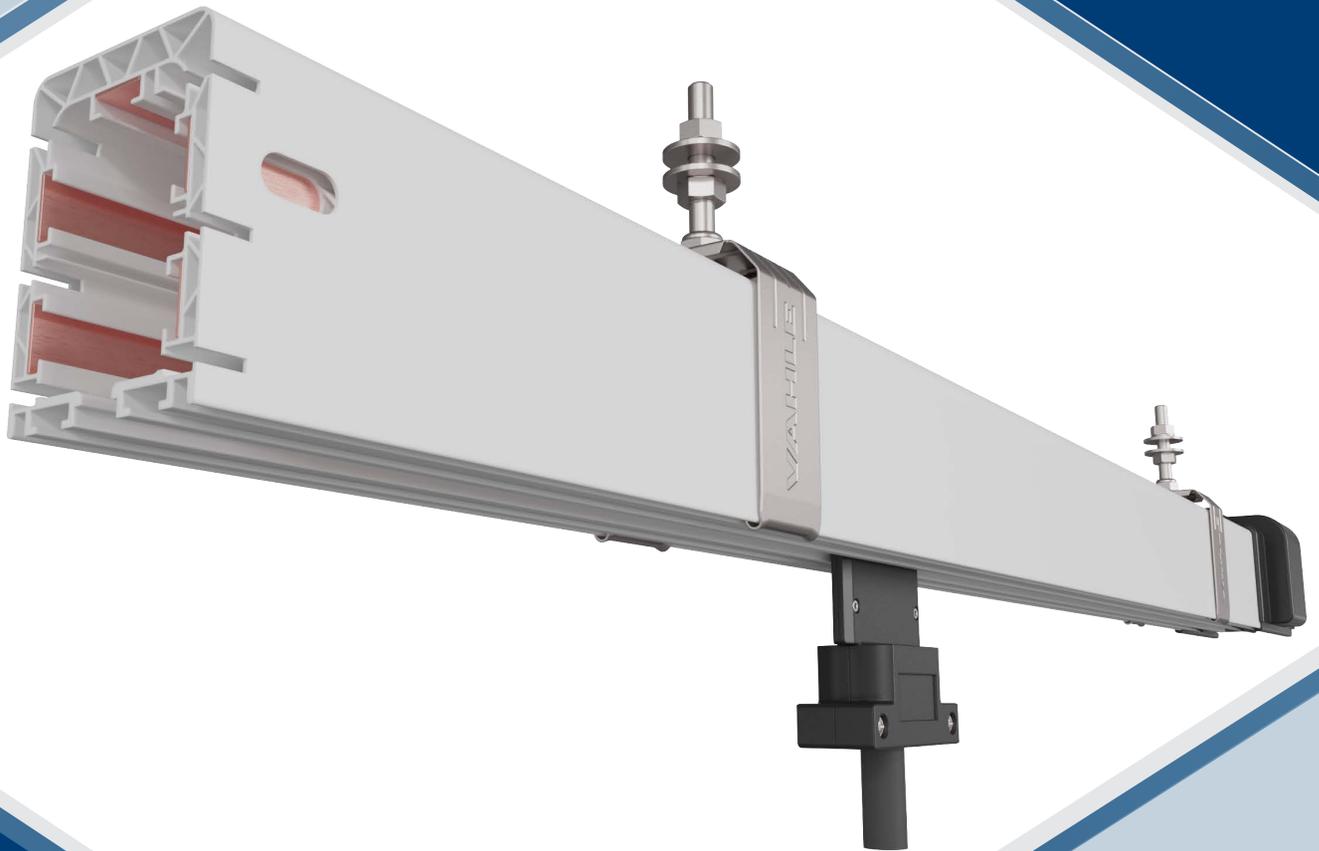




**ENCLOSED
CONDUCTOR SYSTEMS
KBHF | KBHS**



YOUR VISION – OUR SOLUTION

4B | EN | Rev.02

APPLICATION EXAMPLE

POWER FEED FOR CRANES, HOISTS, TRANSPORT AND HANDLING EQUIPMENT

The enclosed conductor systems KBHF and KBHS can be used for power feed or in combination with other VAHLE automation products for a variety of industrial applications, including cranes, hoists, transport and handling equipment.



KBHF system used with VAHLE's SMG for data and video communications

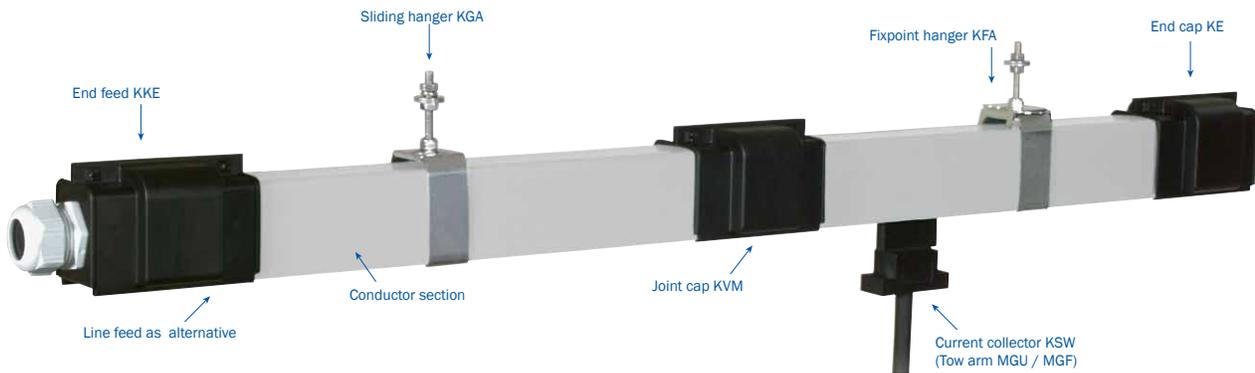


VAHLE's APOS Magnetic for crane positioning

ENCLOSED CONDUCTOR SYSTEM KBH

CONTENT

About KBH	3	Removing sections	23
Technical data	4	Anti-condensation sections	24
Jointing material, hangers and end caps	8	Expansion sections	25
Brackets.....	9	Single current collector.....	26
End feeds, line feeds	10	Double collector and tow arms	28
Line feeds	12	Flexible tow arm	30
Terminal box	13	Examples for ordering.....	31
Curves, sealing strip and cable glands for feeds.....	14	Installation instructions	33
Heating.....	15	Spare part list.....	34
Contact sections, turntables and switches	18	APOS® positioning system	35
Transfer funnels	19	vCOM (SMGM, SMGX) data transmission system.....	36
Transfer guides.....	20	Questionnaire.....	37
Conductor dead sections.....	22	KBH installations in industrial plants	39
Maintenance sections	22		



ABOUT KBH

The VAHLE conductor system KBH is a contact-protected system (IP23) for indoor and outdoor installations. KBH features a compact design, corrosion resistance and is easy to install. It is compliant with European and American standards. The plastic housing can accommodate different copper cross sections for nominal currents ranging from 63 – 200 amps (A). Two styles are available:

KBHF

- 4- and 5-conductor versions available
- Preassembled copper conductors
- Spring-loaded connectors
- Suitable for 63 – 100 A

KBHS

- 4- and 5-conductor versions available
- Preassembled copper conductors
- Bolted joints
- Suitable for 63 – 200 A

Custom-designed sealing strips and heating systems are also available for KBH. When used with the sealing strip, the conductor system is protected to IP 24 standards.

⚠ Collectors are touch-proof only when fully entered into the conductor system. In the event that live parts may be touched by hand, e.g. if a collector leaves the conductor system during operation, safe practices require operators to provide a safety barrier and/or disconnect mains. Please note, this is only valid for a supply voltage that exceeds 24 volts (V) AC or 60 V DC.

Additional cross sections are also available. The upper pole is used as N-conductor if required. The max. copper cross section of the conductor is 26 mm² (0.04 in²). See page 7.



MARKETS

- Ports
- Intralogistics and warehousing
- Assembly automation
- Amusement
- People movers
- Industrial

APPLICATIONS

- Cranes
- Monorails
- Electric hoists
- Machine tools
- Automated storage and retrieval systems (AS/RS)
- Lighting systems

TECHNICAL DATA

HOUSING

Grey plastic housing for 4 or 5 conductors.

Standard section 4 m (13 ft 1.48 in). 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

Sections are joined by spring loaded or mechanical/bolted joint assemblies, covered with a protective plastic cap.

FEED SETS

Electrical feeds for the Powerail system are made via end feed or line feed assemblies.

With the use of end feeds, joint feeds and line feeds installed on 1 m (3 ft 3.37 in) section.

END CAPS

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

HANGERS

Hangers support bracket at the crane track. See *page 8*.

- Indoor systems and roofed outdoor systems: $\leq 35^{\circ}\text{C} = 2.00\text{ m}$ ($\leq 95^{\circ}\text{F} = 6\text{ ft } 6.74\text{ in}$)
- Indoor and outdoor systems with and without heating: $> 35^{\circ}\text{C} = 1.33\text{ m}$ ($> 95^{\circ}\text{F} = 4\text{ ft } 4.36\text{ in}$)
- Cold storage: $\leq 0^{\circ}\text{C} = 1.33\text{ m}$ ($\leq 32^{\circ}\text{F} = 4\text{ ft } 4.36\text{ in}$)

To prevent sagging, provide at least one additional hanger on the sections of the line feeds and all 1 m (3 ft 3.37 in) sections, including removing sections, anti-condensation sections and expansion sections.

EXPANSION DURING TEMPERATURE FLUCTUATION

Expansion sections are required to compensate for the difference 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. Expansion sections are not typically needed for straight installations up to 250 m (820 ft 2.52 in).

ANTI-CONDENSATION SECTIONS

Anti-condensation sections are used to avoid condensation on areas where the conductor system moves between an indoor and outdoor space. The conductor system is not separated electrically.

CONTACT SECTIONS, TURNTABLES AND SWITCHES

Conductor sections for working areas and transfer applications. See *pages 19 and 22*.

SECTIONALIZING

Conductor “dead sections” are electrical interruptions of the conductor. They are used for creating switchable repair zones and similar tasks. Under normal operating conditions, a crossover 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 of 5 mm (0.02 in) or insulating pieces of 35 mm (1.38 in). 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.

COLLECTORS

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

The length of the connecting cable should not exceed 3 m (9 ft 10.11 in) if the added over-load protection device is not designed for the load capacity of this cable.

CONTINUITY OF GROUND CONDUCTOR

A continuous ground is required for use. Connected cranes and other handling devices may not be used as ground conductor, only as an additional connection.

SYSTEM REQUIREMENTS FOR DOUBLE COLLECTORS

The following systems are required to use double collectors to fulfill the continuity of the ground conductor system via carbon brushes:

- 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 can occur at the end of the track and/or at the removing section. The collector can be mounted and unmounted by opening and closing the sliders at the bottom of the conductor housing.

 Disconnect the mains before opening. Do not open the removing section without cutting off all voltage to the conductor system. The removing section does not disconnect the conductor system electrically.

SAFETY INSTRUCTIONS

The conductor system must be arranged so that it provides a minimum

distance of 0.5 m (1 ft 7.69 in) between fixed and mobile plant parts, such as between conductor rails, collector trolleys and towing arms, to avoid the risk of pinching.

PLEASE NOTE

Additional information and sketches may be required when requesting a quote for use in harsh environments with low voltage requirements, such as galvanizing and pickling plants, or more complex system designs, including those with curves, dead sections, turntables and/or switches.

For more information, see our questionnaire on page 37.

