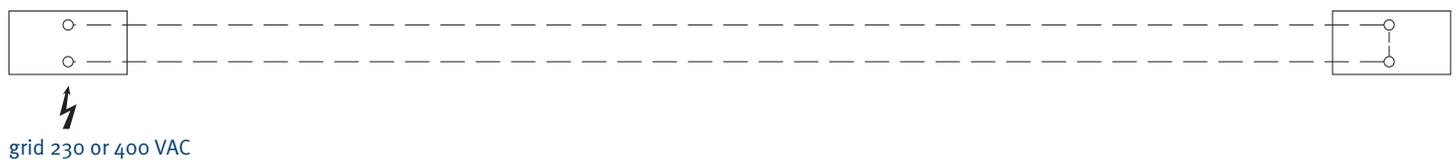
# Heating Cable

Layout examples (depending on system situation)

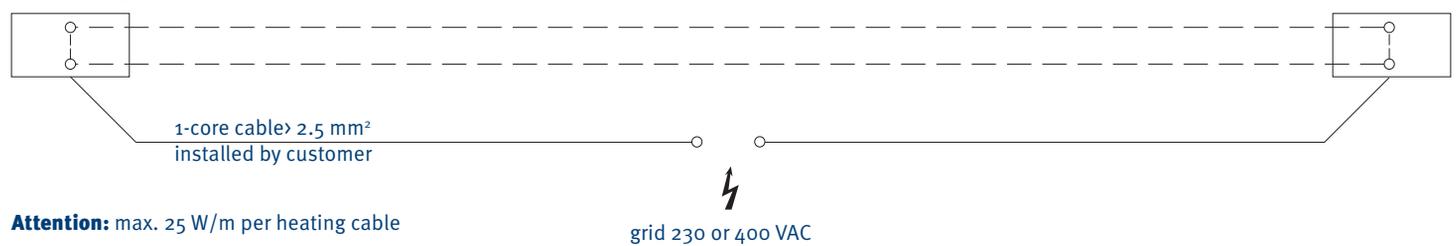
a) 2 heating circuits



b) 1 heating circuit



c) 2 heating circuits



**Attention:** max. 25 W/m per heating cable

Terminal  
box

## Terminal boxes for heating

Type	Version	Cable gland Measurements see page 13	Order-No.
AKB-KBH-L	left end	M 25	600 155
AKB-KBH-R	right end	M 25	600 156
AKB-KBH-M	line feed	2 x M 25	600 065
MA-KBH-MKL/H-LSV/G	1 set of material for connecting clamps		195 291

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

\* For line feed: 4 sets of material for connection ends are required.

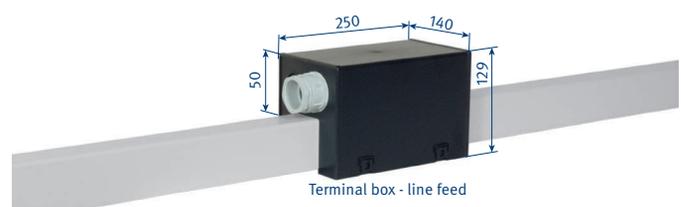
Order for 60 m powerail (example only)

- 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 diagram  
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

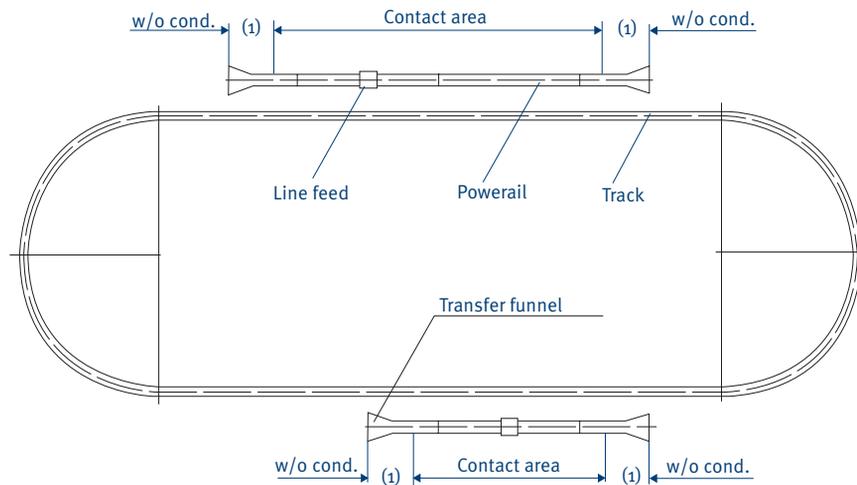
- 3) 4x sets of material for connection ends.

