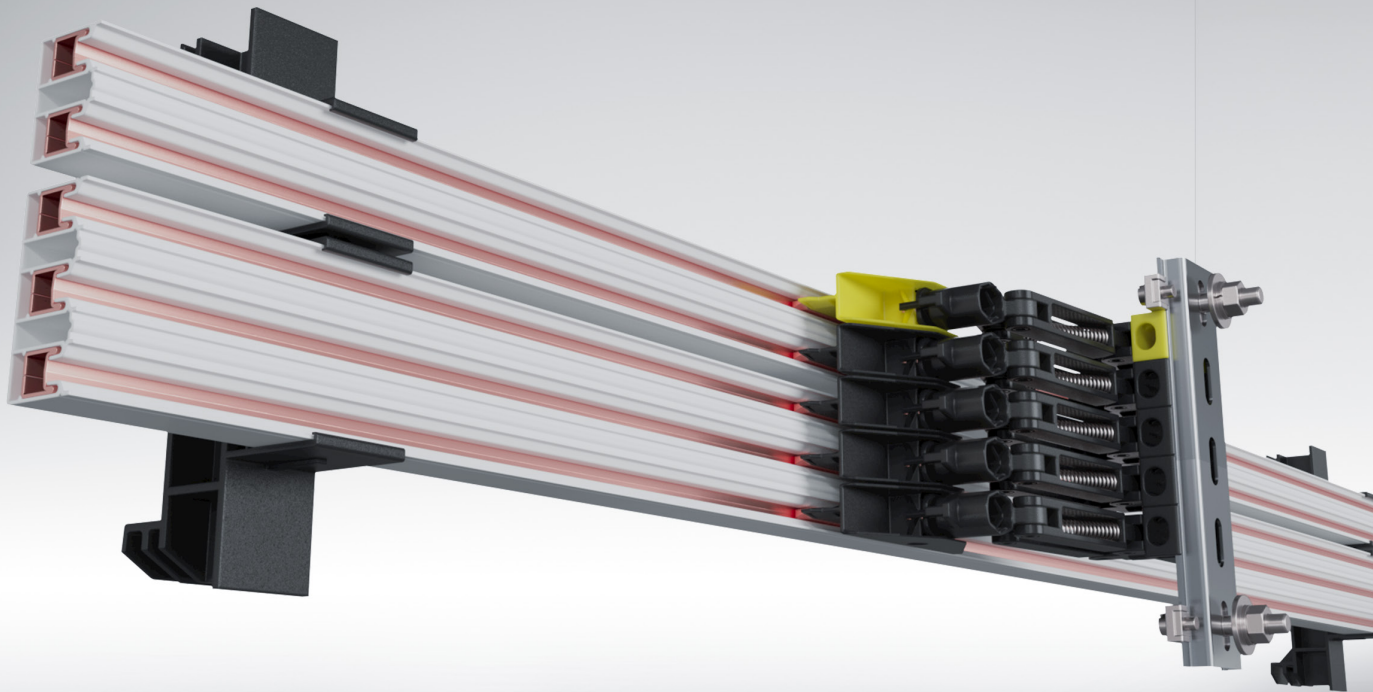
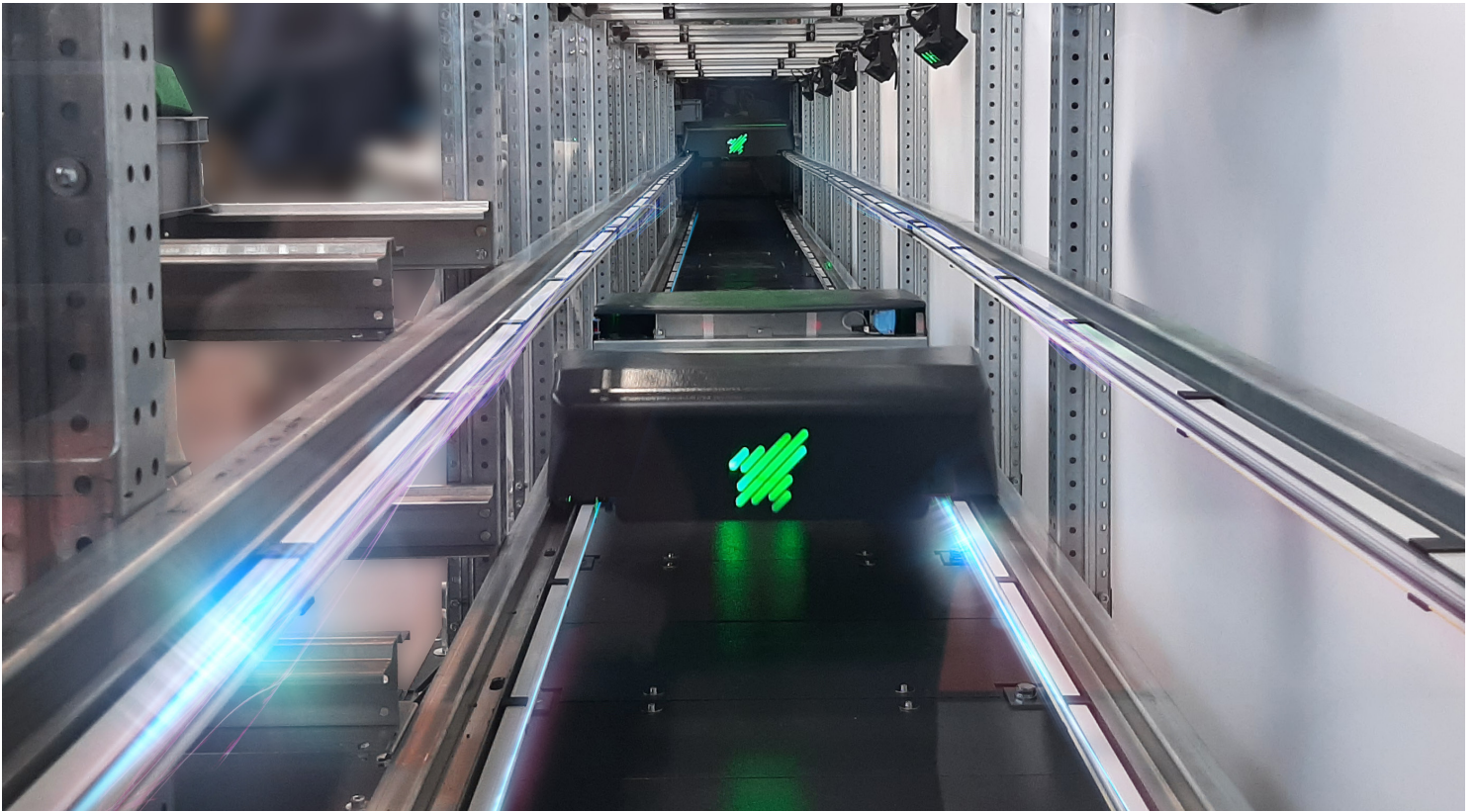


VCL

COMPACT CONDUCTOR SYSTEM



APPLICATION EXAMPLES - PALLET SHUTTLE SYSTEMS



GENERAL

The two-pole compact conductor system VCL was developed specifically for various intralogistics applications. With its compact size and durability, the VCL possesses the ideal properties for small parts warehouse shuttle applications or for other transfer carriages. Additionally, installing VCL is simple due to minimal parts and an easy clip-fastening system.