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 $5 \times 10^{15} \Omega/\text{cm}$	IEC 60093 $10^{13} \Omega$	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 (113 °F)
KBH	75 N/mm ² ±10 %	40 N/mm ² ±10 %	–30 °C (–22 °F) up to +60 °C (140 °F)	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 f_T

Ambient temperature °C (°F)	35 °C (95 °F)	40 °C (104 °F)	45 °C (113 °F)	50 °C (122 °F)	55 °C (131 °F)	60 °C (140 °F)
Correction factor f_T Standard shrouding	1	0.95	0.89	0.84	0.77	0.71

VOLTAGE DROP FOR THE CONDUCTOR

For three-phase current

$$\Delta U = \sqrt{3} \cdot I \cdot I_A \cdot Z$$

Z = Impedance [Ω/km]

For alternating current

$$\Delta U = 2 \cdot I \cdot I_A \cdot Z$$

R = Resistance [Ω/km]

l = Feed length [km]

For direct current

$$\Delta U = 2 \cdot I \cdot I_A \cdot R$$

I_A = Inrush current of installation in amperes

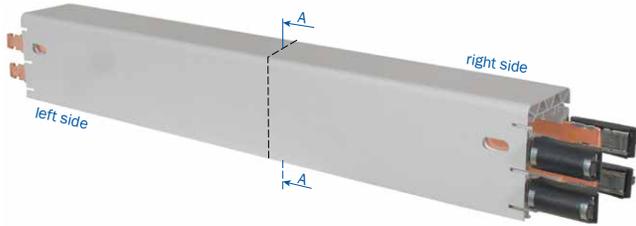
PERMISSIBLE CONTINUOUS CURRENT OF THE CONDUCTOR

$$I_{Dzul,UT} = I_{zul} \cdot f_T [A] \text{ with } I_{Dzul,UT} > I_{DA}$$

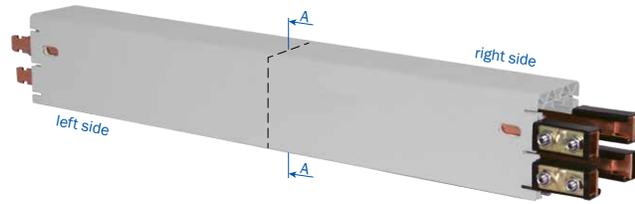
$I_{Dzul,UT}$ = Permissible continuous current of the conductor at ambient temperature

I_{zul} = Permissible continuous current of the conductor at 35 °C (catalogue value) [A]

f_T = Correction factor



KBHF with spring-loaded connectors



KBHS with bolted joints

CONTINUOUS CURRENT DATA

Type ⁽¹⁾ HS with PE SS without PE	Number of poles	Continuous current A at 35° C (95° F) ⁽⁶⁾			Copper cross section mm ²				Nominal voltage V ⁽⁴⁾
		L1 L2 L3	60% DC	80% DC	100% DC	L1 L2 L3		N/5 ⁽²⁾	
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. 2m KBHF4/63-2000HSC, Order No. 600972, shorter lengths are made up from the next largest standard length.

(2) When using a conductor as N, see page 3.

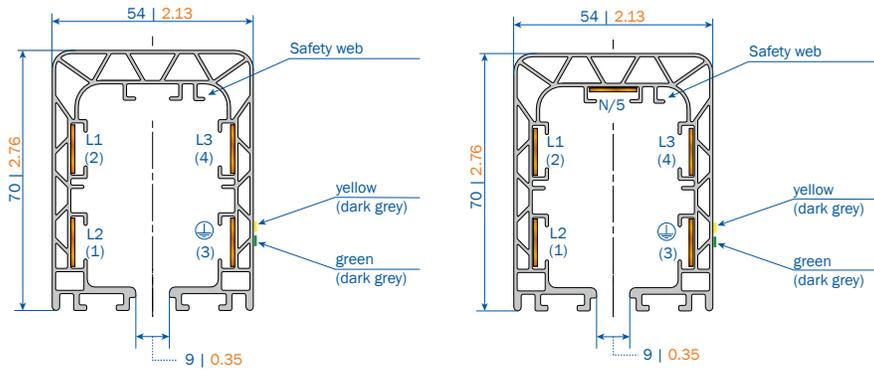
(3) 5th. Conductor max. 80A at 100% DC.

(4) Nominal voltage UL= 600V

(5) Control line

(6) Power consumption UL on request

Orange text on diagrams indicates imperial measurements/conversions



Numbers in parentheses apply to control line

IMPEDANCE AND RESISTANCE DATA

Type ⁽¹⁾ HS with PE SS without PE	Leakage distance mm (in)	Impedance at 50 Hertz and 20 °C (68 °F) Ω / 1000 m			Resistance at 20 °C (68 °F) Ω / 1000 m			Weight kg/m (lb/ft)	Order No. ⁽²⁾
		Phase	⊕	N	Phase	⊕	N		
KBHF									
KBHF4/63-...HSC	33 (1.30)	1.728	1.728	-	1.717	1.717	-	1.304 (2.87)	600974
KBHF4/63-...SSD ⁽²⁾	33 (1.30)	1.728	-	-	1.717	-	-	1.304 (2.87)	600994
KBHF4/80-...HSC	33 (1.30)	1.074	1.074	-	1.057	1.057	-	1.536 (3.39)	600984
KBHF4/100-...HSC	33 (1.30)	0.712	0.712	-	0.687	0.687	-	1.864 (4.11)	600024
KBHF5/63-...HSC	33 (1.30)	1.728	1.728	1.728	1.717	1.717	1.717	1.410 (3.11)	601004
KBHF5/63-...SSD ⁽²⁾	33 (1.30)	1.728	-	1.728	1.717	-	1.717	1.410 (3.11)	601024
KBHF5/80-...HSC	33 (1.30)	1.074	1.074	1.074	1.057	1.057	1.057	1.700 (3.75)	601014
KBHF5/100-...HSC	33 (1.30)	0.712	0.712	0.712	0.687	0.687	0.687	2.110 (4.65)	600124
KBHS									
KBHS4/63-...HSC	33 (1.30)	1.782	1.728	-	1.717	1.717	-	1.424 (3.14)	601034
KBHS4/63-...SSD ⁽²⁾	33 (1.30)	1.728	-	-	1.717	-	-	1.424 (3.14)	601054
KBHS4/80-...HSC	33 (1.30)	1.074	1.074	-	1.057	1.057	-	1.656 (3.65)	601044
KBHS4/100-...HSC	33 (1.30)	0.712	0.712	-	0.687	0.687	-	1.984 (4.37)	600064
KBHS4/125-...HSC	33 (1.30)	0.579	0.712	-	0.549	0.687	-	2.161 (4.76)	600074
KBHS4/160-...HSC	30 (1.18)	0.383	0.712	-	0.344	0.687	-	2.699 (5.95)	600084
KBHS4/200-...HSC	27 (1.06)	0.299	0.457	-	0.254	0.429	-	3.297 (7.27)	600314
KBHS5/63-...HSC	33 (1.30)	1.728	1.728	1.728	1.717	1.717	1.717	1.560 (3.44)	601064
KBHS5/63-...SSD ⁽²⁾	33 (1.30)	1.728	-	1.728	1.717	-	1.717	1.560 (3.44)	601084
KBHS5/80-...HSC	33 (1.30)	1.074	1.074	1.074	1.057	1.057	1.057	1.850 (4.08)	601074
KBHS5/100-...HSC	33 (1.30)	0.712	0.712	0.712	0.687	0.687	0.687	2.260 (4.98)	600164
KBHS5/125-...HSC	33 (1.30)	0.579	0.712	0.712	0.549	0.687	0.687	2.437 (5.37)	600174
KBHS5/160-...HSC	30 (1.18)	0.383	0.712	0.712	0.344	0.687	0.687	2.926 (6.45)	600184
KBHS5/200-...HSC	27 (1.06)	0.299	0.457	0.457	0.254	0.429	0.687	3.573 (7.88)	600324

(1) ... Suffix types e.g. 2 m KBHF4/63-2000HSC, Order No. 600972, shorter lengths are made up from the next largest standard length.
(2) The last number of the order specifies the section length in meters. Please suffix the order number with 1, 2, 3, 4. Round up for shorter sections.

⊕ Ground = PE
Orange text on diagrams indicates imperial measurements/conversions
■ Parts typically available for next-day shipping.

JOINTING MATERIAL, HANGERS AND END CAPS



Installed joint cap

JOINT CAP, SELF LOCKING

Type	Weight kg (lb)	Order No.
VM-KVM	0.116 (0.26)	600005



Sliding hanger at conductor section

SLIDING HANGER

Type ⁽¹⁾	Weight kg (lb)	Order No.
AH-KGA	0.129 (0.28)	600000
AH-KGA/K	0.129 (0.28)	600397



Fixpoint hanger at conductor section

FIXPOINT HANGER

Type ⁽¹⁾	Weight kg (lb)	Order No.
AH-KFA	0.160 (0.35)	600007
AH-KFA/K	0.177 (0.39)	600398



Installed end cap

END CAP (LEFT AND RIGHT VERSION)

Type	Weight kg (lb)	Order No.
EK-KE	0.150 (0.33)	600008

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

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

BRACKETS

Type ⁽¹⁾	X mm (ft in)	L mm (ft in)	B max mm (ft in)	Weight kg (lb)	Order No.	
					standard version	small fixing claw ⁽¹⁾
HK-EHK250-NS	250 (0' 9.84")	350 (1' 1.78")	170 (0' 6.69")	1.080 (2.38)	251600	-
HK-EHK250-KS ...					-	251720- ...
HK-EHK300-NS	300 (0' 11.81")	400 (1' 3.75")	170 (0' 6.69")	1.128 (2.49)	251610	-
HK-EHK300-KS ...					-	251730- ...
HK-EHK400-NS	400 (1' 3.75")	500 (1' 7.69")	170 (0' 6.69")	1.266 (2.79)	251620	-
HK-EHK400-KS ...					-	251740- ...
HK-EHK500-NS	500 (1' 7.69")	600 (1' 11.62")	170 (0' 6.69")	1.394 (3.07)	251630	-
HK-EHK500-KS ...					-	251750- ...
HK-EHK600-NS	600 (1' 11.62")	700 (2' 3.56")	170 (0' 6.69")	1.561 (3.44)	251640	-
HK-EHK600-KS ...					-	251760- ...
HK-EHK700-NS	700 (2' 3.56")	800 (2' 7.50")	170 (0' 6.69")	1.761 (3.88)	251650	-
HK-EHK700-KS ...					-	251770- ...
HK-EHK750-NS	750 (2' 5.53")	850 (2' 9.46")	170 (0' 6.69")	1.782 (3.93)	251660	-
HK-EHK750-KS ...					-	251780- ...
HK-EHK800-NS	800 (2' 7.50")	900 (2' 11.43")	170 (0' 6.69")	1.936 (4.27)	251670	-
HK-EHK800-KS ...					-	251790- ...

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 (lb)	Cable gland (Dimensions see page 15)	Order No.
ES-KKE4/63-80HS	0.271 (0.60)	M 40	600010
ES-KKE5/63-80HS	0.288 (0.63)	M 40	600107
ES-KKE4/63SS	0.252 (0.56)	M 25	600015
ES-KKE5/63SS	0.265 (0.58)	M 25	600108

(1) e.g. HK-EHK250-KS12 → Order No. 251720-12 for fixing claw with D = 12 mm (.47 in).

Select next larger size bracket when your -beam dimension B is more than 170 mm (6.69 in).

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

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 (lb)	Cable gland (Dimensions see page 15)	Order No.
ES-KKE4/63-100HS	0.613 (1.35)	M 32 or M 50 ⁽¹⁾	600422
ES-KKE5/63-100HS	0.646 (1.42)	M 32 or M 50 ⁽¹⁾	600423

LINE FEED/JOINT FEED (63 A)

KSE joint feed comes loose without conductor section.

It can be mounted at any joint.

Electrical connection with customer-supplied cable shoes to M6 terminals.



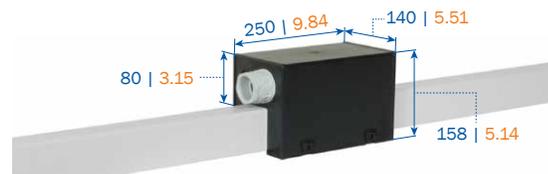
Type	Weight kg (lb)	Cable gland (Dimensions see page 15)	Order No.
ES-KSE4/63HS-L	0.806 (1.78)	M 32	600035
ES-KSE5/63HS-L	0.866 (1.91)	M 32	600038
ES-KSE4/63SS-L	0.785 (1.73)	M 25	600028
ES-KSE5/63SS-L	0.843 (1.86)	M 25	600029

LINE FEED/JOINT FEED (80–100 A)

KSE joint feed 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 15)	Order No.
ES-KSE4/80-100HS-L	0.936 (2.06)	M 50	600036
ES-KSE5/80-100HS-L	0.996 (2.20)	M 50	600039

Feeds in the curve area on request.