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

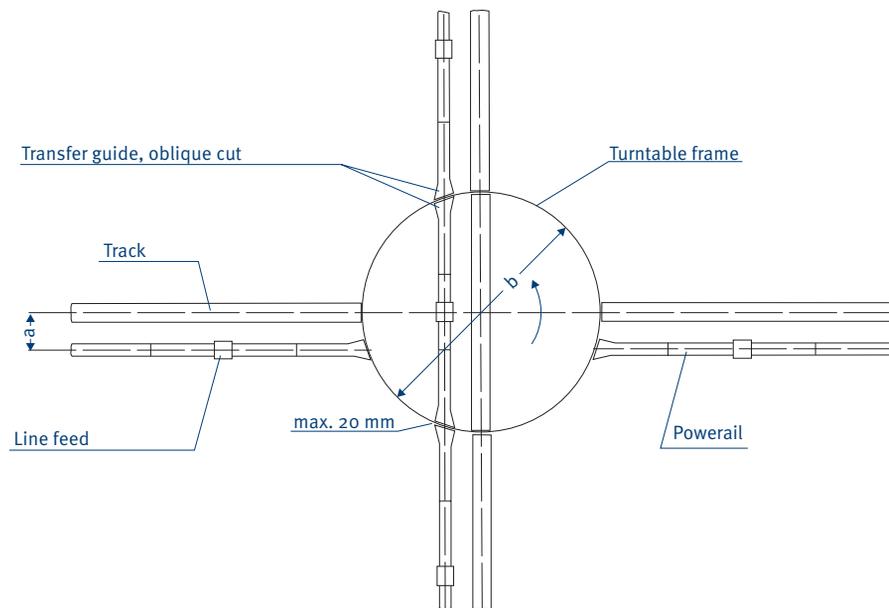


# Contact sections, Turntables & Switches

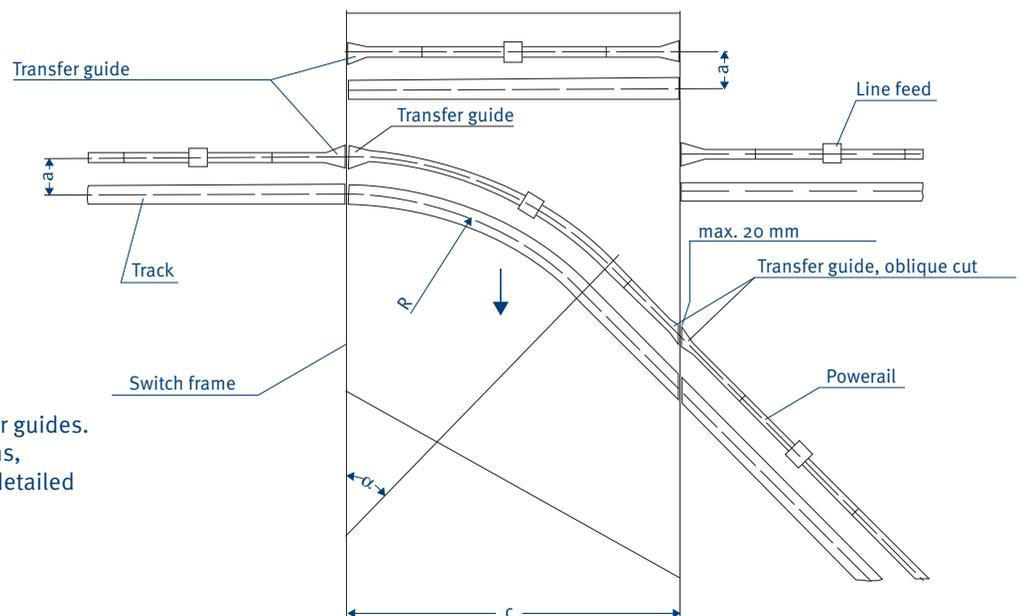
Contact section<sup>(1)</sup>



Turntable



Switch



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

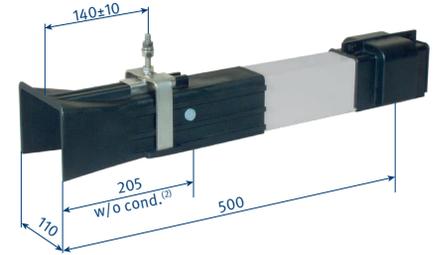
Max. 20 mm air gap between transfer guides. To create all parts for contact sections, turntables and switches we require detailed construction drawings.

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

# Transfer Funnels & Transfer Guides

## Transfer Funnel

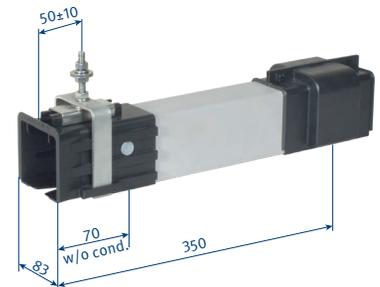
- Conductor system should not be activated until the collectors are fully inserted into the system.
- Offset: max. 10 mm horizontal  
max. 10 mm vertical
- Max. speed for crossover of the current collector 60 m/min.



Type	Weight kg (lb)	Order-No.	
		left version	right version
KET 4 / 63–125 HS <sup>(1)</sup>	1.612 (3.5)	600 285	600 279
KET 4 / 160 HS	1.724 (3.8)	600 286	600 280
KET 4 / 200 HS	1.943 (4.3)	600 305	600 303
KET 5 / 63–125 HS <sup>(1)</sup>	1.720 (3.8)	600 288	600 282
KET 5 / 160 HS	1.858 (4)	600 289	600 283
KET 5 / 200 HS	2.128 (4.7)	600 306	600 304
KET 4 / 63 SS <sup>(1)</sup>	1.612 (3.6)	600 287	600 281
KET 5 / 63 SS <sup>(1)</sup>	1.720 (3.8)	600 290	600 284

## 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.



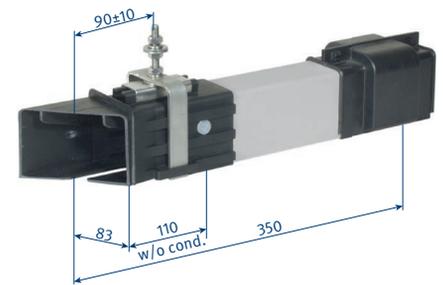
Type	Weight kg (lb)	Order-No.	
		left version	right version
KÜ 4 / 63–125 HS <sup>(1)</sup>	1.348 (3)	600 261	600 255
KÜ 4 / 160 HS	1.448 (3.2)	600 262	600 256
KÜ 4 / 200 HS	1.640 (3.6)	600 309	600 307
KÜ 5 / 63–125 HS <sup>(1)</sup>	1.500 (3.3)	600 264	600 258
KÜ 5 / 160 HS	1.625 (3.6)	600 265	600 259
KÜ 5 / 200 HS	1.865 (4.1)	600 310	600 308
KÜ 4 / 63 SS <sup>(1)</sup>	1.348 (3.0)	600 263	600 257
KÜ 5 / 63 SS <sup>(1)</sup>	1.500 (3.3)	600 266	600 260

<sup>(1)</sup> Suitable replacement for former 40A version.