Safety

The compact conductor system, VCL, has been designed according to VDE 0100. It complies with current conductor system safety requirements and is protected against accidental contact according to VDE 0470, part 1 (protection class IP 2X).

The current collectors are protected against contact only if the carbon brushes are fully located in the conductor rails. For conductor rail systems located at arm's length, where under normal operation the current collectors leave the conductor rails, contact protection must be provided on site, e. g. by means of barriers or by switching off. This, however, only applies to voltages above 25 volts AC or 60 volts DC.

Fig. 1 shows that the VDE finger cannot touch live parts. The insulation rail covering the conductor rail offers good insulation for maximum safety. Any number of conductors can be installed side by side at minimum space requirement.

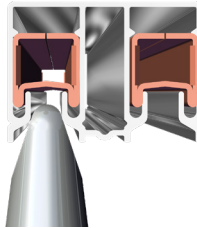


Fig 1: VDE finger

Standard rail sections are 4m long, but shorter sections are available. The ground conductor is yellow, marked with a continuous green stripe at the insulating housing.

Hangers

The maximum support distance between hangers is 0.8m. Using VMT Support Profile, VCL can be also applied for high-bay storage systems and AS/RS systems with support distance up to 3.5m (see page 5).

Joints

Joints are used for the electrical and mechanical connection of the conductor rail sections. Every joint is protected against contact with a joint cap.

Application

For indoor systems with travel speeds of up to 300 m/min.

Specially designed for pallet shuttle systems.

Approvals

UL-approved.

Expansion

System lengths of up to 150 meters can be installed without additional expansion sections.

Feeds

The feeds can be realized as an end feed via the transfer guides or on the line as a line feed.

Transfer guides

Transfer guides are the contact-protected ends of the conductor rails at the end of the lines and mechanical line interruptions (switches, dropout sections, etc.). Transfer guides are available with or without feed capability.

Current collectors

The current collectors are manufactured from impact-resistant plastic and stainless steel parts. The current is drawn via a carbon brush.

The length of the current collector connection cable may not exceed 3 m if the downstream overcurrent protection device is not designed to handle the capacity of the connection cable. Refer also to DIN VDE 0100, part 430 and DIN EN 60204-32. (Note: this is often the case if more than one collector is used in the system).

The cross section of the supplied connecting cables is designed for the stated nominal currents. The reduction factors according to DIN VDE 0298-4 must be observed for the various laying procedures.

According to DIN EN 60204-1 and DIN EN 60204-32, the continuity of the ground conductor system via sliding contacts must be ensured using suitable measures. As a simple and suitable measure, it is recommended to double the PE current collector.

SAFETY INFORMATION

To avoid pinching, ensure that the arrangement of the conductor system and current collectors / tow arms provides a minimum distance of 0.5 m between fixed and mobile plant parts.

TECHNICAL SPECIFICATIONS

Isolating profile

Electrical values: Dielectric strength according to DIN 53481	Specific resistance according to IEC 60093	Surface resistance according to IEC 60093	Comparative tracking index according to IEC 60112	Service temperature ⁽¹⁾	Flammability
>22.4 kV/mm	>8 x 10 ¹⁵ ohm x cm	2 x 10 ¹³ ohm x cm	CTI > 400	-30 °C to +55 °C	Flame-retardant, self-extinguishing, UL 94 V0

VCL2 | VCL3. MODULAR DESIGN FOR 2-6 POLES

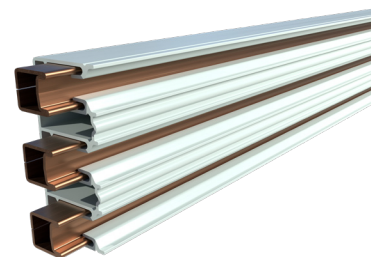
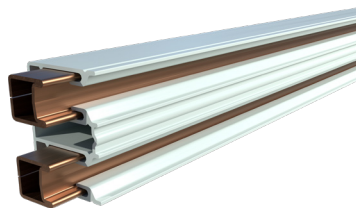
Length

The standard section length is **4m**.

Shorter sections are available.

2-pole and 3-pole sections.

The combination of 2 sections creates 4-6 poles.



Support spacing

0.8 m for installation in straight runs.

With **VMT Support Profile** (catalog 03c) the support spacing may be increased to **3.5m**.

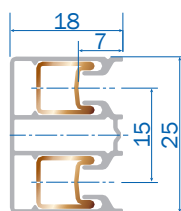
Conductor spacing

15 mm

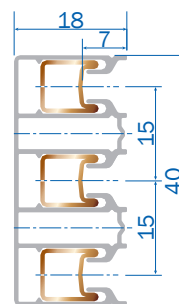
Application

Only for indoor systems

VCL2



VCL3



Conductor system data

Type	Conductor cross section ⁽²⁾ mm ²	Creepage distance of insulation mm	max. voltage V	max. continuous current A	Resistance ohm/1000 m	Impedance ⁽³⁾ ohm/1000 m
VCL2/100C & VCL3/100C	25	32	AC/DC 48V	100	0.721	0.723
VCL2/40F ⁽⁴⁾ & VCL3/40F ⁽⁴⁾			AC 500V	40	3.844	3.846

Conductor system sections

Type	Conductor material	Weight kg/m	No. of Poles	Phase suffix SSD, Order No.	phase + PE (Ground) suffix HSD, Order No.	Comments
VCL2/100C-4000	C-copper	2.406	2	0281524	0281534	Last digit of the order number indicates the length in meters. Standard length is 4m. Please replace the last digit of the order number from 4 to 1,2 or 3 for short sections.
VCL3/100C-4000	C-copper	2.406	3	0281584	0281594	
VCL2/40F-4000	F-galv.steel	2.190	2	0281544	0281554	
VCL3/40F-4000	F-galv.steel	2.190	3	0281604	0281614	

(1) For applications permanently below 0 °C (cold storage), please consult separately.

(2) C = conductor material copper; F = conductor material galvanized steel

(3) At phase spacing of 15 mm and frequency of 50 Hz.