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

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

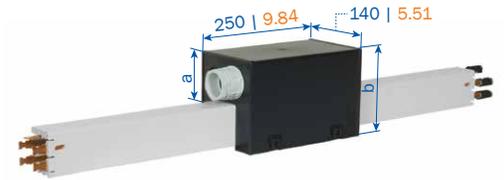
LINE FEEDS

LINE FEED (63–100 A)

Including 1 m (3 ft 3.37 in) section

Line feed with spring-loaded connector.

Electrical connection with customer supplied cable shoes to M6 terminals.



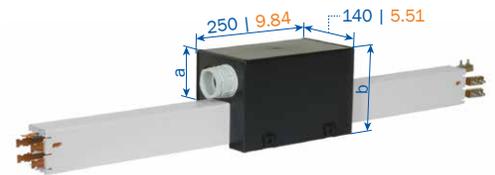
Type	Weight kg (lb)	Dimension		Cable gland (Dimensions see page 15)	Order No.
		a	b		
ES-KEF4/63HSC-1000	2.066 (4.55)	50	128	M 32	600975
ES-KEF4/80HSC-1000	2.428 (5.35)	80	158	M 50	600976
ES-KEF5/63HSC-1000	2.232 (4.92)	50	128	M 32	600977
ES-KEF5/80HSC-1000	2.652 (5.85)	80	158	M 50	600978
ES-KEF4/100HSC-1000	2.756 (6.08)	80	158	M 50	600201
ES-KEF5/100HSC-1000	3.062 (6.75)	80	158	M 50	600209
ES-KEF4/63SSD-1000	2.046 (4.51)	50	128	M 25	600979
ES-KEF5/63SSD-1000	2.210 (4.87)	50	128	M 25	600980

LINE FEED (63–125 A)

Including 1 m (3 ft 3.37 in) section

Line feed with bolted joints.

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



Type	Weight kg (lb)	Dimension		Cable gland (Dimensions see page 15)	Order No.
		a	b		
ES-KES4/63HSC-1000	2.190 (4.83)	50	128	M 32	600985
ES-KES4/80HSC-1000	2.552 (5.63)	80	158	M 50	600986
ES-KES5/63HSC-1000	2.387 (5.26)	50	128	M 32	600987
ES-KES5/80HSC-1000	2.807 (6.19)	80	158	M 50	600988
ES-KES4/100HSC-1000	2.880 (6.35)	80	158	M 50	600225
ES-KES4/125HSC-1000	3.222 (7.10)	80	158	M 50	600045
ES-KES5/100HSC-1000	3.217 (7.09)	80	158	M 50	600233
ES-KES5/125HSC-1000	3.621 (7.98)	80	158	M 50	600049
ES-KES4/63SSD-1000	2.170 (4.78)	50	128	M 25	600989
ES-KES5/63SSD-1000	2.365 (5.21)	50	128	M 25	600990

Feeds in the curve area on request.

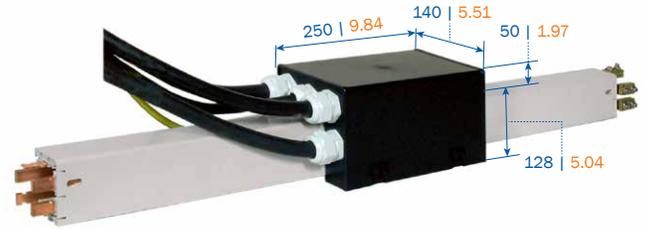
Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

LINE FEED (125 – 200 A)

Including 1 m (3 ft 3.37 in) section with 2 m (6 ft 6.74 in) single cores

Electrical connection with customer-supplied cable shoes to M6 terminals.



Type	Weight kg (lb)	Cable cross section in mm ² / Ø in mm			Order No.
		L1–L3	Ground	N / 5	
ES-KELS4/125HSC-1000-2	7.803 (17.20)	35 / 16	25 / 10	-	600069
ES-KELS4/160HSC-1000-2	9.690 (21.36)	50 / 18	25 / 10	-	600075
ES-KELS4/200HSC-1000-2	11.668 (25.72)	70 / 21	35 / 11	-	600385
ES-KELS5/125HSC-1000-2	9.150 (20.17)	35 / 16	25 / 10	25 / 15	600077
ES-KELS5/160HSC-1000-2	11.037 (24.33)	50 / 18	25 / 10	25 / 15	600079
ES-KELS5/200HSC-1000-2	13.014 (28.69)	70 / 21	35 / 11	25 / 15	600387

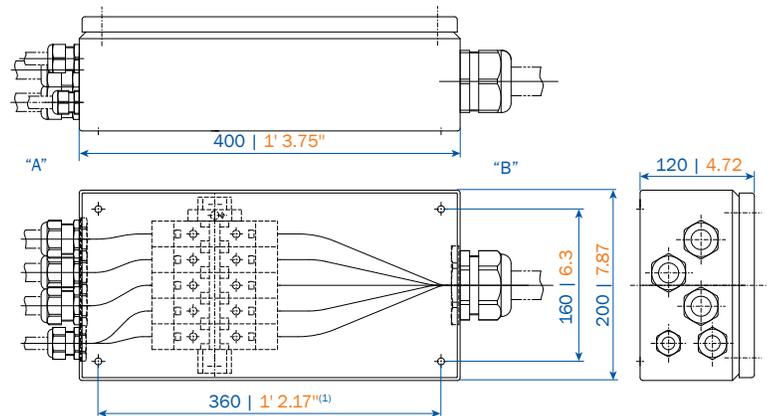
TERMINAL BOX

TERMINAL BOX (FOR KELS, 125–200 A)

Electrical connection with customer supplied cable shoes.

Clamping range 16 – 95 mm² (0.02 – 0.15 in²).

View A Input of the single cores of the KELS (a. m.) and view B with M 63 in the diagram.



Type	Weight kg (lb)	For feed line	Order No.
ES-ZK1	5.228 (11.53)	ES-KELS4/125HSC-1000-2	600389
ES-ZK2	5.276 (11.63)	ES-KELS4/160HSC-1000-2 and ES-KELS4/200HSC-1000-2	600390
ES-ZK3	5.595 (12.33)	ES-KELS5/125HSC-1000-2	600391
ES-ZK4	5.645 (12.44)	ES-KELS5/160HSC-1000-2 and ES-KELS5/200HSC-1000-2	600392

Feeds in the curve area on request.

(1) Fixing borings ø 7 mm (.28 in) at the bottom of the box.

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

CURVES, SEALING STRIP AND CABLE GLANDS FOR FEEDS

CURVES

PRODUCTION CORRESPONDING TO CUSTOMER DRAWING

Min. horizontal bending radius	63-125A	= 600 mm (1 ft 11.62 in)
	160A	= 1000 mm (3 ft 3.37 in)
	200A	= on request

max. \sphericalangle 120°

min. bending radius, vertical = 2000 mm (6 ft 6.74 in)

max. curved length = 3600 mm (11 ft 9.73 in)

HORIZONTAL CURVE FOR SI AND SA

SI = Safety web inside

SA = Safety web outside

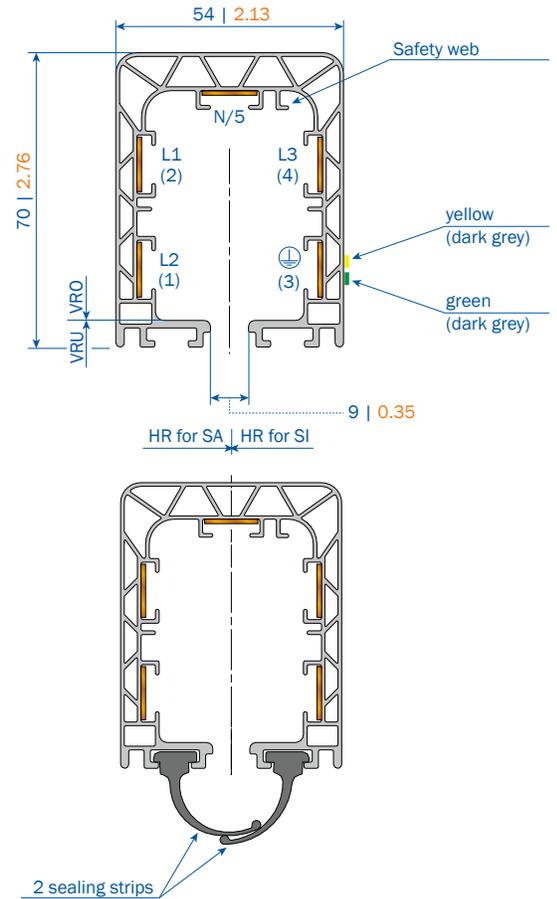
VERTICAL CURVE FOR VRO AND VRU

VRO = Vertical radius upwards

VRU = Vertical radius downwards

The ground for a horizontal curve will be installed inside (SI) or outside (SA) the safety web in the direction of the track.

When ordering a replacement for a vertical curve, any changes in measurement must be indicated on with the order.



SEALING STRIP (INCLUDING ACCESSORIES)

The sealing strip is installed in pairs. When placing an order, be sure to order 2x the system length for installation.

The maximum length is 40 m (131 ft 2.8 in), with cuts of 10 m (32 ft 9.7 in) and 20 m (65 ft 7.4 in) available.

Type	Description	Order No.
DL-D-KBH-MKH-MKL-TDV	Sealing strip	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 (1 set 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



600551



600354



258300



600109



600640

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

CABLE GLANDS FOR FEEDS

For Type	Cable gland	For cable diam. in mm (in)	Power rating in A	Page
ES-KKE ...	M50	27 - 35 (1.06 - 1.38)	63-100 HS	10
ES-KKE ...	M40	17 - 28 (0.67 - 1.10)	63/80 HS	10
ES-KKE ...	M32	15 - 21 (0.59 - 0.83)	63 SS	10
ES-KSE/KEF/KES ...	M32	17 - 26 (0.67 - 1.02)	63 HS	10 and 11
ES-KSE/KEF/KES ...	M50	23 - 34 (0.91 - 1.34)	80-100 HS	10 and 11
ES-KES ...	M50	29 - 40 (1.14 - 1.57)	125 HS	11
ES-ZK1-4 ... (Page B)	M63	27 - 48 (1.06 - 1.89)	125/160/200 HS	12
BH-AKB-KBH ...	M25	9 - 19 (0.35 - 0.75)	-	15
ES-KKE/KSE/KEF/KES ...	M25	9 - 19 (0.35 - 0.75)	63SS	10 and 11

HEATING

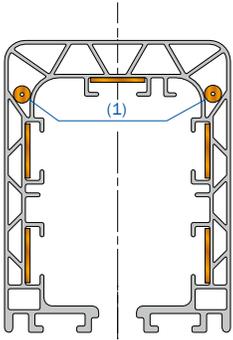
HEATING CABLE

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%

Orange text on diagrams indicates imperial measurements/conversions

HEATING CABLE

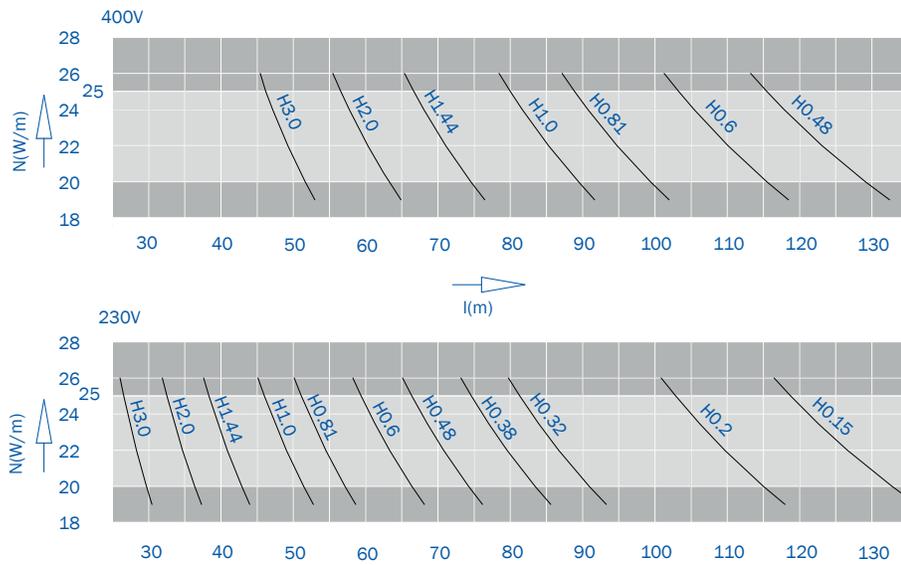


Heating systems are recommended for outdoor installations and when installing conductor systems in humid plants.