# Transfer Guides

## 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.



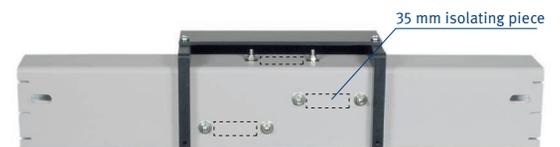
Type	Weight kg (lb)	Order-No.	
		left version	right version
KÜS 4 / 63–125 HS <sup>(1)</sup>	1.312 (2.9)	600 273	600 267
KÜS 4 / 160 HS	1.396 (3)	600 274	600 268
KÜS 4 / 200 HS	1.560 (3.4)	600 317	600 315
KÜS 5 / 63–125 HS <sup>(1)</sup>	1.450 (3.2)	600 276	600 270
KÜS 5 / 160 HS	1.555 (3.4)	600 277	600 271
KÜS 5 / 200 HS	1.760 (3.9)	600 318	600 316
KÜS 4 / 63 SS <sup>(1)</sup>	1.312 (2.9)	600 275	600 269
KÜS 5 / 63 SS <sup>(1)</sup>	1.450 (3.2)	600 278	600 272

(1) Suitable replacement for former 40A version.

# Conductor Dead Section

## Conductor Dead Section

Please advise which conductors should be disconnected (see Page 6 and 7). The dead section comes factory assembled.



Picture shows an isolating piece.

Air gap 5 mm		Isolating piece 35 mm	
Type	Order-No.	Type	Order-No.
KTL 1	600 298	KTI 1	600 293
KTL 2	600 299	KTI 2	600 294
KTL 3	600 300	KTI 3	600 295
KTL 4	600 301	KTI 4	600 296
KTL 5	600 302	KTI 5	600 297

# Removing Section

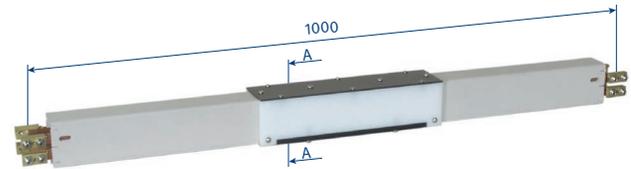
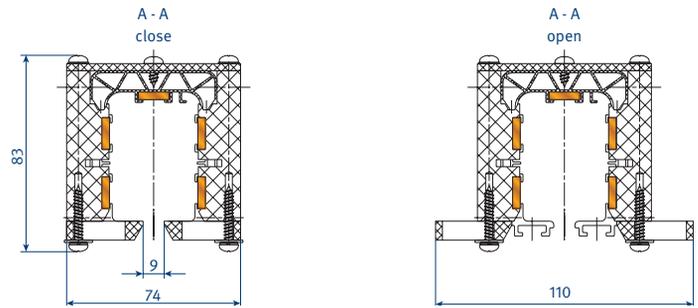
## Removing section

Includes 1m conductor section with special bolted joints for KBHF & KBHS

## Application

Removal and insertion of the collector is possible at any point a removal section is installed. Standard method of removal or insertion of collector is at system ends. By opening and closing the sliders at the bottom of the removing section housing the collector can be removed or inserted easily.

All safety restrictions must be followed before removal or insertion of collector as the removing section does not interrupt the conductor system electrically.



## For single collectors

Type	Weight kg (lb)	Order-No.
KAT 4 / 63–125 HS <sup>(1)</sup>	3.450 (7.6)	600 165
KAT 4 / 160 HS	3.802 (8.4)	600 166
KAT 4 / 200 HS	4.494 (9.9)	600 327
KAT 5 / 63–125 HS <sup>(1)</sup>	3.781 (8.3)	600 167
KAT 5 / 160 HS	4.133 (9.1)	600 168
KAT 5 / 200 HS	4.825 (10.6)	600 328
KAT 4 / 63 SS <sup>(1)</sup>	3.450 (7.6)	600 169
KAT 5 / 63 SS <sup>(1)</sup>	3.781 (8.3)	600 170

## For double collectors

Type	Weight kg (lb)	Order-No.
KATD 4 / 63–125 HS <sup>(1)</sup>	4.044 (8.9)	600 175
KATD 4 / 160 HS	4.396 (9.7)	600 176
KATD 4 / 200 HS	5.088 (11.2)	600 329
KATD 5 / 63–125 HS <sup>(1)</sup>	4.375 (9.6)	600 177
KATD 5 / 160 HS	4.727 (10.4)	600 178
KATD 5 / 200 HS	5.419 (11.9)	600 330
KATD 4 / 63 SS <sup>(1)</sup>	4.044 (8.9)	600 179
KATD 5 / 63 SS <sup>(1)</sup>	4.375 (9.6)	600 180

(1) Suitable replacement for former 40A version.