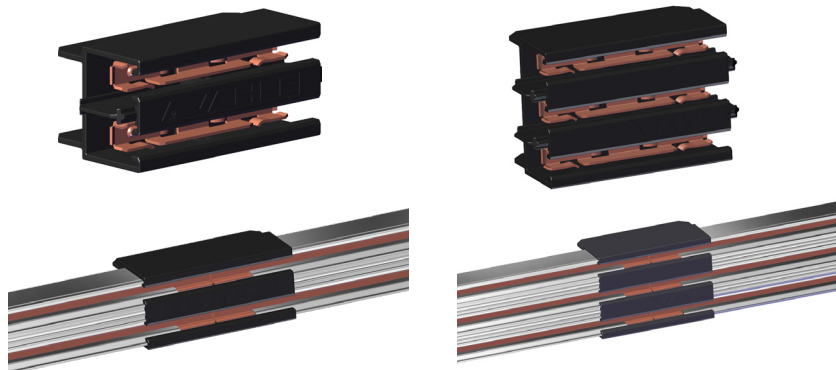
(4) VCL2/40F and VCL3/40F max. feed length 100 meters

ACCESSORIES

Connector (Connecting material)

100 Amps

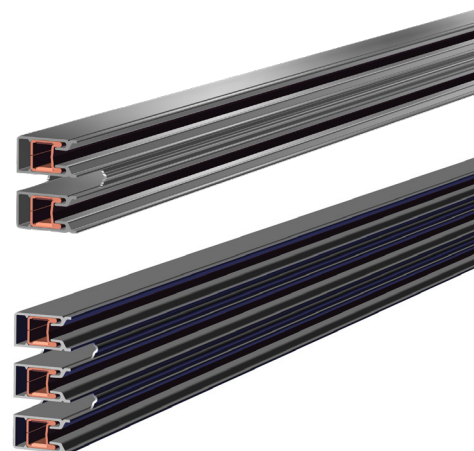
Type	Description	Weight kg	Order No.
VM-VCL2-7	Joint connector, plug-in. 2 poles	0.024	0281559
VM-VCL3-7	Joint connector, plug-in. 3 poles	0.235	0281577



End segment**, L=1m

Application: for line start and end with transfer guide

Type	Weight kg/m	Order No. phase	Order No. phase + PE
ESM-VCL2-100C-SSD	0.324	0281510	-
ESM-VCL2-100C-HSC-R*		-	0281515
ESM-VCL2-100C-HSC-L*		-	0281518
ESM-VCL2-40F-SSD	0.297	0281516	-
ESM-VCL2-40F-HSC-R*		-	0281517
ESM-VCL2-40F-HSC-L*		-	0281519
ESM-VCL3-100C-SSD	0.662	0281578	-
ESM-VCL3-100C-HSC-R*		-	0281579
ESM-VCL3-100C-HSC-L*		-	0281580
ESM-VCL3-40F-SSD		0281585	-
ESM-VCL3-40F-HSC-R*		-	0281586
ESM-VCL3-40F-HSC-L*		-	0281587



Transfer guide**

with or without feed

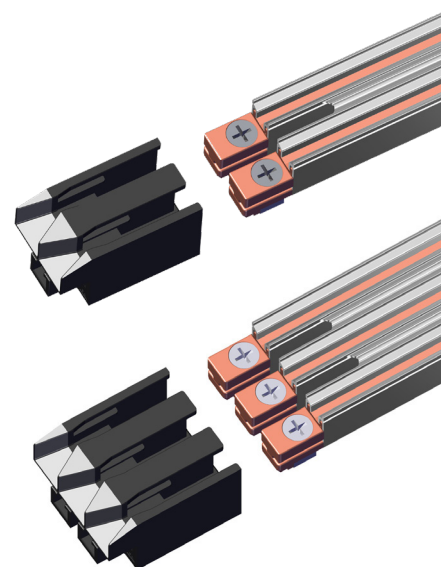
(also used as end caps and as a fixpoint in connection with the provided carrier profile)

max. vertical and lateral offset ± 3 mm to each other,

please contact us for greater tolerances,

for use as infeed max 50 amps.

Type	Description	Weight kg	Order No. Height 27
US-VCL2-7-F	Transfer guide with fixpoint	0.055	0281556
US-VCL2-7	Transfer guide without fixpoint	0.052	0281555
US-VCL3-7-F	Transfer guide with fixpoint	0.073	0281588
US-VCL3-7	Transfer guide without fixpoint	0.073	0281589



* Lines with PE marking require 1x end segment...-HSC-R and 1x end segment...-HSC-L

** Pre-assembled unit with transfer guide or transfer guide with connecting cable on request

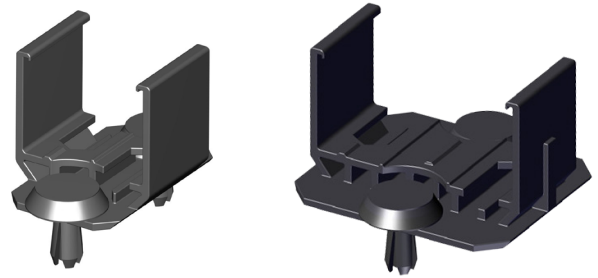
ACCESSORIES

Hanger

For clip or screw fastening,
expanding rivet is included in scope of delivery

Type	Description	Weight kg	Order No.
AH-VCL2-7	Hanger / Support	0.004	0281520
AH-VCL3-7	Hanger / Support	0.005	0281590

Customer-specific supports are available on request

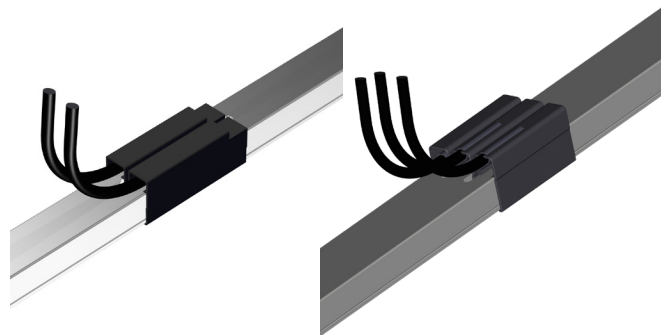


Line feed*

Straight section, L=1m, max. current 50A or 100A

Type	Weight kg	Order No. phase	Order No. phase + PE
ES-VCL2/100C-50A-SSD	0.324	0281502	-
ES-VCL2/100C- 100A -SSD		0281622	-
ES-VCL2/100C-50A-HSC		-	0281503
ES-VCL2/100C- 100A -HSC		-	0281623
ES-VCL2/40F-50A-SSD	0.297	0281504	-
ES-VCL2/40F-50A-HSC		-	0281505
ES-VCL3/100C-50A-SSD	0.947	0281595	-
ES-VCL3/100C- 100A -SSD		0281620	-
ES-VCL3/100C-50A-HSC		-	0281596
ES-VCL3/100C- 100A -HSC		-	0281621
ES-VCL3/40F-50A-SSD		0281597	-
ES-VCL3/40F-50A-HSC		-	0281598