For heating larger spaces, the total length must be divided into different heating sections. For heating smaller spaces, lower secondary voltage via transformers can feed the heating cables.

Attention! Heating systems are designed to be used in below +5 °C (41 °F) ambient temperature.

(1) The heating system consists of two cables arranged on either side.



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

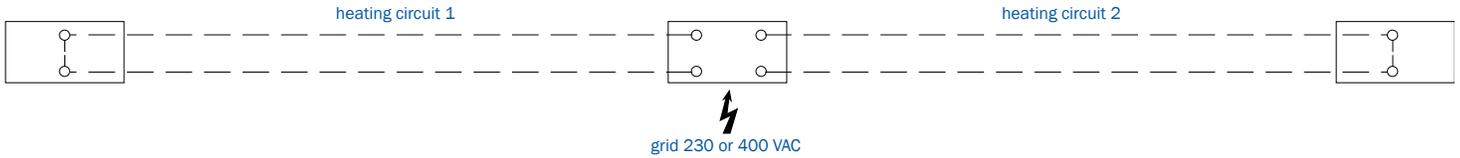
U = Supply voltage (Volt)

R = Resistance of heating cable (Ohm/m or Ohm/in)

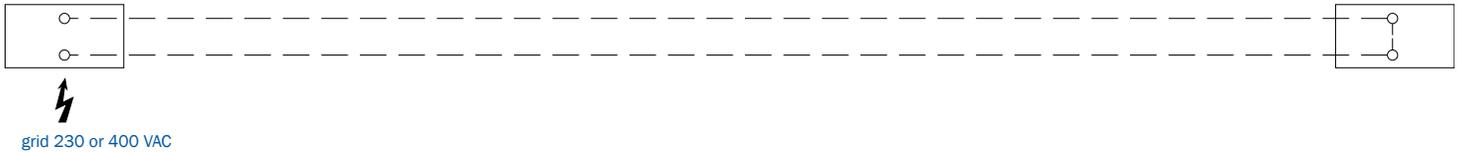
L = Length of heating section (m)

HEATING SYSTEM EXAMPLES

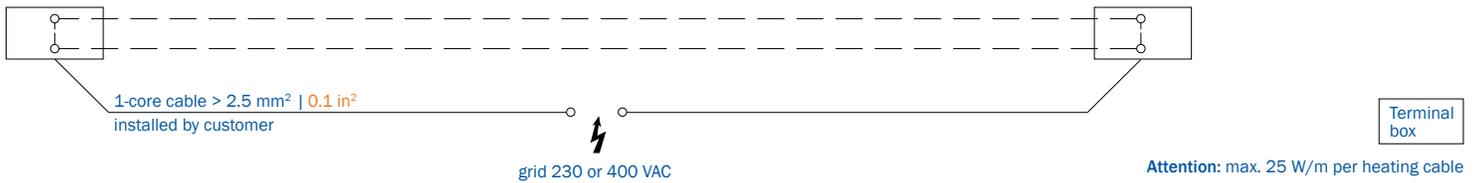
a) 2 Heating Circuits



b) 1 Heating Circuit



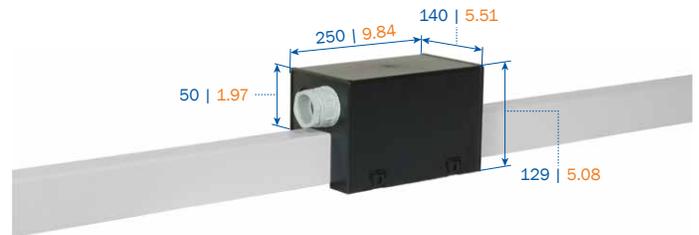
c) 2 Heating Circuits



TERMINAL BOXES FOR HEATING

For each end feed box, two (2) sets of material for connecting ends are required.

For each line feed, four (4) sets of material for the connection ends are required.



Type	Version	Cable gland Measurements (see page 15)	Order No.
BH-AKB-KBH-L	Left end	M25	600155
BH-AKB-KBH-R	Right end	M25	600156
BH-AKB-KBH-M	Line feed	2x M25	600065
BH-MA-KBH-MKL/H-LSV/G	1 Set material for connecting clamps		195291

EXAMPLE C

60 m (196 ft 10.2 in) order

- 1) 122 m (400 ft 3.15 in) heating cable type H 2.0
2x 60 m (196 ft 10.2 in) and 2x 1 m (3 ft 3.37 in) additional

Voltage: 400 V, two heating circles parallel

Heating capacity: 25 W/m per heating cable

2x 22 W/m at 60 m 2x 22 W/m ~2640 W = 2,64 kW

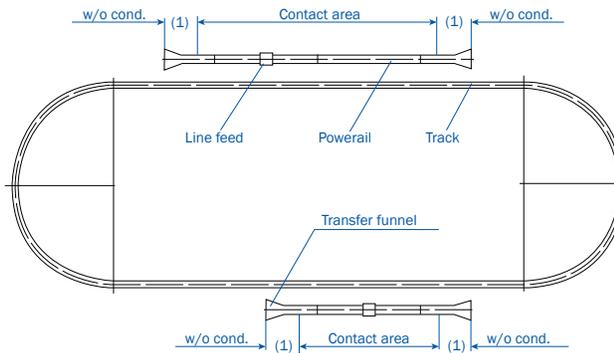
(2x 22W/m at 196 ft 10.2 in 2x 22 W/m ~2640 W = 2,64 kW)

- 2) 1x junction box left end, 1x junction box right end
- 3) 4x sets of material for connection ends

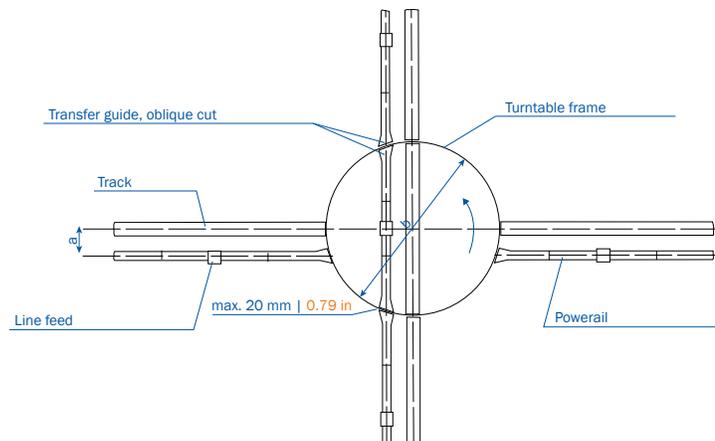
Switch gear assembly and temperature control units are available, per customer request. Please note that fuses, connecting cables, etc. must be provided by the customer.

CONTACT SECTIONS, TURNTABLES AND SWITCHES

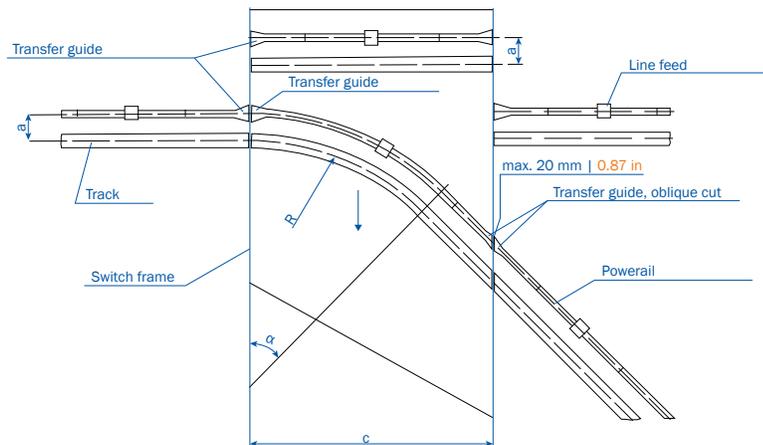
CONTACT SECTION⁽¹⁾



TURNTABLE



SWITCH



Please submit drawings of transfer applications.

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

$\alpha = 50^\circ$

Max. 20 mm (0.79 in) air gap between transfer guides.

Detailed construction drawings of turntables and switches are required for contact sections.

(1) Contact sections must not be activated before collectors are fully engaged.
 Orange text on diagrams indicates imperial measurements/conversions

TRANSFER FUNNELS

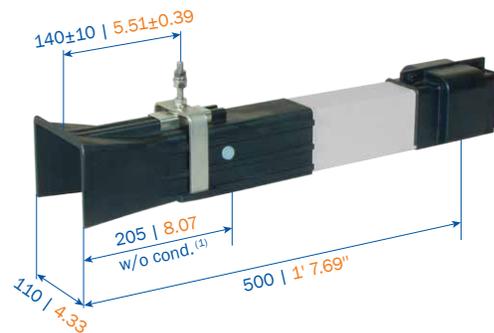
TRANSFER FUNNEL

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

- Offset:
- max. 10 mm (0.39 in) horizontal
 - max. 10 mm (0.39 in) vertical

Max. speed for crossover of the current collector 60 m / min (~196 ft / min).

See pages 6 – 7 for illustration showing maximum allowable offsets during installation.



Type	Weight kg (lb)	Order No.	
		Left version	Right version
ET-KET4/63-125-L-HSC-500 ⁽²⁾	1.552 (3.42)	600285	-
ET-KET4/63-125-R-HSC-500 ⁽²⁾	1.493 (3.29)	-	600279
ET-KET4/160-L-HSC-500	1.636 (3.61)	600286	-
ET-KET4/160-R-HSC-500	1.562 (3.44)	-	600280
ET-KET4/200-L-HSC-500	1.786 (3.94)	600305	-
ET-KET4/200-R-HSC-500	1.688 (3.72)	-	600303
ET-KET5/63-125-L-HSC-500 ⁽²⁾	1.702 (3.75)	600288	-
ET-KET5/63-125-R-HSC-500 ⁽²⁾	1.632 (3.60)	-	600282
ET-KET5/160-L-HSC-500	1.784 (3.93)	600289	-
ET-KET5/160-R-HSC-500	1.701 (3.75)	-	600283
ET-KET5/200-L-HSC-500	1.934 (4.26)	600306	-
ET-KET5/200-R-HSC-500	1.823 (4.02)	-	600304
ET-KET4/63-L-SSD-500 ⁽²⁾	1.524 (3.36)	600287	-
ET-KET4/63-R-SSD-500 ⁽²⁾	1.524 (3.36)	-	600281
ET-KET5/63-L-SSD-500 ⁽²⁾	1.524 (3.36)	600290	-
ET-KET5/63-R-SSD-500 ⁽²⁾	1.524 (3.36)	-	600284

(1) Corresponding to the center of collector

(2) Also suitable for former 40 A-version

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

TRANSFER GUIDES

TRANSFER GUIDES

Straight

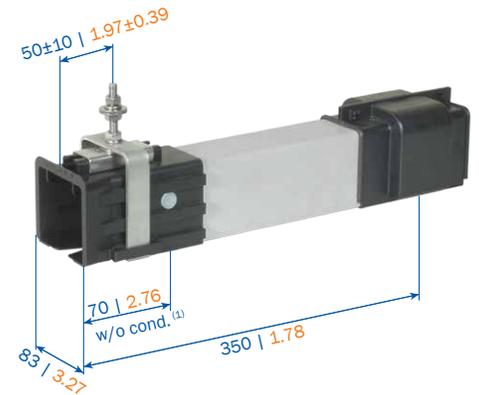
Transfer guides are required for use with all types of double collectors or two (2) single collectors.