# Anti-Condensation Section

## Anti-Condensation Section

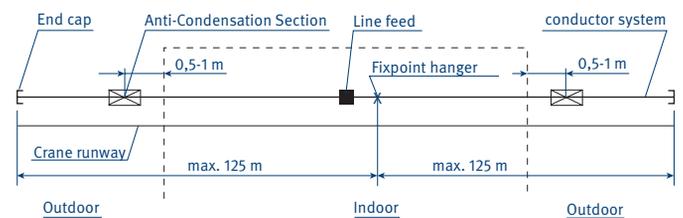
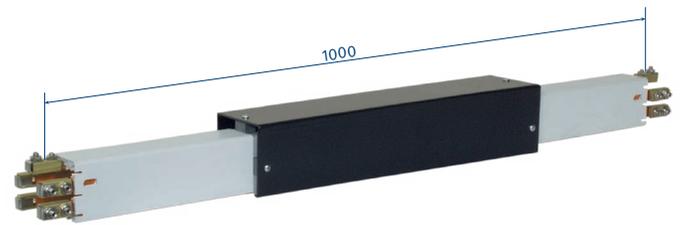
Includes 1m section with special bolted joints for KBHF & KBHS

## Application

The anti-condensation section is used anywhere the 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 (0.5m - 1m max.) at the transfer point from indoor to outdoor. See sketch.



Type	Weight kg (lb)	Order-No.
KBT 4 / 63-125 HS <sup>(1)</sup>	3.858 (8.5)	600 185
KBT 4 / 160 HS	4.210 (9.3)	600 186
KBT 4 / 200 HS	4.902 (10.8)	600 319
KBT 5 / 63-125 HS <sup>(1)</sup>	4.180 (9.2)	600 188
KBT 5 / 160 HS	4.532 (10)	600 189
KBT 5 / 200 HS	5.224 (11.5)	600 320
KBT 4 / 63 SS <sup>(1)</sup>	3.858 (8.5)	600 187
KBT 5 / 63 SS <sup>(1)</sup>	4.180 (9.2)	600 190

(1) Suitable replacement for former 40A version.

# Expansion Section

## Expansion Section

Includes 1m section with special bolted joints for KBHF & KBHS

## Application

Expansion sections are required to compensate the different expansions, between copper conductors and steel or concrete structures, in varying temperatures without interrupting electrical power. Placement of expansion sections is dependent on total system length, changes in ambient temperature, and distance between fixpoints (curves, switches, feeds, etc.)

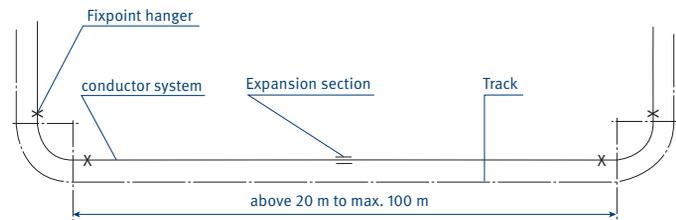
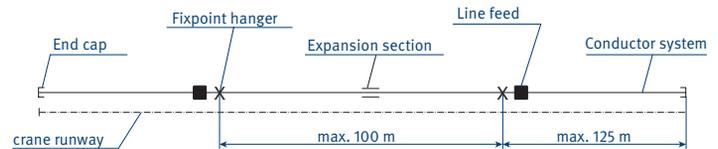
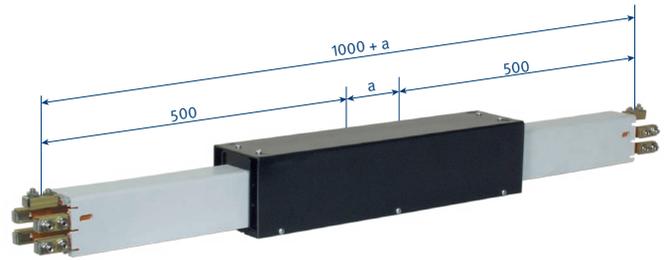
See figures

Contact VAHLE for additional information or consult installation instructions.

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 (14 °F) to +35 °C (95 °F) during installation.



Type	Weight kg (lb)	Order-No.
KD 4 / 63-125 HS <sup>(1)</sup>	4.400 (9.7)	600 135
KD 4 / 160 HS	4.752 (10.5)	600 136
KD 4 / 200 HS	5.444 (12)	600 325
KD 5 / 63-125 HS <sup>(1)</sup>	4.895 (10.8)	600 138
KD 5 / 160 HS	5.247 (11.6)	600 139
KD 5 / 200 HS	5.939 (13)	600 326
KD 4 / 63 SS <sup>(1)</sup>	4.400 (9.7)	600 137
KD 5 / 63 SS <sup>(1)</sup>	4.895 (10.8)	600 140

(1) Suitable replacement for former 40A version.