* Pre-assembled straight section with connection on request

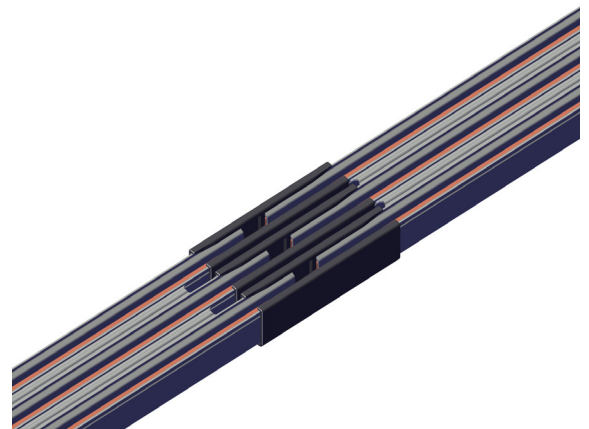


Expansion joint

Straight section, L=1m, max. current 50A

More than 50 A can be realized with cable bridge.

Type	Weight kg	Order No. phase	Order No. phase + PE
DT-DVCL2/100C-SSD	0.324	0281506	-
DT-DVCL2/100C-HSC		-	0281507
DT-DVCL2/40F-SSD	0.297	0281508	-
DT-DVCL2/40F-HSC		-	0281509
DT-DVCL3/100C-SSD	0.953	0281599	
DT-DVCL3/100C-HSC			0281600
DT-DVCL3/40F-SSD		0281605	
DT-DVCL3/40F-HSC			0281606



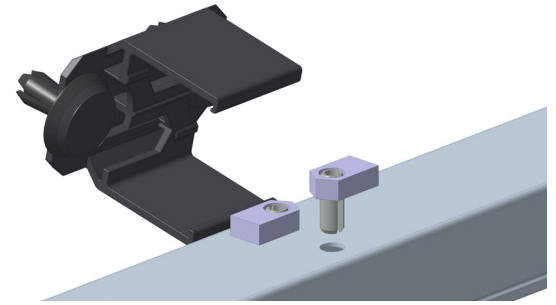
ACCESSORIES

Locating clamp / Fixpoint terminal

Permissible only for voltages up to 48 volt.

Can be applied in special cases if the transfer guide cannot be used and a fixpoint is needed for technical reasons.

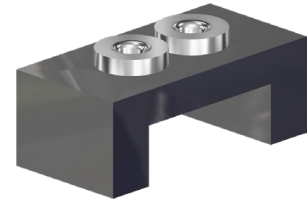
Type	Description	Weight kg	Order No.
FK-AH-VCL2/3	Locating clamp VCL2	0.020	0281527



Drill template

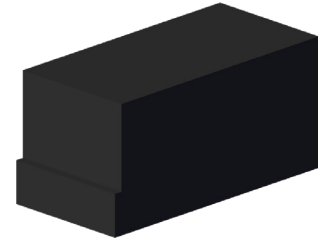
For fixpoint terminal

Type	Description	Weight kg	Order No.
MZ-BS-AH-VCL2	Drilling template for fixpoint	0.050	0281525



Assembly safety device

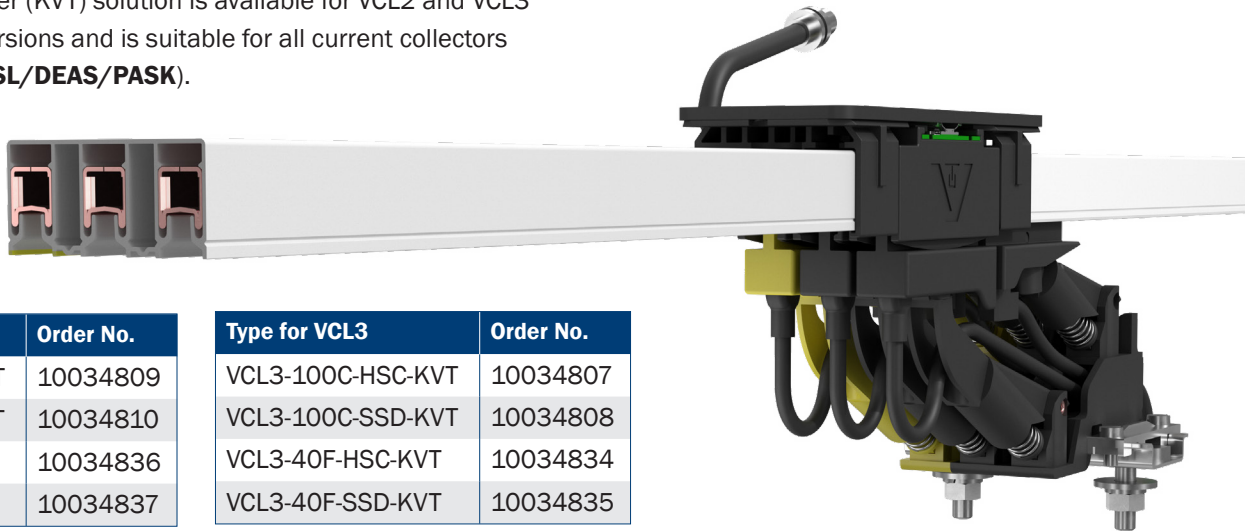
Type	Description	Weight kg	Order No.
MZ-MK-VCL2	Assembly safety device	0.050	0281526



Brush Wear Indicator KVT

Including 1 meter section, installed in the middle of the section.

The carbon wear tester (KVT) solution is available for VCL2 and VCL3 in 40 A and 100 A versions and is suitable for all current collectors in the VCL range (**EASL/DEAS/PASK**).