Staggered arrangement of the transfer guides to each other:

- max. 5 mm (0.02 in) horizontal
- max. 3 mm (0.12 in) vertical

Max. speed for crossover of the current collector 80 m / min (~262 ft / min).

See pages 6 – 7 for illustration showing maximum allowable offsets during installation.



Type	Weight kg (lb)	Order No.	
		Left version	Right version
UE-KÜ4/63-125-L-HSC-350 ⁽²⁾	1.276 (2.81)	600261	-
UE-KÜ4/63-125-R-HSC-350 ⁽²⁾	1.276 (2.81)	-	600255
UE-KÜ4/160-L-HSC-350	1.351 (2.98)	600262	-
UE-KÜ4/160-R-HSC-350	1.351 (2.98)	-	600256
UE-KÜ4/200-L-HSC-350	1.490 (3.28)	600309	-
UE-KÜ4/200-R-HSC-350	1.490 (3.28)	-	600307
UE-KÜ5/63-125-L-HSC-350 ⁽²⁾	1.434 (3.16)	600264	-
UE-KÜ5/63-125-R-HSC-350 ⁽²⁾	1.434 (3.16)	-	600258
UE-KÜ5/160-L-HSC-350	1.509 (3.33)	600265	-
UE-KÜ5/160-R-HSC-350	1.509 (3.33)	-	600259
UE-KÜ5/200-L-HSC-350	1.648 (3.63)	600310	-
UE-KÜ5/200-R-HSC-350	1.648 (3.63)	-	600308
UE-KÜ4/63-L-SSD-350 ⁽²⁾	1.276 (2.81)	600263	-
UE-KÜ4/63-R-SSD-350 ⁽²⁾	1.276 (2.81)	-	600257
UE-KÜ5/63-L-SSD-350 ⁽²⁾	1.427 (3.15)	600266	-
UE-KÜ5/63-R-SSD-350 ⁽²⁾	1.427 (3.15)	-	600260

(1) Corresponding to the center of collector

(2) Also suitable for former 40A-version

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

TRANSFER GUIDES

Oblique

Transfer guides are required for use with all types of double collectors or two (2) single collectors.

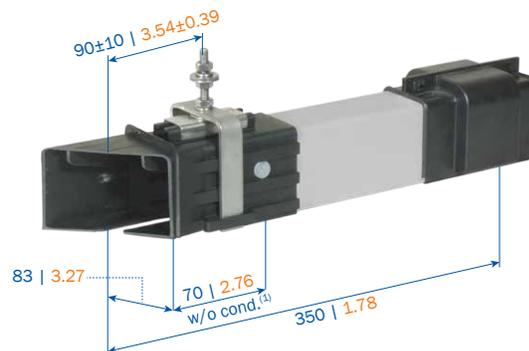
Staggered arrangement of the transfer guides to each other:

- max. 5 mm (0.02 in) horizontal
- max. 3 mm (0.12 in) vertical

Max. speed for crossover of the current collector 80 m / min (~262 ft / min).

Measurements (oblique) and angle are specified by customer.

See pages 6 – 7 for illustration showing maximum allowable offsets during installation.



Type ⁽¹⁾	Weight kg (lb)	Order No.	
		Left version	Right version
UE-KÜS4/63-125-L-HSC-350 ⁽²⁾	1.243 (2.74)	600273	-
UE-KÜS4/63-125-R-HSC-350 ⁽²⁾	1.243 (2.74)	-	600267
UE-KÜS4/160-L-HSC-350	1.324 (2.92)	600274	-
UE-KÜS4/160-R-HSC-350	1.324 (2.92)	-	600268
UE-KÜS4/200-L-HSC-350	1.517 (3.34)	600317	-
UE-KÜS4/200-R-HSC-350	1.517 (3.34)	-	600315
UE-KÜS5/63-125-L-HSC-350 ⁽²⁾	1.381 (3.04)	600276	-
UE-KÜS5/63-125-R-HSC-350 ⁽²⁾	1.381 (3.04)	-	600270
UE-KÜS5/160-L-HSC-350	1.447 (3.19)	600277	-
UE-KÜS5/160-R-HSC-350	1.447 (3.19)	-	600271
UE-KÜS5/200-L-HSC-350	1.668 (3.68)	600318	-
UE-KÜS5/200-R-HSC-350	1.668 (3.68)	-	600316
UE-KÜS4/63-L-SSD-350 ⁽²⁾	1.243 (2.74)	600275	-
UE-KÜS4/63-R-SSD-350 ⁽²⁾	1.243 (2.74)	-	600269
UE-KÜS5/63-L-SSD-350 ⁽²⁾	1.379 (3.04)	600278	-
UE-KÜS5/63-R-SSD-350 ⁽²⁾	1.379 (3.04)	-	600272

(1) Corresponding to the center of collector

(2) Also suitable for former 40 A-version

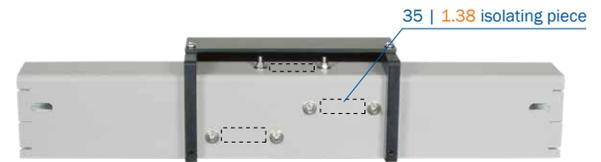
Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

CONDUCTOR DEAD SECTIONS

CONDUCTOR DEAD SECTION

Dead sections come factory assembled to customer specifications regarding which sections should be disconnected.



Isolating piece on conductor

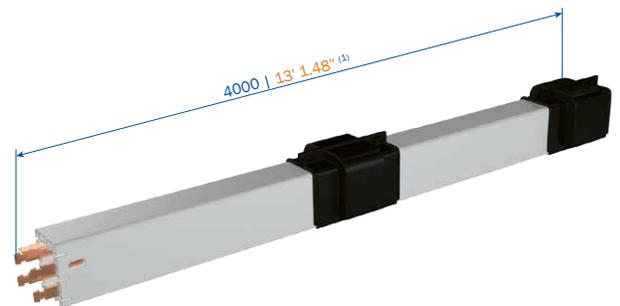
Air gap 5 mm (0.2 in)		Isolating piece 35 mm (1.38 in)	
Type ⁽¹⁾	Order No.	Type	Order No.
ST-KTL1 ...	600298	ST-KTI1 ...	600293
ST-KTL2 ...	600299	ST-KTI2 ...	600294
ST-KTL3 ...	600300	ST-KTI3 ...	600295
ST-KTL4 ...	600301	ST-KTI4 ...	600296
ST-KTL5 ...	600302	ST-KTI5 ...	600297

MAINTENANCE SECTIONS

Maintenance sections are designed to make collector removal and conductor bar replacement quick and easy for KBH. For convenience, maintenance section drop out or reinstall at existing runway installations.

For longer runways, installing maintenance repair sections at convenient intervals and locations is recommended to allow for more access points.

The standard length is 4000 mm (13 ft 1.48 in). Additional lengths and curved maintenance sections that follow $R_{min} = 1000 \text{ mm}$ / $L_{min} = 1000 \text{ mm}$ ($R_{min} = 3 \text{ ft } 3.37 \text{ in}$ / $L_{min} = 3 \text{ ft } 3.37 \text{ in}$) are available upon request.



Type	Weight kg (lb)	Order No.
RVT-KRT4/63-4000HSC	5.534 (12.20)	601005
RVT-KRT5/63-4000HSC	5.953 (13.12)	601007
RVT-KRT4/80-4000HSC	6.462 (14.25)	601006
RVT-KRT5/80-4000HSC	7.113 (15.68)	601008
RVT-KRT4/100-4000HSC	7.774 (17.14)	600811
RVT-KRT5/100-4000HSC	8.753 (19.30)	600812
RVT-KRT4/125-4000HSC	8.482 (18.70)	600813
RVT-KRT5/125-4000HSC	9.461 (20.86)	600814
RVT-KRT4/160-4000HSC	10.438 (23.01)	600816
RVT-KRT5/160-4000HSC	11.417 (25.17)	600817
RVT-KRT4/200-4000HSC	13.016 (28.70)	600801
RVT-KRT5/200-4000HSC	13.994 (30.85)	600802
RVT-KRT4/63-4000SSD	5.534 (12.20)	601009
RVT-KRT5/63-4000SSD	5.953 (13.12)	601010

(1) Complete types e.g. ST-KTI3HS-L1/L2/L3-KSW for a 35 mm isolating piece with separation of conductors L1, L2, L3 and 2 for the current collector KSW
→ Order No.: 600295

Orange text on diagrams indicates imperial measurements/conversions

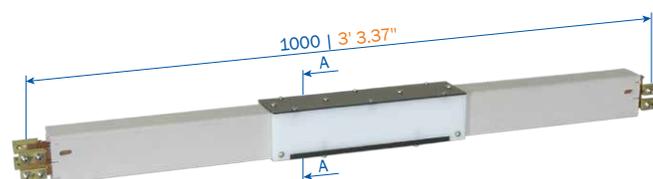
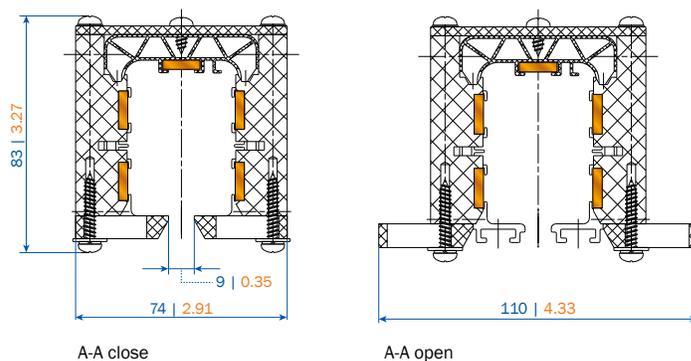
REMOVING SECTIONS

REMOVING SECTIONS

Including 1 m (3 ft 3.37 in) Conductor Sections

Removing sections are available with special bolted joints for KBHF and KBHS on both ends. Assembly and disassembly can occur at the end of the track and and/or at the removing section. The collector can be mounted and unmounted by opening and closing the sliders at the bottom of the conductor housing.

⚠ Disconnect the mains before opening. Do not open the removing section without cutting off all voltage to the conductor system. The removing section does not disconnect the conductor system electrically.



FOR SINGLE COLLECTORS

Type	Weight kg (lb)	Order No.
AT-KAT4/63-125HSC-1000 ⁽¹⁾	3.507 (7.73)	600165
AT-KAT4/160HSC-1000	3.763 (8.30)	600166
AT-KAT4/200HSC-1000	4.260 (9.39)	600327
AT-KAT5/63-125HSC-1000 ⁽¹⁾	3.957 (8.72)	600167
AT-KAT5/160HSC-1000	4.213 (9.29)	600168
AT-KAT5/200HSC-1000	4.710 (10.38)	600328
AT-KAT4/63SSD-1000 ⁽¹⁾	3.449 (7.60)	600169
AT-KAT5/63SSD-1000 ⁽¹⁾	3.899 (8.60)	600170

FOR DOUBLE COLLECTORS

Type	Weight kg (lb)	Order No.
AT-KATD4/63-125HSC-1000 ⁽¹⁾	4.330 (9.55)	600175
AT-KATD4/160HSC-1000	4.566 (10.07)	600176
AT-KATD4/200HSC-1000	5.050 (11.13)	600329
AT-KATD5/63-125HSC-1000 ⁽¹⁾	4.780 (10.54)	600177
AT-KATD5/160HSC-1000	5.015 (11.06)	600178
AT-KATD5/200HSC-1000	5.501 (12.13)	600330
AT-KATD4/63SSD-1000 ⁽¹⁾	4.312 (9.51)	600179
AT-KATD5/63SSD-1000 ⁽¹⁾	4.762 (10.50)	600180

⁽¹⁾ Also suitable for former 40A-version

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

ANTI-CONDENSATION SECTIONS

ANTI-CONDENSATION SECTIONS

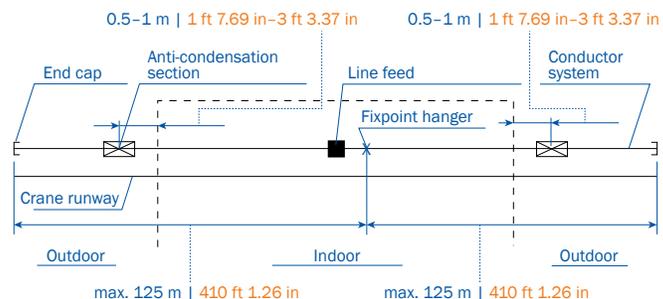
Anti-condensation sections are available with special bolted joints for KBHF and KBHS at both ends.