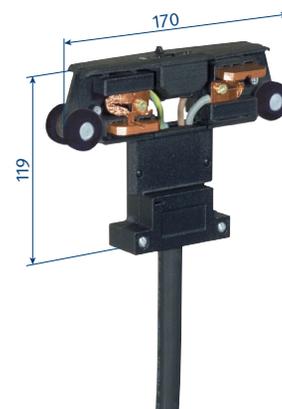
# Single Current Collector

## Collector KSW

- Max. speed 150 m/min or 100 m/min with sealing strip

### Connecting cable

- 1m long, additional lengths available\*
- 25 A with 2.5 mm<sup>2</sup>/core
- 40 A with 4.0 mm<sup>2</sup>/core
- 60 A with 6.0 mm<sup>2</sup>/core



\*Order example for a 2 m long cable: Order-No. 600 096.2 for collector KSW 4/40-2 HS

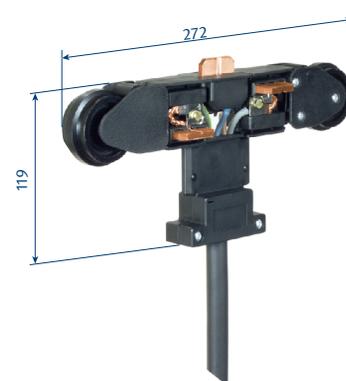
Type	Weight kg (lb)	No. of conductors	Power rating at 60 % DC in A	approx. diam. of connecting-cables in mm	Order-No. <sup>(2)</sup>
KSW 4 / 25-1 HS	0.552 (1.2)	4	25	13.0	600 095.1
KSW 4 / 40-1 HS	0.656 (1.45)	4	40	15.0	600 096.1
KSW 4 / 60-1 HS	0.797 (1.7)	4	60 <sup>(1)</sup>	17.0	600 066.1
KSW 5 / 25-1 HS	0.634 (1.4)	5	25	14.0	600 098.1
KSW 5 / 40-1 HS	0.771 (1.7)	5	40	17.0	600 099.1
KSW 5 / 60-1 HS	0.945 (2.1)	5	60 <sup>(1)</sup>	19.0	600 413.1
KSW 4 / 25-1 ST	0.472 (1)	4	25	11.0	600 097.1
KSW 5 / 25-1 ST	0.534 (1.2)	5	25	12.0	600 100.1

## Collector KSWS

- Max. speed 250 m/min or 100 m/min with sealing strip

### Connecting cable:

- 1 m long, longer cables on request\*
- 25 A with 2.5 mm<sup>2</sup>/core
- 40 A with 4.0 mm<sup>2</sup>/core
- 60 A with 6.0 mm<sup>2</sup>/core



\*Order example for a 2 m long cable: Order-No. 600 149.2 for collector KSWS 5/40-2 HS

Type	Weight kg (lb)	No. of conductors	Power rating at 60 % DC in A	approx. diam. of connecting-cables in mm	Order-No. <sup>(2)</sup>
KSWS 4 / 25-1 HS	0.664 (1.5)	4	25	13.0	600 145.1
KSWS 4 / 40-1 HS	0.768 (1.7)	4	40	15.0	600 146.1
KSWS 4 / 60-1 HS	0.942 (2.1)	4	60 <sup>(1)</sup>	17,0	600 416.1
KSWS 5 / 25-1 HS	0.724 (1.6)	5	25	13.5	600 148.1
KSWS 5 / 40-1 HS	0.861 (1.9)	5	40	16.0	600 149.1
KSWS 5 / 60-1 HS	1.035 (2.3)	5	60 <sup>(1)</sup>	19.0	600 417.1
KSWS 4 / 25-1 ST	0.584 (1.3)	4	25	11.0	600 147.1
KSWS 5 / 25-1 ST	0.624 (1.4)	5	25	12.0	600 150.1

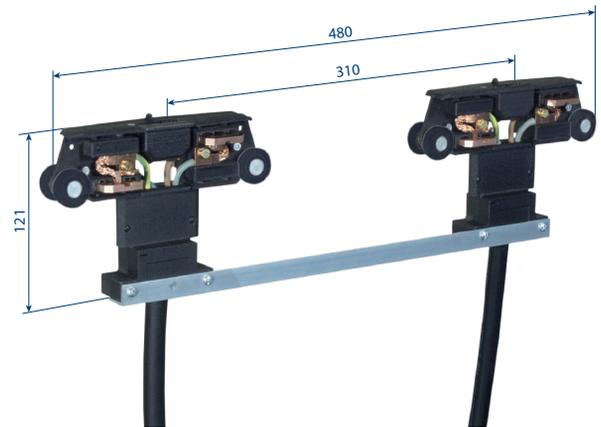
<sup>(1)</sup> at 40% DC

<sup>(2)</sup> Order No. for 1m cable

# Double Collector & Tow arms

## Double collector DKSW

Max. speed 150 m/min or 100 m/min with sealing strip  
The double collectors are supplied as an assembly kit consisting of 2 collectors (KSW) and a connecting bar with mounting material.



## Connecting cable:

- 1m long, additional lengths available\*
- 50 A with (2x) 2.5 mm<sup>2</sup>/core
- 80 A with (2x) 4.0 mm<sup>2</sup>/core
- 120 A with (2x) 6.0 mm<sup>2</sup>/core

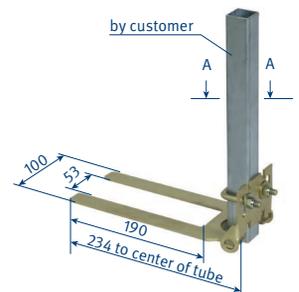
\*Order example for 2 m long cables: Order-No. 600 119.2 for collector DKSW 5/80-2 HS

Type	Weight kg (lb)	No. of conductors	Power rating at 60 % DC in A	approx. diam. of connecting-cables in mm	Order-No. <sup>(4)</sup>
DKSW 4 / 50-1 HS	1.170 (2.6)	4	50	12.5	600 115.1
DKSW 4 / 80-1 HS	1.378 (3)	4	80	14.5	600 116.1
DKSW 4 / 120-1 HS	1.660 (3.7)	4	120 <sup>(1)</sup>	17.0	600 414.1
DKSW 5 / 50-1 HS	1.334 (2.9)	5	50	13.5	600 118.1
DKSW 5 / 80-1 HS	1.608 (3.5)	5	80	16.0	600 119.1
DKSW 5 / 120-1 HS	1.956 (4.3)	5	120 <sup>(1)</sup>	19.0	600 415.1
DKSW 4 / 50-1 ST	1.010 (2.2)	4	50	11.0	600 117.1
DKSW 5 / 50-1 ST	1.134 (2.5)	5	50	12.0	600 120.1