Type for VCL2	Order No.	Type for VCL3	Order No.
VCL2-100C-HSC-KVT	10034809	VCL3-100C-HSC-KVT	10034807
VCL2-100C-SSD-KVT	10034810	VCL3-100C-SSD-KVT	10034808
VCL2-40F-HSC-KVT	10034836	VCL3-40F-HSC-KVT	10034834
VCL2-40F-SSD-KVT	10034837	VCL3-40F-SSD-KVT	10034835

- Enables predictive maintenance and ensures system availability - by recognising upcoming replacement intervals at an early stage, maintenance can be planned and faults and damage caused by worn carbon brushes are avoided
- Compact and easy to integrate - extremely compact dimensions enable installation in all applications
- Simple integration into the system peripherals - only requires a 24 VDC supply voltage & a DC input on the customer's control system to function
- Suitable for retrofitting - can be retrofitted to existing systems at any time

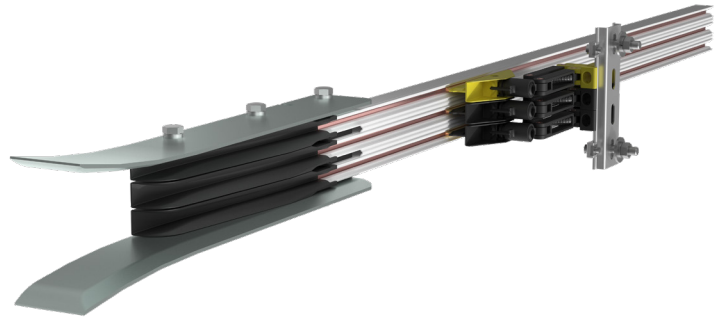
HSF MODULAR HIGH-SPEED FUNNEL & CURRENT COLLECTOR

SYSTEM INFORMATION

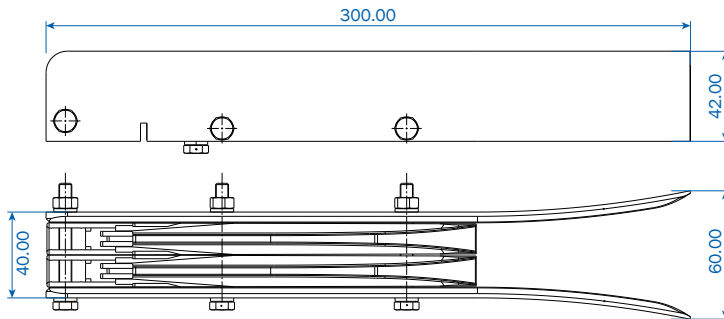
- For all versions of the VCL 2 and VCL 3
- Consists of High-Speed Funnel & corresponding **PASK** Collector with stroke limitation
- Factory preassembled funnel module on 1 m VCL section

TECHNICAL DATA

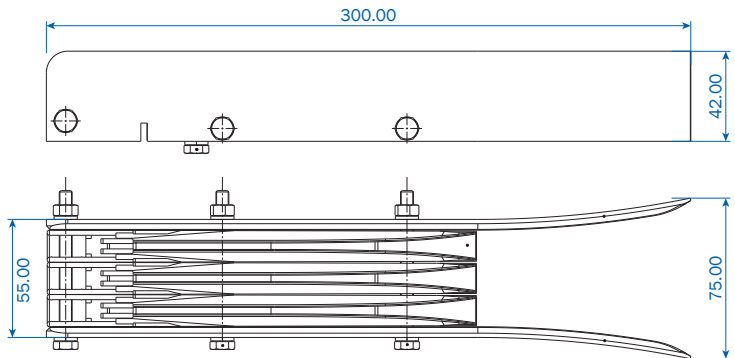
- Funnel type specification **HSF-VCL...**
- Collector type specification **SA-PASK-50...HSF**
- Travel speed Up to 240 m/min (4 m/s)
- Installation dimension 75 mm
- Possible entry tolerances ± 5 mm to all directions
- Travel direction Standard und reverse operation
- Max. current per collector 50 A / Connection cable: 6 mm²



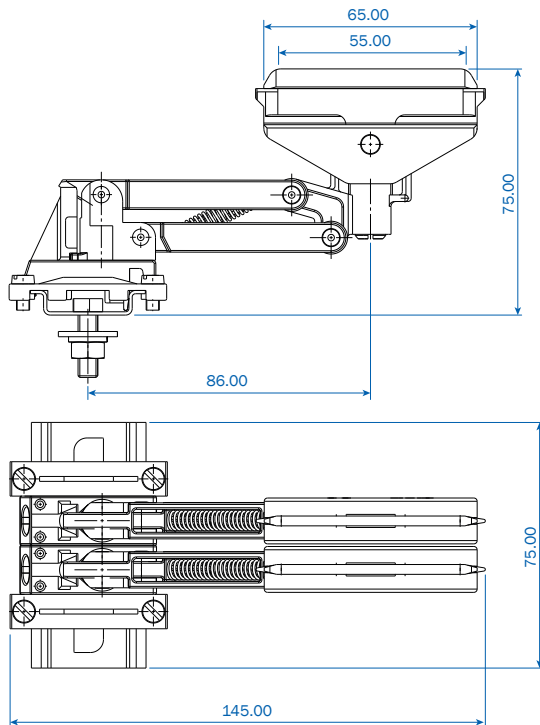
Modular funnel HSF for VCL 2



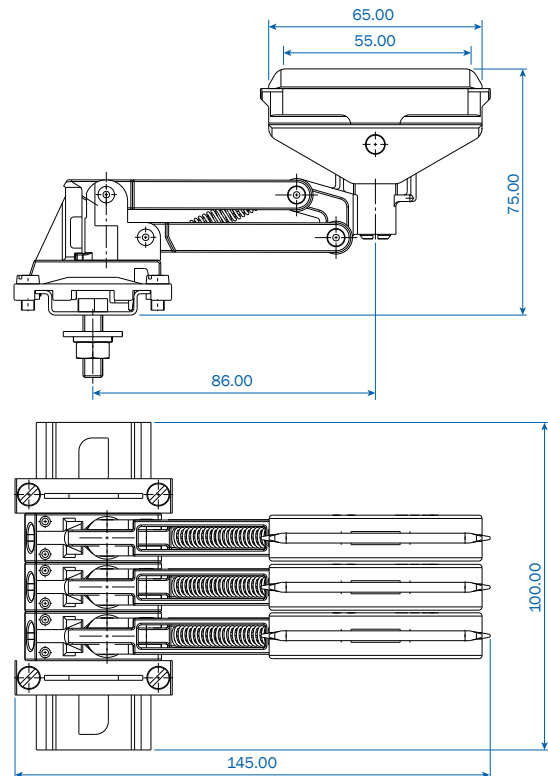
Modular funnel HSF for VCL 3



HS-Collector PASK... HSF for VCL 2



HS-Collector PASK... HSF for VCL 3



CURRENT COLLECTORS

Current collector set DEAS (D-EAS)

Suitable for funnel

Phase spacing: 15 mm

Max. current: 30 A

Lift ± 12 mm, Swivel ± 20 mm

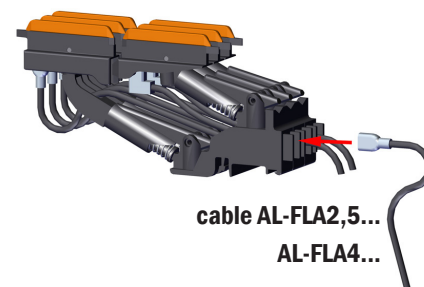
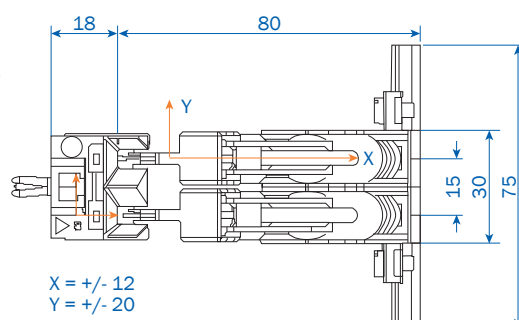
Contact pressure: ~ 4 N per carbon brush