APPLICATION

Anti-condensation sections are designed for use where conductor systems are passing from indoor to outdoor spaces. They prevent condensation of the outside mounted conductor section by allowing warm air from indoors to escape through the anti-condensation section. 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 within 0.5 – 1 m (1 ft 7.69 in – 3 ft 3.37 in) of the transfer point from indoor to outdoor.



Type	Weight kg (lb)	Order No.
BT-KBT4/63-125HSC-1000 ⁽¹⁾	3.573 (7.88)	600185
BT-KBT4/160HSC-1000	3.843 (8.47)	600186
BT-KBT4/200HSC-1000	4.358 (9.61)	600319
BT-KBT5/63-125HSC-1000 ⁽¹⁾	3.805 (8.39)	600188
BT-KBT5/160HSC-1000	4.075 (8.98)	600189
BT-KBT5/200HSC-1000	4.590 (10.12)	600320
BT-KBT4/63SSD-1000 ⁽¹⁾	3.573 (7.88)	600187
BT-KBT5/63SSD-1000 ⁽¹⁾	3.805 (8.39)	600190

(1) Also suitable for former 40A-version

Orange text on diagrams indicates imperial measurements/conversions

EXPANSION SECTIONS

EXPANSION SECTIONS

Expansion sections are required to compensate for the difference 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 exceeds 20 m (65 ft 7.4 in).

Max. length during differences in temperature:

$$\Delta t \ 90^{\circ}\text{C} \ (-30^{\circ}\text{C} \ \text{up to} \ +60^{\circ}\text{C}) \ | \ \Delta t \ 162^{\circ}\text{F} \ (-22^{\circ}\text{F} \ \text{up to} \ 140^{\circ}\text{F})$$

Short installation with curves may need expansion sections if there are straight segments fixed between two (2) curves.

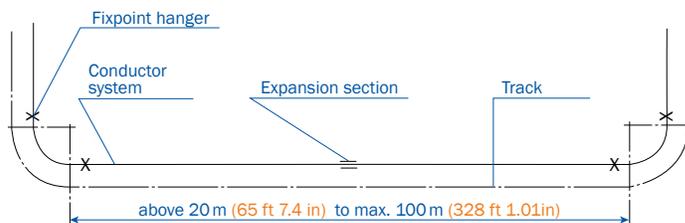
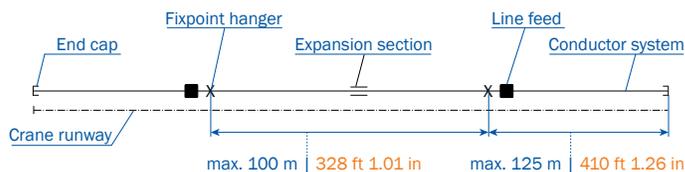
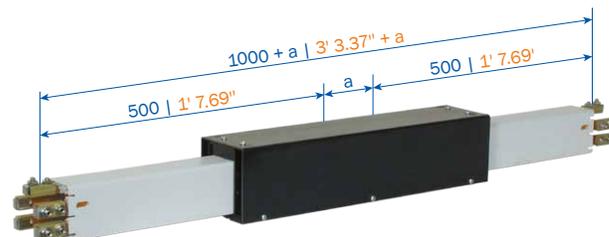
Straight installation up to 250 m (820 ft) do not require expansion sections. For each additional length up to 100 m (328 ft 1.01 in), install one (1) expansion section.

For example, the installation of 300 m (984 ft 3.02 in) requires one (1) expansion section. The installation of 440 m (1443 ft 6.83 in) requires two (2) expansion sections.

The remaining conductor sections must 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 (2.95 in) and is valid for an ambient temperature of -10°C (14°F) to $+35^{\circ}\text{C}$ (95°F) during installation.



Type	Weight kg (lb)	Order No.
DT-KD4/63-125HSC-1000 ⁽¹⁾	4.540 (10.01)	600135
DT-KD4/160HSC-1000	4.752 (10.48)	600136
DT-KD4/200HSC-1000	5.034 (11.10)	600325
DT-KD5/63-125HSC-1000 ⁽¹⁾	5.014 (11.05)	600138
DT-KD5/160HSC-1000	5.218 (11.50)	600139
DT-KD5/200HSC-1000	5.508 (12.14)	600326
DT-KD4/63SSD-1000 ⁽¹⁾	4.540 (10.01)	600137
DT-KD5/63SSD-1000 ⁽¹⁾	5.014 (11.05)	600140

(1) Also suitable for former 40A-version

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

SINGLE CURRENT COLLECTOR

COLLECTOR KSW

The KSW collector is designed for conductor systems with sealing strips up to 100 m / min (328 ft .96 in / min).

Max. speed is 150 m / min (~492 ft / min).

CONNECTING CABLE

For 25 A with 2.5 mm² / core (.003 in² / core)

For 40 A with 4.0 mm² / core (006 in² / core)

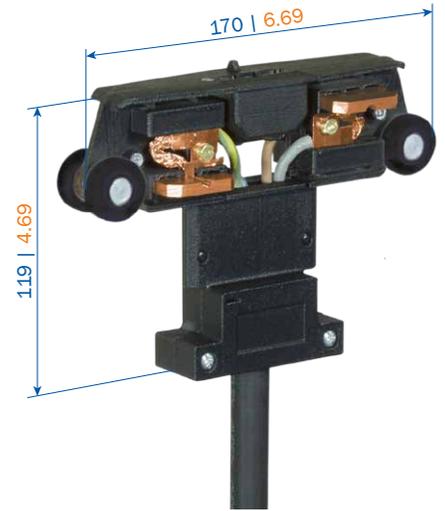
For 60 A with 6.0 mm² / core (009 in² / core)

1 m (3 ft 3.37 in) long, longer cables available upon request.

Cleaning collector is available upon request.

Order example for a 2 m (6 ft 6.74 in) long cable:

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



Type	Weight kg (lb)	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 (1.22)	4	25	13.0	600095
SA-KSW4/40-1HS28-60	0.656 (1.45)	4	40	15.0	600096
SA-KSW4/60-1HS28-40	0.797 (1.76)	4	60 ⁽¹⁾	17.0	600066
SA-KSW5/25-1HS28-60	0.634 (1.40)	5	25	14.0	600098
SA-KSW5/40-1HS28-60	0.771 (1.70)	5	40	17.0	600099
SA-KSW5/60-1HS28-40	0.945 (2.08)	5	60 ⁽¹⁾	19.0	600413
SA-KSW4/25-1SS28-60	0.472 (1.04)	4	25	11.0	600097
SA-KSW5/25-1SS28-60	0.534 (1.18)	5	25	12.0	600100

(1) At 40% DC

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.

COLLECTOR KSW5

The KSW5 conductor is designed for conductor systems with sealing strips up to 100 m / min (328 ft .96 in / min).

Max. speed 250 m/min (~820 ft / min).

CONNECTING CABLE

For 25 A with 2.5 mm² / core (003 in² / core)

For 40 A with 4.0 mm² / core (006 in² / core)

For 60 A with 6.0 mm² / core (009 in² / core)

1 m (3 ft 3.37 in) long, longer cables available upon request.

Cleaning collector is available upon request.

Order example for a 2 m (6 ft 6.74 in) long cable:

Order No. 600149-2 for collector SA-KSW5/40-2HS28-60



Type	Weight kg	Number of poles	Power rating at 60% DC in A	Approx. diameter of connecting-cables in mm	Order No.
SA-KSW5/25-1HS28-60	0.664 (1.46)	4	25	13.0	600145
SA-KSW5/40-1HS28-60	0.768 (1.69)	4	40	15.0	600146
SA-KSW5/60-1HS28-40	0.942 (2.08)	4	60 ⁽¹⁾	17.0	600416
SA-KSW5/25-1HS28-60	0.724 (1.60)	5	25	13.5	600148
SA-KSW5/40-1HS28-60	0.861 (1.90)	5	40	16.0	600149
SA-KSW5/60-1HS28-40	1.035 (2.28)	5	60 ⁽¹⁾	19.0	600417
SA-KSW5/25-1SS28-60	0.584 (1.29)	4	25	11.0	600147
SA-KSW5/25-1SS28-60	0.624 (1.38)	5	25	12.0	600150

(1) At 40% DC

Orange text on diagrams indicates imperial measurements/conversions

DOUBLE COLLECTOR AND TOW ARMS

DOUBLE COLLECTOR DKSW

Maximum speed 150 m / min (~492 ft / min)

The DKSW double collectors are available as an assembly kit, consisting of two (2) KSW collectors and a connecting bar with mounting material. Conductor systems are also available with a sealing strip up to 100 m / min (328 ft .96 in / min).

DKSW are designed for straight sections only. For curves, use single collectors.

There are currently no double collectors available for KSWs, but two (2) single collectors can be used instead.



CONNECTING CABLE

For 50 A with (2x) 2.5 mm² / core (0.1 in² / core)

For 80 A with (2x) 4.0 mm² / core (0.16 in²/core)

For 120 A with (2x) 6.0 mm² / core (0.24 in² / core)

1 m (3 ft 3.37 in) long, longer cables available upon request.

Order example for 2 m (6 ft 6.74 in) long cables:

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

Type	Weight kg (lb)	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 (2.68)	4	50	12.5	600115
SA-DKSW4/80-1HS28-60	1.423 (3.14)	4	80	14.5	600116
SA-DKSW4/120-1HS28-40	1.705 (3.76)	4	120 ⁽¹⁾	17.0	600414
SA-DKSW5/50-1HS28-60	1.379 (3.04)	5	50	13.5	600118
SA-DKSW5/80-1HS28-60	1.653 (3.64)	5	80	16.0	600119
SA-DKSW5/120-1HS28-40	2.001 (4.41)	5	120 ⁽¹⁾	19.0	600415
SA-DKSW4/50-1SS28-60	1.055 (2.33)	4	50	11.0	600117
SA-DKSW5/50-1SS28-60	1.179 (2.60)	5	50	12.0	600120

(1) At 40% DC

Orange text on diagrams indicates imperial measurements/conversions

■ Parts typically available for next-day shipping.



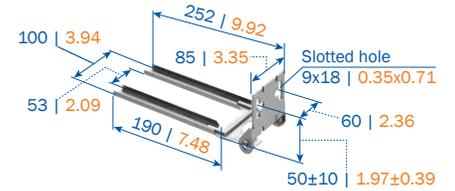
A-A
Version with square hollow profile (without adapter plate)

A-A
Version with tube⁽¹⁾

TOW ARM

Installation options of 30 mm² (0.04 in²), hollow profile or tube with 30 – 34 mm (1.18 in – 1.34 in).