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



A-A  
Version with tube<sup>(2)</sup>



## Tow Arm

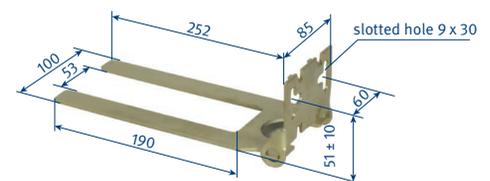
Installation options of 30 mm square, hollow profile or tube with 30 - 34 mm

Type	Weight kg (lb)	Order-No.
MGU	0.550 (1.2)	600 334
MGU / K <sup>(3)</sup>	0.550 (1.2)	600 336

## Tow Arm

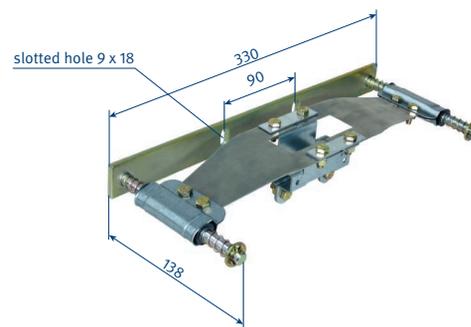
Installation option for plane surface

Type	Weight kg (lb)	Order-No.
MGF	0.510 (1.1)	600 335
MGF / K <sup>(3)</sup>	0.510 (1.1)	600 337



(1) At 40% DC  
(2) For assembly use enclosed adapter plate  
(3) Stainless steel  
(4) Order No. for 1m cable

# Flexible Tow Arm



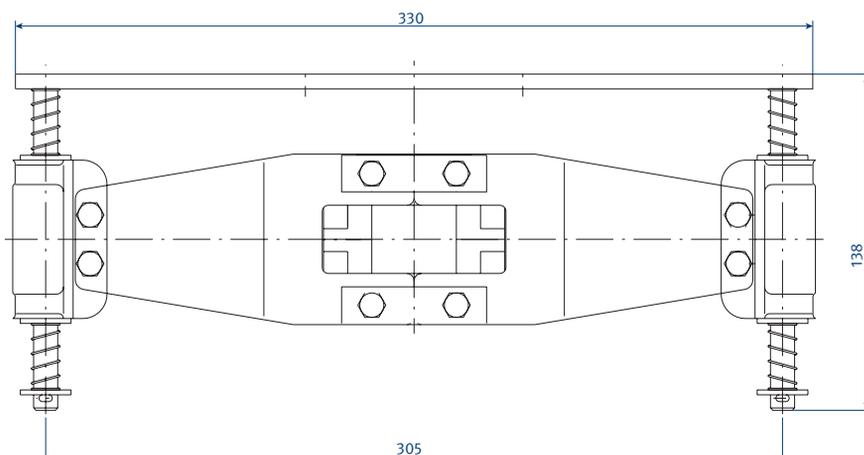
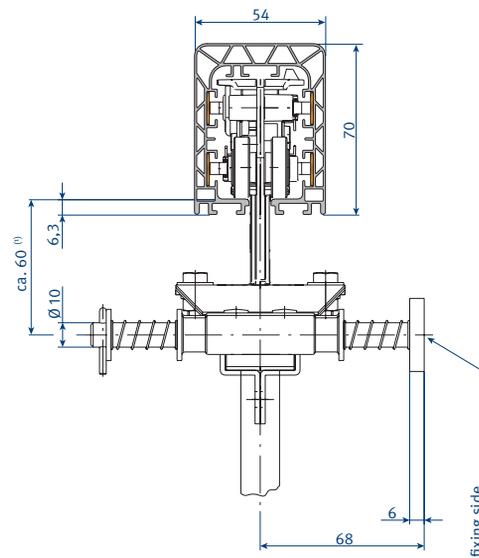
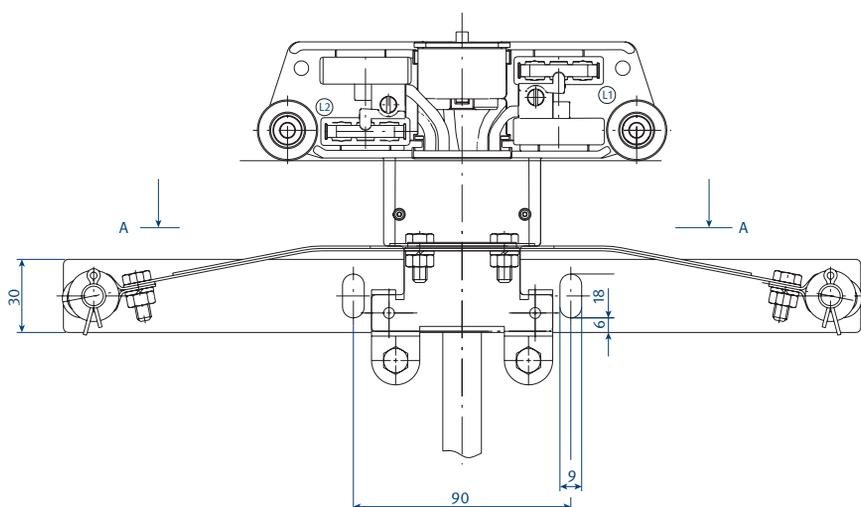
## Flexible Tow Arm

Flexible support tow arm for single collector for installations with transfer funnels type KET (see page 17). Measurements for installation see below. Please consult with factory before using flex tow arm in systems with curves.