HS version has PE/Ground marked collector

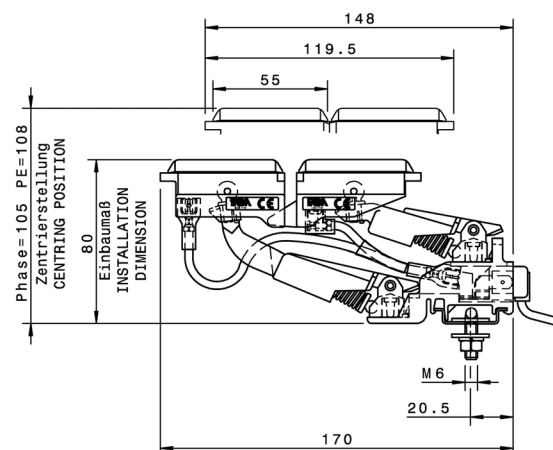
SS version is for control current

Connecting cables are ordered separately

See page 12.



Type	Number of poles	Weight kg	Order No.
SA-DEAS-2/30-2-SS-2.5-0/2-2-PA	2	0.302	2823983/00
SA-DEAS-2/30-2-HS-2.5-0/2-2-PA	2 (PE)	0.302	2823998/00
SA-DEAS-2/30-3-SS-2.5-0/2-2-PA	3	0.400	0281610/00
SA-DEAS-2/30-3-HS-2.5-0/2-2-PA	3 (PE)	0.400	0281615/00
SA-DEAS-2/30-4-HS-2,5-1/4-4	4 (PE)	0.708	2823606/00



Current collector set EASL

Phase spacing: 15 mm

Max. current: 20 A

Lift ± 15 mm, Swivel ± 20 mm

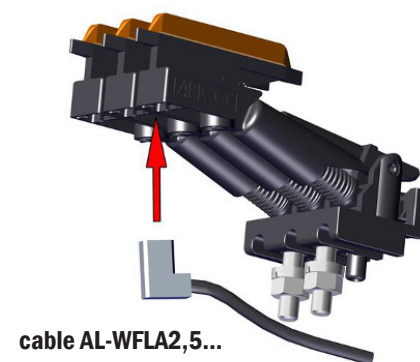
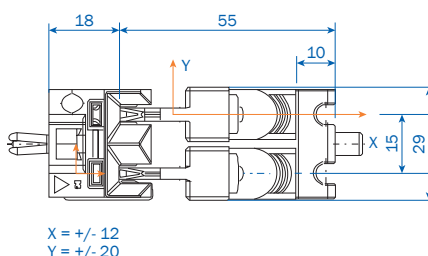
Contact pressure: approx. 4 N per carbon brush

HS version has PE/Ground marked collector

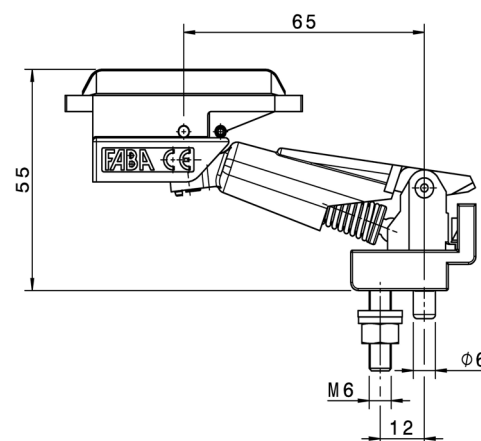
SS version is for control current

Connecting cables are ordered separately

See page 12.



Type	Number of poles	Weight kg	Order No.
SA-EASL-20-2-SS-0-2-PA-V.E	2	0.098	2823982/00
SA-EASL-20-2-HS-0-2-2-PA-V.E.	2 (PE)	0.098	2823997/00
SA-EASL-20-3-SS-0-2-PA-V.E	3	0.120	0281616/00
SA-EASL-20-3-HS-0-2-2-PA-V.E.	3 (PE)	0.120	0281617/00
SA-EASL-20-4-SS-1,5-0,5-4-V.E.	4	0.150	2808079/00
SA-EASL-20-4-HS-1,5-0,5-4-V.E.	4 (PE)	0.150	2808078/00



CURRENT COLLECTORS

Current collector set PASK

Suitable for funnel

Phase spacing: 15 mm

Max. current: 50 A

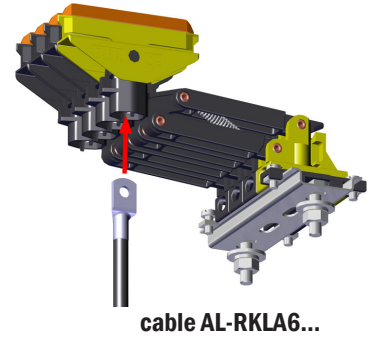
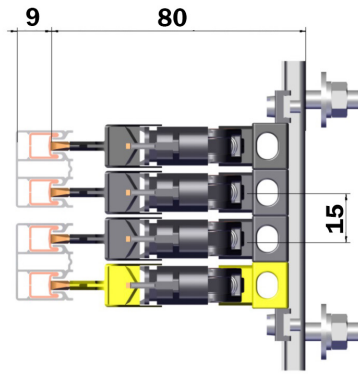
Lift ± 15 mm, Swivel ± 20 mm

Contact pressure: approx. 4 N per carbon brush
only HS version with PE/Ground marked collector
to be used only with HS version VCL (with PE/Ground)
VCL3 and VCL4-6 (with Support Profile VMT).