Type	Weight kg (lb)	Order No.
MN-MGUN	0.436 (0.96)	600887
MN-MGU/K ⁽²⁾	0.550 (1.21)	600336



TOW ARM

Installation option for plane surface

Type	Weight kg (lb)	Order No.
MN-MGFN	0.328 (0.72)	600888
MN-MGF/K ⁽²⁾	0.442 (0.97)	600337

(1) For assembly use enclosed adapter plate

(2) Stainless steel

Orange text on diagrams indicates imperial measurements/conversions

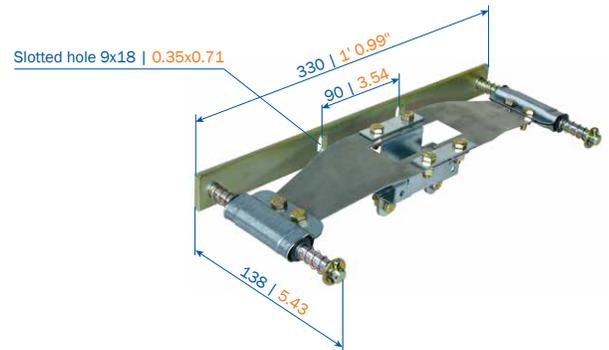
■ Parts typically available for next-day shipping.

FLEXIBLE TOW ARM

FLEXIBLE TOW ARM

Flexible support type for single collector for installations with KET transfer funnels type KET. See page 19.

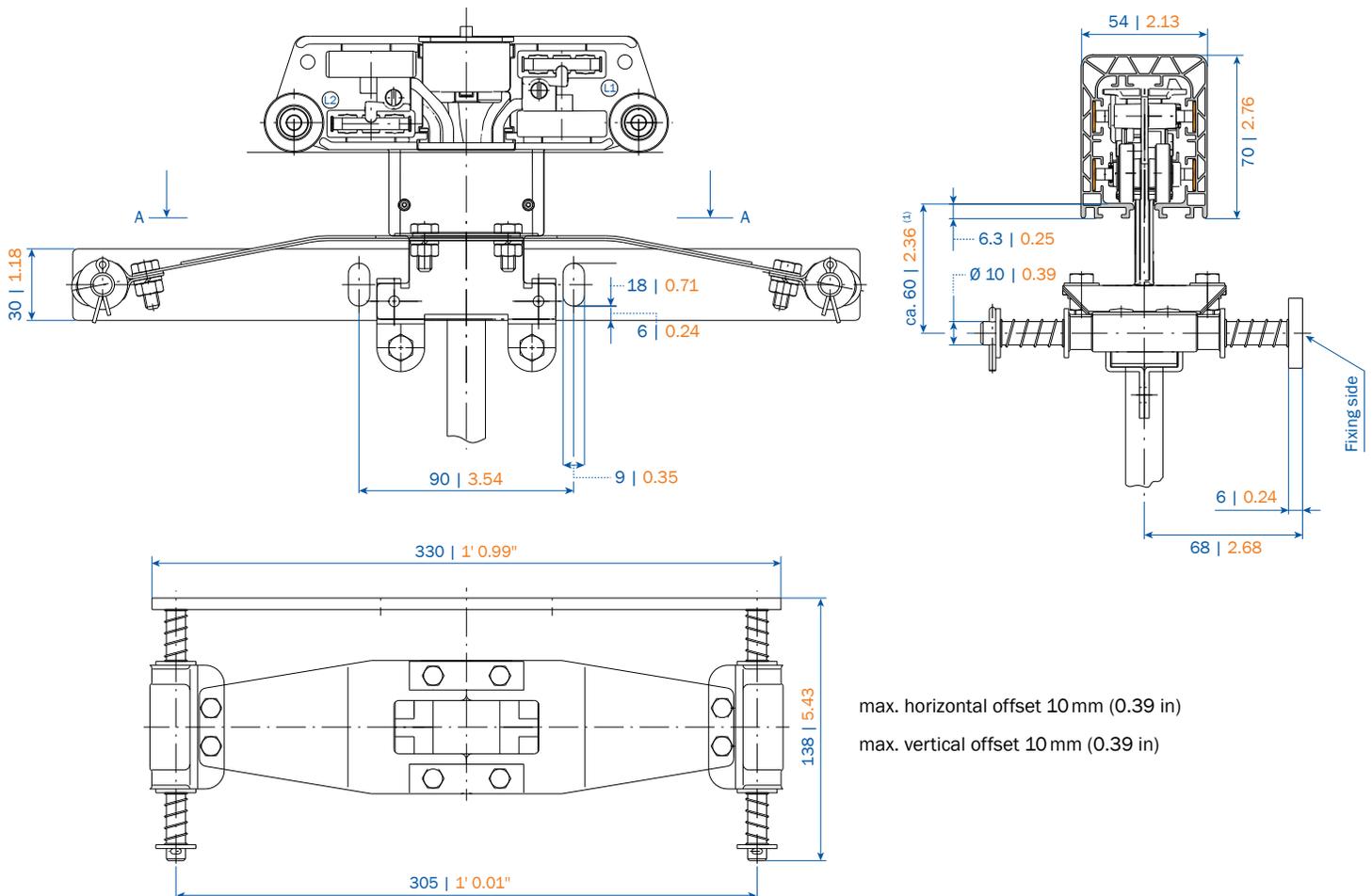
See table below for installation measurements.



Type	Weight kg (lb)	Order No.
MN-KFMHN	1.067 (2.35)	600558

ARRANGEMENT

KFMHN with KSW collector



(1) To be fixed during installation.

Orange text on diagrams indicates imperial measurements/conversions

EXAMPLES FOR ORDERING

STANDARD ORDER (100 FT, 63 A RUNWAY)

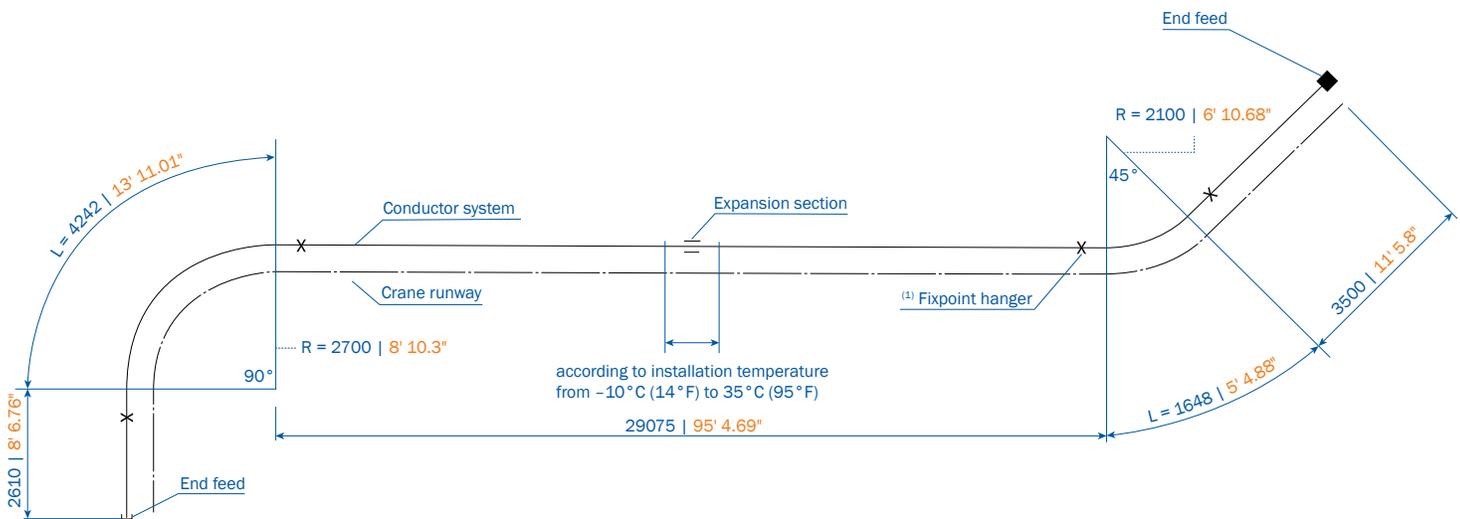
QTY	Part Number	Description	Type
7	600974	4 Meter Busbar	KBHF 4/63-4000HSC
1	600973 (2480 MM)	3 Meter Busbar CUT to 2480 MM (8 ft 1.64 in)	KBHF 4/63-3000HSC
7	600005	Joint Cover	VM-KVM
14	600000	Sliding Hanger	AH-KGA
1	600007	Fix Point Hanger	AH-KFA
1	600008	End Cap	EK-KE
1	600010	End Feed	ES-KKE 4/63-80 HS
1	600414	Double Collector	DKSW 4/120-1 HS
2	600888	Tow Arm	MN-MGFN

For systems requiring specialty sections and/or curves, please contact your sales representative for assistance.

COMPLEX ORDER (INSTALLATION WITH CURVES PER CUSTOMER DRAWING)

41.075 m (134 ft 9.13 in) conductor system

Quantity	Article	KBHF4/80-....HSC		KBHS5/80-....HSC	
		Type	Order No.	Type	Order No.
7	Conductor system, 4 m (13 ft 1.48 in) long	KBHF4/80-4000HSC	600984	KBHS5/80-4000HSC	601074
1	Conductor system, 4 m (13 ft 1.48 in) long for 1x3500 mm (1x11ft 5.8in) short length	KBHF4/80-4000HSC	600984	KBHS5/80-4000HSC	601074
1	Conductor system, 3 m (9 ft 10.11 in) long for 1x2610 mm (1x8ft 6.76in) short length	KBHF4/80-3000HSC	600983	KBHS5/80-2000HSC	601073
1	Conductor system, 2 m (6 ft 6.74 in) long for horizontal curve 45°, R = 2100 mm (6 ft 10.68 in), L = 1648 mm (5 ft 4.88 in), SA	KBHF4/80-2000HSC	600982	KBHS4/125-2000HSC	601072
2	Conductor system, 3 m (9 ft 10.11 in) long for horizontal curve 2x45°, R = 2700 mm (8ft 10.30in), L = 2121 mm (6ft 11.5 in) , 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
 Orange text on diagrams indicates imperial measurements/conversions

INSTALLATION INSTRUCTIONS

COMMISSIONING

Before starting the system, check:

- Width of conductor bar slot along entire system to ensure it is not obstructed by joint caps, hangers, etc.
- All hangers for proper fitment. Sliding hangers should be fit loosely, to allow expansion of conductor system. Confirm that fix point hanger is in proper location.
- All joints prior to closing them with joint caps to ensure proper fit and no misalignment.

Once the system has been inspected, begin a low-speed trial run and check for the following:

- Ensure there are no vibrations from collector and there is no sparking from the brushes.
- Proper pass through of joint sections. Confirm there is no jumping or lurching forward.
- Sealing strip does not impede collector travel.
- Cables do not restrict collector movement and feed cables do not restrict proper expansion of conductor system.

MAINTENANCE

 Always ensure the system is full disconnected and securely locked out before beginning any maintenance work. Failure to follow these directions can result in serious injury and/or damage to the equipment.

Under normal conditions, KBH requires infrequent maintenance. For systems in dirty, abrasive, acidic or other harsh environments or under excessive usage, more frequent maintenance will be required.

Standard maintenance in optimal site conditions:

- Check the rails annually for signs of external damage, joint and hanger misalignment.
- Manually pull a collector through the length of the system to inspect travel and watch for trouble spots.
- Every 6 – 12 months, clean the conductor bar with compressed air or a special cleaning collector.
- Inspect wheels and carbon brushes of current collectors every 6 months for signs of wear and replace if necessary.
- Carbon brushes are factory marked with 5mm wear line. Replace once worn to line.