Type	Weight kg (lb)	Order-No.
KFMHN	0.790 (1.7)	600 558

## Arrangement of a Flexible Tow Arm

KFMHN with collector type KSW



max. horizontal offset = 10 mm  
max. vertical offset = 10 mm

(i) To be fixed during installation.

# Spare Part List

## For Conductor System

Type	KBHF & KBHS
	Order-No.
Spring loades connector 63–100A (KBHF)	600 483
Bolted joints 63–160A (KBHS)	262 018
Bolted joints 200A (KBHS)	600 712
KBH Housing HS (housing only, does not contain copper)	250 4155
KBH Housing SS (housing only, does not contain copper)	250 4149
Feed terminal for end feed (40/63A)	600 006
Feed terminal for line feed (lateral)	600 017
Feed terminal for line feed (on top, 5th conductor)	600 016

## For Current Collector

Type	KSW(S)/DKSW
	Order-No.
Carbon brush phase (side pole)	600 088
Carbon brush 5th conductor (top pole)	600 089
Carbon brush ground (side pole PE)	600 090
Carbon pressure spring (standard, suitable for all carbon brushes)	600 338
Connecting bar for double collector DKSW	600 105
Assembly kit (to convert KSW to KSW(S))	600 106
Sealing strip slide plate for collectors KSW	600 640

## Cleaning Collectors for KBH

Type	KSW
	Order-No.
KSW 4 SC cleaning collector (w/ 4x scotch brite cleaning brushes)	600 335
KSW 4 BSC cleaning collector (w/ 4x scotch brite cleaning brushes & 2x bristle brushes)	600 445
KSW 5 BSC cleaning collector (w/ 5x scotch brite cleaning brushes & 2x bristle brushes)	600 446
Spare cleaning brushes (side pole)	600 357
Spare cleaning brush (top pole)	600 358
Bristle brush (side mounted)	600 479