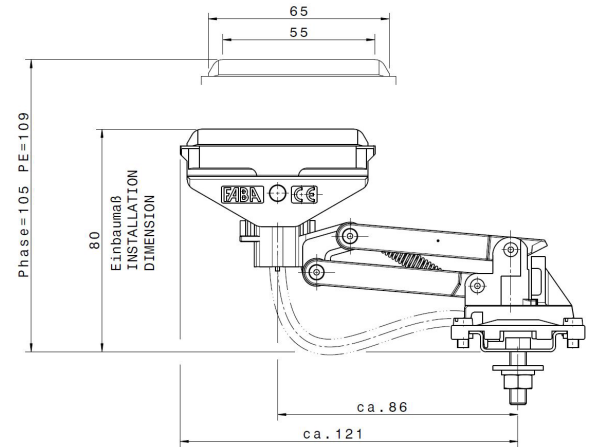
The letter (in bold) indicates the design of the current collector.

i.e. SA-PASK-50-3**L**-HS/3-4

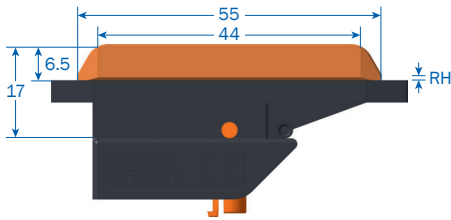
R = right version, **L** = left version



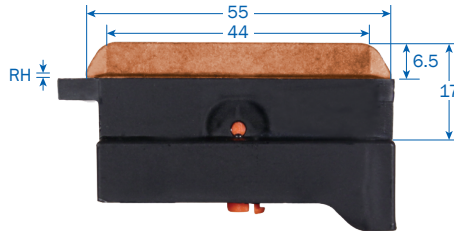
Type	Number of poles	Order No.
SA-PASK-50-3L-HS/3-4	3 (PE)	0281633/00
SA-PASK-50-3R-HS/3-4	3 (PE)	0281634/00
SA-PASK-50-4L-HS/4-4	4 (PE)	0281624/00
SA-PASK-50-4R-HS/4-4	4 (PE)	0281627/00
SA-PASK-50-5L-HS/5-6	5 (PE)	0281625/00
SA-PASK-50-5R-HS/5-6	5 (PE)	0281628/00
SA-PASK-50-6L-HS/6-6	6 (PE)	0281626/00
SA-PASK-50-6R-HS/6-6	6 (PE)	0281629/00



SPARE BRUSHES FOR CURRENT COLLECTORS



EAS



DEAS (Rear collector brush)



DEAS (Front collector brush)

Type	Description	RH ⁽¹⁾ , mm	Weight kg	Order No.
SK-EK-DEAS-2/30-PH-32-6.3-H	Rear collector brush Phase for DEAS	0.5	0.016	2808580
SK-EK-DEAS-2/30-PH-32-6.3-V	Front collector brush Phase for DEAS	0.5	0.016	2808575
SK-EK-DEAS-2/30-PE-36-6.3-H	Rear collector brush PE/Ground for DEAS	0.5	0.016	2808581
SK-EK-DEAS-2/30-PE-36-6.3-V	Front collector brush PE/Ground for DEAS	0.5	0.016	2808576
SK-EK-EAS-20-PH-36-6.3-PA	Collector brush Phase for EAS(L)	0.5	0.014	2820750/00-PA
SK-EK-EAS-20-PE-36-6.3-HG-PA	Collector brush PE/Ground for EAS(L)	0.5	0.014	2820751/00-PA

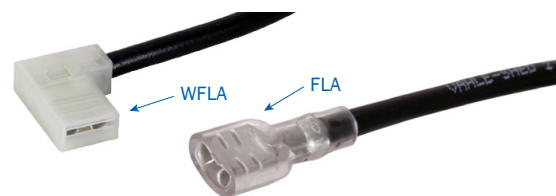
(1) RH stands for Remaining Height. The brush should be replaced with a new one when its wear approaches this value.

CONNECTING CABLES FLA, WFLA

Connecting cable FLA, WFLA, double insulated, highly flexible

For current collectors DEAS, EASL, cable length: 1 m, 3 m

Replace **x** in type, i.e. AL-WFLA2.5**x**-6.3, Phase, L=3m → AL-WFLA2.5**PH3**-6.3



For current collectors DEAS, EASL

Type (collectors DEAS, EASL)	Cross section mm ²	A Ø mm	Order No. Phase black L=1m (x=PH1)	Order No. PE green/yellow L=1m (x=PE1)	Order No. Phase black L=3m (x=PH3)	Order No. PE green/yellow L=3m (x=PE3)
AL-WFLA2.5 x -6.3	2.5	4.5	2809179/00-1	2809183/00-1	0168107/00-3	0168108/00-3
AL-FLA2.5 x -6.3	2.5	4.5	2809171/00	2809175/00	2809173/00	2809177/00
AL-FLA4 x -6.3	4.0	5.3	2823085/00-1	2823086/00-1	2823085/00-3	2823086/00-3

CONNECTING CABLES RKLA

Connecting cable RKLA, double insulated, flexible

- For current collectors PASK with cable lug M4, cable length: 1 m, 3 m.
- For transfer guides with cable lug M5, cable length: 1 m, 5 m .
- For line feeds with cable lug M6, cable length: 1 m, 5 m.



Replace **x** in type, i.e. AL-RKLA2.5**x**-M6, Phase, L=1m → AL-RKLA2.5**PH1**-M6

For current collectors PASK

Type (collectors PASK)	Cross section, mm ²	A Ø mm	lug	Order No. Phase black L=1m (x=PH1)	Order No. PE green/yellow L=1m (x=PE1)	Order No. Phase black L=3m (x=PH3)	Order No. PE green/yellow L=3m (x=PE3)
AL-RKLA2.5 x -M4	2.5	4.5	M4	2808979/00	2808978/00	2808979/00-5	2808978/00-5

For transfer guides

Type (transfer guides)	Cross section, mm ²	A Ø mm	lug	Order No. Phase black L=1m (x=PH1)	Order No. PE green/yellow L=1m (x=PE1)	Order No. Phase black L=5m (x=PH5)	Order No. PE green/yellow L=5m (x=PE5)
AL-RKLA2.5 x -M5	2.5	4.5	M5	2808971/00	2808958/00	2808971/00-5	2808958/00-5
AL-RKLA4 x -M5-HL	4.0	5.3	M5	2821809/00	2821810/00	2821809/00-5	2821810/00-5
AL-RKLA6 x -M5-HL	6.0	6.5	M5	2808965/00	2808967/00	2808965/00-5	2808967/00-5