SPARE PART LIST

FOR CONDUCTOR SYSTEM

Type		KBHF	KBHS
		Order No.	Order No.
VM-KVM	Joint cap (pair)	600005	600005
VM-STV13/63-100A-KBHF/MKHF ⁽¹⁾	Spring loaded connector 63–100 A	600483	-
VM-SCHV13/63-200A-KBHS/MKHS/MKLS ⁽¹⁾	Bolted joints 63–160 A	-	262018
VM-SCHV13/200A-KBHS	Bolted joints 200 A	-	600712
DL-D-KBH-MKH-MKL-TDV	Neoprene sealing strip, in pairs (max. length 40 m (131 ft 2.8 in) each)	600551	600551
DL-V-KSLT-KBH-MKL/H-LSV/G	Coupling for sealing strip, in pairs (for lengths <40 m (131 ft 2.8 in) 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 (32 ft 9.7 in) 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

FOR CURRENT COLLECTOR

Type		KSW / DKSW	KSWs
		Order No.	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

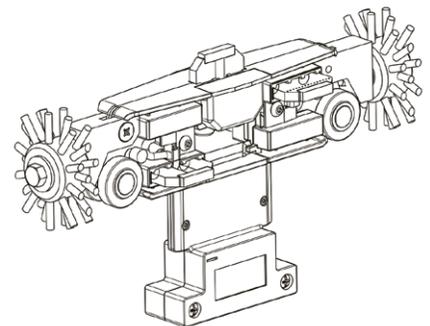
CLEANING ACCESSORIES

Cleaning trolleys can be used on a regular basis or run continuously in dirty or harsh environments.

Type		Order No.
RW-KSW4BSC	For 4-pole installations	0600445
RW-KSW5BSC	For 5-pole installations	0600446

Cleaning trolley KSW 5 BSC with bristle brushes and cleaning equipment with **Scotch Brite**.

Additional options available upon request.



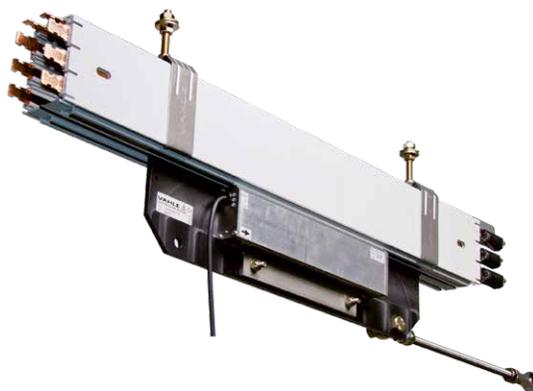
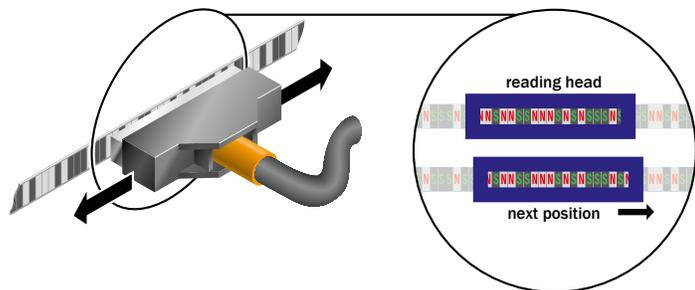
(1) Also suitable for former 40 A-version

■ Parts typically available for next-day shipping.

APOS® POSITIONING SYSTEM

The Absolute Position System (APOS®) was developed for automated conveying and materials handling systems. The control system can constantly query the absolute position of the mobile consumer.

The embedded APOS® Magnetic Positioning System can be used in combination with SMGX (SMGM) data transmission system.



FEATURES

- Absolute position determination up to 262 m (859 ft 6.96 in)
Additional extended lengths are available upon request
- Saves space by integrating directly into the Powerail system
- Absolute position immediately available when switching on or after a power failure
- Designed for use in harsh environments, including humid, dusty and low-lighting environments
- Travel speed up to 250 m / min (820 ft / min)
- Retrofittable
- Contactless
- No wear and tear

For more information about APOS®, see our catalog.



KBH, APOS® and SMGX installations for automating the crane in an industrial warehouse

VCOM (SMGM, SMGX) DATA TRANSMISSION SYSTEM

VAHLE's Slotted Microwave Guide Mini (SMGM) and Slotted Microwave Guide Extreme (SMGX) are mobile data transmission systems designed to meet the high data rates required for complex applications.

The SMGM is for indoor applications, including EMS, skilnet and shuttle systems.

The SMGX is for outdoor and more complex applications, including crane systems and amusement rides.

Various segment lengths and mechanical tolerances are available.



FEATURES

- RS 485 Interface (transparent protocol)
- High frequency (HF) secure interference-free design
- Radio license not required
- Low-wear skids and pressure spring for stable mechanical guide and steady immersion depth of the data coupler
- Secure data signals and transmission quality in straight and curved sections
- Approved for use in people-safe applications
- Wireless data transmission
- No IP address required

HIGHLIGHTS

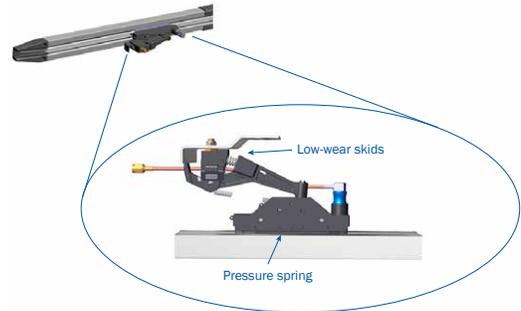
HF-SECURE

The interference-free profile design prevents signals from transmitting beyond the aluminum housing, enabling the systems to work alongside other industrial free radio systems. A radio license is not required. All HF components are factory tested and measured before each delivery, ensuring steady HF behavior.



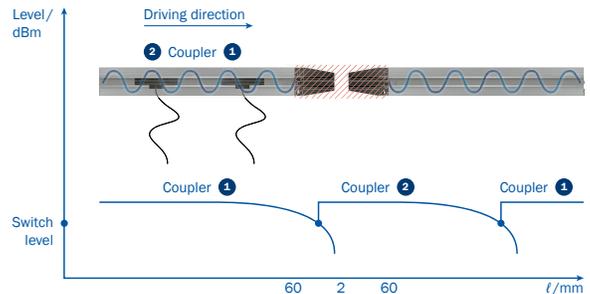
STEADY SIGNAL QUALITY

Low-wear skids and a pressure spring provide a stable mechanical guide and steady immersion depth of the data coupler into the SMG profile, guaranteeing secure signals and data transmission quality even in curved stretches.



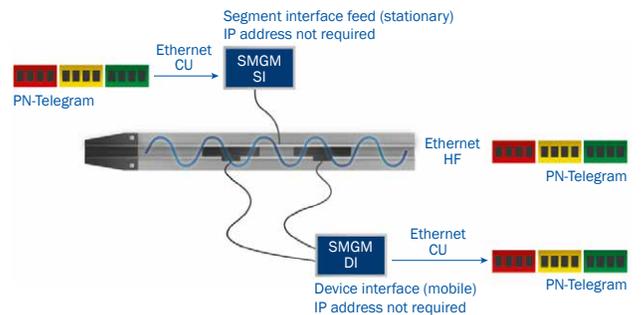
RELIABLE DATA TRANSMISSION

Connected data couplers ease segment transitions for interruption-free data transmission. VAHLE's SMGM technology is suitable for use in people-safe applications.



TRANSPARENT SYSTEM

Data transmission through SMGM occurs wirelessly within the SMG profile and no changes to the data occur during the transfer (packet-oriented). The SMGM interface does not require IP addresses.



QUESTIONNAIRE

To request a quote, complete the questionnaire and return to sales@vahleinc.com or your VAHLE sales rep. The questionnaire can be completed digitally (using Adobe Acrobat) or by filling out a hard copy and scanning or photographing with your smartphone. To help optimize the busbar system, please include information about your motors. VAHLE can provide the electrical calculation report and installation drawing with the quote.

Name: _____ Company: _____ 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 _____ in (max. 2 m or 6 ft 6.74 in) Other: _____

7. Number of consumers per system: _____

8. System location: Indoor system Outdoor system

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

10. Ambient temperature: _____ °F min. _____ °F 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: _____ in/min in curves: _____ in/min at transfers: _____ in/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: _____

(1) Sketches are required for quoting more complex requests, such as curved tracks or conductor systems with isolating sections.

Motor data	Crane 1 / Machine 1						Crane 2 / Machine 2							
	Power kW	Nominal current			Starting current		Type of motors ⁽¹⁾	Power kW	Nominal current			Starting current		Type of motors ⁽¹⁾
		A	cos φ _N	% duty	A	cos φ _A			A	cos φ _N	% duty	A	cos φ _A	
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

(1) Use the following key to indicate the types of motors: K = Squirrel cage motor | S = Slipring motor | F = Frequency-controlled motor

Please use the following markups to indicate the following types of motors in the table.

* Motors that can run simultaneously

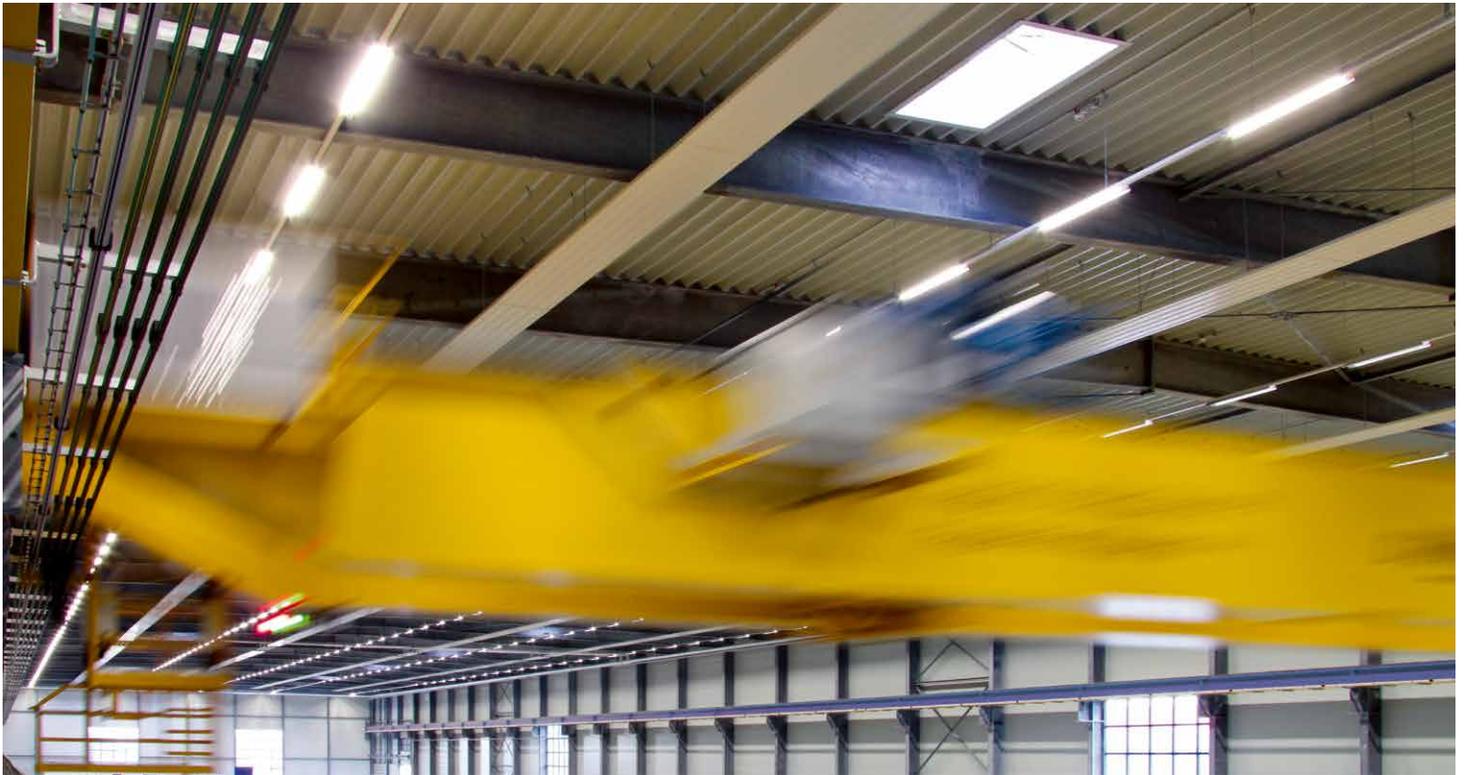
Δ Motors that can start up simultaneously

Further remarks: _____

Signature: _____

Date: _____

KBH INSTALLATIONS IN INDUSTRIAL PLANTS





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