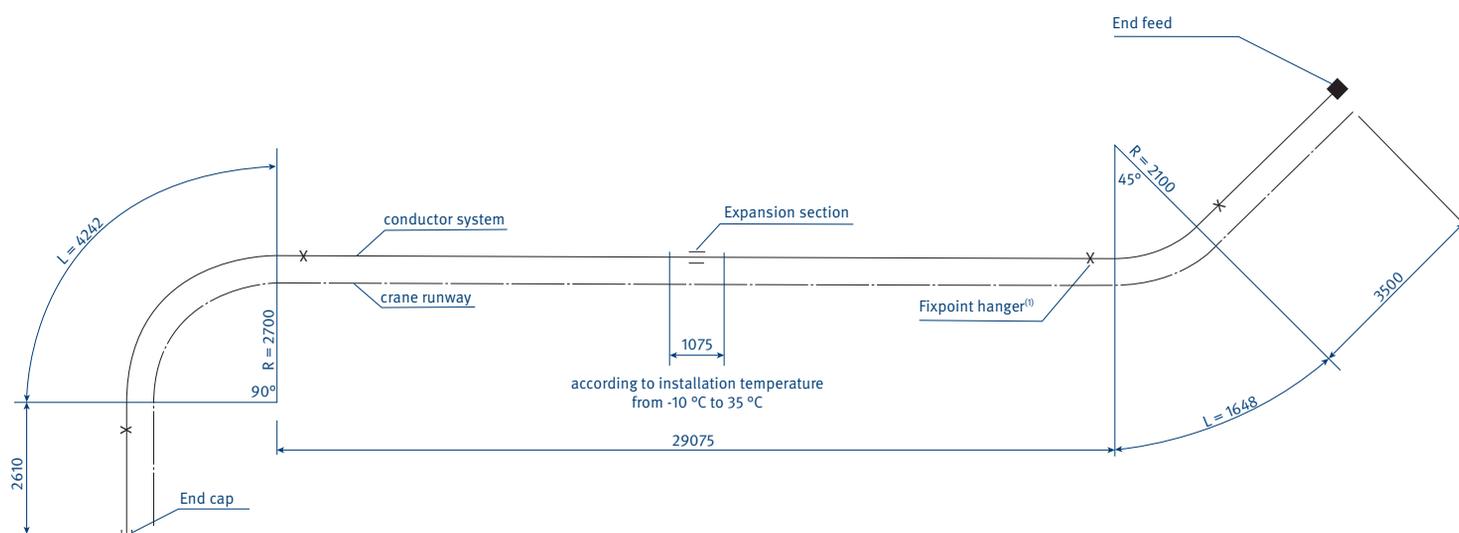
# Sample System Order\*

## \*Installations with curves as per customer drawing

\*41.075 m conductor system KBHF

QTY	Description	KBHF 4/ 80 HS		KBHS 5/80 HS	
		Type	Order-No.	Type	Order-No.
7	KBHF conductor bar, 4m length	KBHF 4/80-4 HS	600 984	KBHS 5/80-4 HS	601 074
1	KBHF conductor bar, 1 x 3500 mm cut length	KBHF 4/80-4 HS	600 984	KBHS 5/80-4 HS	601 074
1	KBHF conductor bar, 1 x 2610 mm cut length	KBHF 4/80-3 HS	600 983	KBHS 5/80-3 HS	601 073
1	KBHF conductor bar, 2 m long for horizontal curve 45°, R = 2100 mm, L = 1648 mm, SA	KBHF 4/80-2 HS	600 982.C <sup>(1)</sup>	KBHS 5/80-2 HS	601 072.C <sup>(1)</sup>
2	KBHF conductor bar, 3 m long for horizontal curve 2 x 45°, R = 2700 mm, L = 2121 mm, SI	KBHF 4/80-3 HS	600 983.C <sup>(1)</sup>	KBHS 5/80-3 HS	601 073.C <sup>(1)</sup>
1	End feed	KKE 4/63-80 HS	600 010	KKE 5/63-80 HS	600 107
1	Expansion section	KD 4/63-125 HS	600 135	KD 5/63-125 HS	600 138
11	Joint cap	KVM	600 005	KVM	600 005
4	Fixpoint hanger	KFA	600 007	KFA	600 007
24	Sliding hanger	KGA	600 000	KGA	600 000
1	End cap	KE	600 008	KE	600 008
1	Current collector w/ 1m cable	KSW 4/40-1 HS	600 096.1	KSW 5/40-1 HS w/ 1m cable	600 099.1
1	Tow arm	MGF	600 335	MGF	600 335

1..C designates curved KBH



<sup>(1)</sup> Rest of conductor system to be installed with sliding hangers

# Questionnaire

Contact Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Company: \_\_\_\_\_ Address: \_\_\_\_\_

Email: \_\_\_\_\_ Date: \_\_\_\_\_

1. Type of application: \_\_\_\_\_

2. Type of equipment to be powered: \_\_\_\_\_

3. Operating voltage: \_\_\_\_\_ Volt Frequency: \_\_\_\_\_ Hz

Three phase voltage: \_\_\_\_\_ AC voltage: \_\_\_\_\_ DC voltage: \_\_\_\_\_

4. Total system length: \_\_\_\_\_

5. Number of conductors: \_\_\_\_\_ neutral: \_\_\_\_\_ control: \_\_\_\_\_ ground: \_\_\_\_\_

6. Power required per vehicle(amps/hp/kw/etc): \_\_\_\_\_

7. Number of vehicles per system: \_\_\_\_\_

8. Indoor: \_\_\_\_\_ Outdoor: \_\_\_\_\_

9. Other operating conditions (humidity, dust, chemical influence, etc.) \_\_\_\_\_

10. Ambient temperature: \_\_\_\_\_ °C min. \_\_\_\_\_ °C max.

11. Mounting Location: \_\_\_\_\_

12. Position and number of feeds<sup>(1)</sup>: \_\_\_\_\_

13. Position and number of isolating sections (e.g. for maintenance)<sup>(1)</sup>: \_\_\_\_\_

14 Brackets required: yes \_\_\_\_\_ no \_\_\_\_\_ c/c distance beam/conductor system: \_\_\_\_\_

15. Travel speed: \_\_\_\_\_ m/min. in curves: \_\_\_\_\_ m/min. at transfers: \_\_\_\_\_ m/min.

16. Maximum allowable voltage drop: \_\_\_\_\_

Motor data	Crane 1							Crane 2						
	Power kW	Nominal current			Starting current		Type of Motors <sup>(2)</sup>	Power kW	Nominal current			Starting current		Type of Motors <sup>(2)</sup>
		A	cos φ <sub>N</sub>	% DC	A	cos φ <sub>A</sub>			A	cos φ <sub>N</sub>	% DC	A	cos φ <sub>A</sub>	
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

Mark with \* those motors which can run simultaneously.

Mark with # those motors which can start up simultaneously.

Further remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Signature \_\_\_\_\_

<sup>(1)</sup> For curved tracks, powerail with isolating sections etc., we require a layout drawing to enable us to prepare a quotation

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

We reserve all rights to make alterations in the interests of further development

Please copy and fill in the questionnaire

<b>1 Open Conductor Systems</b>	
Open conductor systems	1a
<b>2 Insulated Conductor Systems</b>	
U10	2a
U15, U25, U35	2c
U20, U30, U40	2d
<b>3 Compact Conductor Systems</b>	
VKS 10	3a
VKS - VKL	3b
<b>4 Enclosed Conductor Systems</b>	
KSL	4a
KBH	4b
MKH	4c
LSV - LSVG	4d
<b>5 Contactless Power Supply</b>	
Contactless power supply (CPS®)	5a
<b>6 Data Transmission</b>	
VAHLE Powercom®	6a
Slotted Microwave Guide (SMG)	6b
Mini-Slotted Microwave Guide (M-SMG)	6c
<b>7 Positioning Systems</b>	
VAHLE APOS®	7a
VAHLE APOS Optic	7b
<b>8 Festoon Systems</b>	
Light duty festoon systems - □ tracks & ◇ tracks	8a
Heavy duty festoon systems - ⊥ Beam tracks	8b
<b>9 Reels</b>	
Spring operated cable reels	9a
Motor powered cable reels	9b
<b>10 Port Technology</b>	
eRTG Solutions	10a
<b>11 Control Systems</b>	
VAHLE-DETO	11a
<b>12 Other</b>	
Battery charging contacts	12a
VMT	12b
BOK	12c
Specialty Components	Misc
Conductor Rings, Heavy Enclosed, Handling Systems, Cleaning Components, Polarity Protection	
<b>13 Services</b>	
Installation Services - On site supervision & training, pre-assembly, and commissioning	
Troubleshooting - Site inspection, maintenance, and repair	