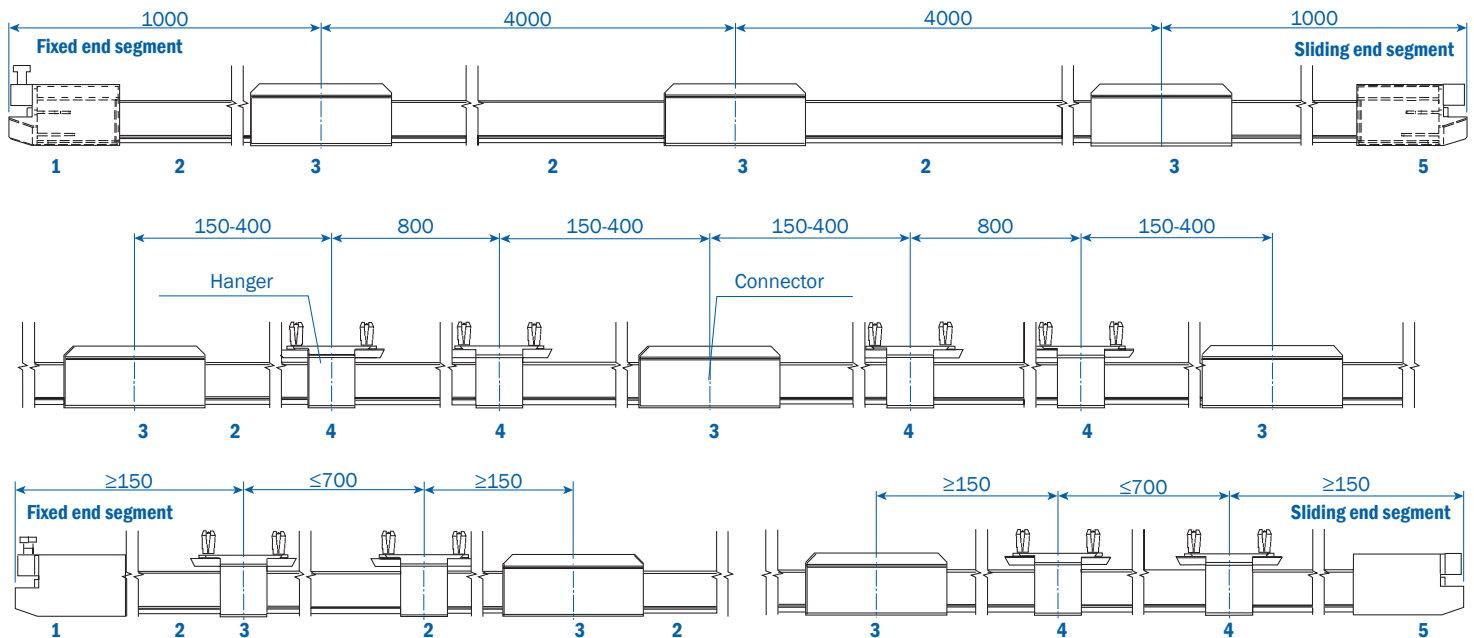
For line feeds

Type (line feeds)	Cross section, mm ²	A Ø mm	lug	Order No. Phase black L=1m (x=PH1)	Order No. PE green/yellow L=1m (x=PE1)	Order No. Phase black L=5m (x=PH5)	Order No. PE green/yellow L=5m (x=PE5)
AL-RKLA2.5 x -M6	2.5	4.5	M6	2808979/00	2808978/00	2808979/00-5	2808978/00-5
AL-RKLA4 x -M6-HL	4.0	5.3	M6	2808751/00	2808752/00	2808751/00-5	2808752/00-5
AL-RKLA6 x -M6-HL	6.0	6.5	M6	2808745/00	2808759/00	2808745/00-5	2808759/00-5
AL-RKLA10 x -M6-HL	10.0	8.3	M6	2808753/00	2808754/00	2808753/00-5	2808754/00-5
AL-RKLA16 x -M6-HL	16.0	8.3	M6	2808756/00	2808762/00	2808756/00-5	2808762/00-5

Cable Weight per meter for 2.5mm² ~0.04 kg/m, for 4mm² ~0.06 kg/m, for 6mm² ~0.1 kg/m

SYSTEM LAYOUT AND ORDER EXAMPLE

Conductor system layout (standard parts)



Standard parts:

1. Transfer guide used as a fixpoint
2. Conductor rail (2 or 3 poles)
3. Connector (Connecting material)
4. Hanger (Support)
5. Sliding transfer guide

Example: 80 meters, 2 poles. 48V DC, 50 A. SHUTTLE APPLICATION



TOOLS FOR INSTALLATION

See the installation manual for more information

Table saw

For cutting insulating profile and conductor rails with length stop.

Connection: 230 Volt, 50 Hz (110V 60Hz upon request).

Type	Weight kg	Order No.
Table saw KS 10	6.500	165276
Spare Blade SB	0.070	165263



Hexagon socket SW 4

Type	Weight kg	Order No.
Hexagon screwdriver 4 mm	0.036	2812962



Mounting handle for plug-in joint connector

Type	Weight kg	Order No.
MZ-MGF100	0.010	2809348



Deburring tool flat blunt file FSF

For deburring the outside of the conductor rail in case of shorter sections.

Type	Weight kg	Order No.
Flat blunt file FSF 150x16x4	0.085	2812964



Screw driver PH1

Type	Weight kg	Order No.
Phillips screwdriver PH 1	0.014	2812963



For a free quote, please submit your inquiry in your preferred format, including any relevant drawings and sketches.

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QUESTIONNAIRE VCL

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Please fill out the following questionnaire in order to determine which conductor bar system is right for your application. Copy / print this page, fill out the questionnaire, and send it to your VAHLE experts. For tracks with funnels etc., we require sketches to enable us to prepare a quotation. We can offer an alternative VAHLE system that suits your requirements.

Contact Information

Company Name

Contact Person

Address

Email Address

State ZIP

Phone Number

System Information

☐ New Application

☐ Replacement

☐ Add on existing system

Application Type (i.e. shuttles)
details are helpful: i.e. load

Desired Hanger Spacing m ft
max. 0.8 m
with VMT profile up to 3.5m

Total System Length m ft

Total Number of Conductors

System Layout
(Straight / Funnels / Other)

Will one be a ground conductor? ☐ Yes ☐ No

please provide sketches
or drawings when applicable

Power Requirements

Operating voltage Volt Hz

AC/DC

Total system amperage
(example 50A at 40% duty cycle)

Max. voltage drop allowed %
(typically 3% - 5%)

Power Feed(s) Location
(end feed, center feed, several feeds)

Duty Cycle % (DC, ED) %

No. of Devices / Consumers in the system

Power consumption
of each device hp, A, kW

Max. Travel Speed m/min ft/min

Type of motors
(usually frequency controlled)

☐ collector cable downwards ☐ collector cable lateral

If detailed motor information is available, please specify below

For the calculation, it is important to consider engines that can operate simultaneously. This helps to calculate and quote the optimal system.

Environment

Install Location
indoor / Cold Storage

Ambient Temperature min. max. °C °F

Interested in VAHLE certified installation? ☐ Yes ☐ No

Additional Comments: dirt, dust, salty air, corrosive, Please specify if you want data communication / positioning system.

Machine type 1. Information about motors kW, Amperes **or** hp.

	Motor name	Motor power	hp, Amp, kW	Type of Motors
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

example: Motor 1 main load, motor 2 main travel, motor 3 cross travel

Machine type 2. Information about motors kW, Amperes **or** hp.

	Motor name	Motor power	hp, Amp, kW	Type of Motors
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Please send us the form after it is filled out to receive a free quote.



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