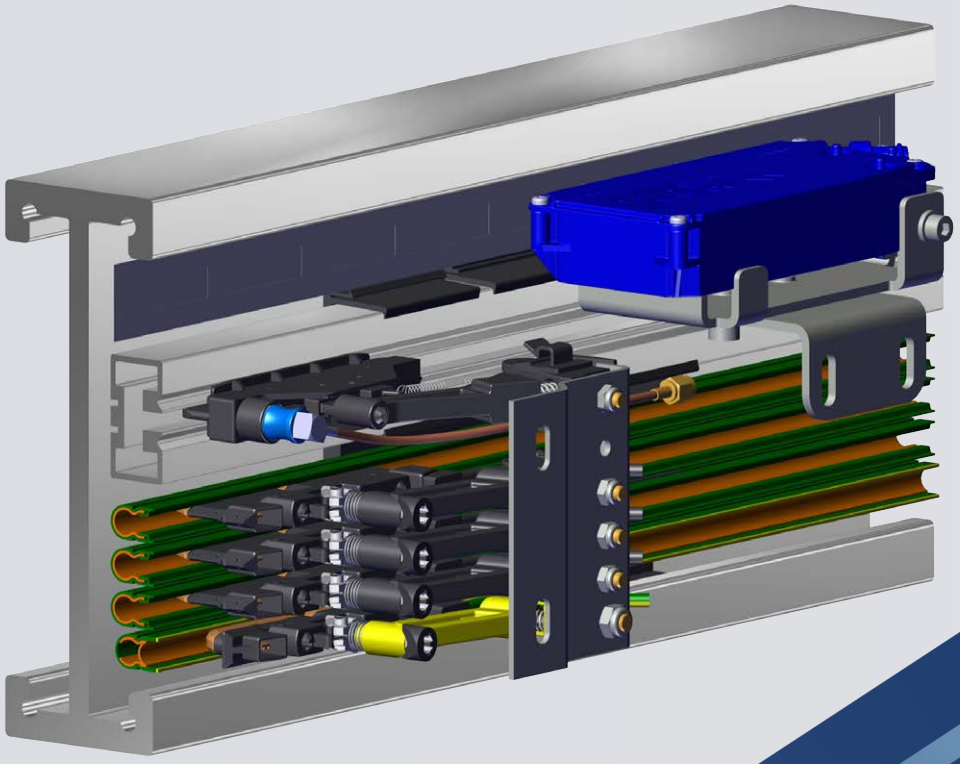
VAHLE

ORIGINAL OPERATING INSTRUCTIONS

INSULATED CONDUCTOR RAIL U10



SYSTEM MANUAL
INSTALLATION MANUAL
MAINTENANCE MANUAL

EN | V 1.04 | DCL 088

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1 DOCUMENT HISTORY

Material number	Version	Issue	Description/changes
-	1.01	09/2020	First issue
	1.02	09/2020	Adaptation maintenance current collector, editorial revision
	1.03	03/2023	Addition MK55, Protective measures (chapter 11), editorial revision
-	1.04	05/2023	Replacement drawings expansion connector (chapter 7.4.6), Modification Technical data (4), Travel speed, supplement funnel operation KESR 32-55, Note Wear of busbar (chapter 9.3), editorial revision

2 GENERAL

2.1 About these instructions

These operating instructions enable the safe and efficient handling of our VAHLE products. This document is an integral part of the installation and must be kept accessible to operating and maintenance personnel in the immediate vicinity. The basic requirement for safe working is compliance with all specified safety instructions and instructions. This documentation does not give instructions for operating the plant/machine in which our system is integrated. In addition, the local accident prevention regulations and general safety regulations for the use of the system apply. Diagrams are for basic understanding and may deviate from the actual version.

2.2 Symbols

Safety instructions in this manual are identified by symbols. Each safety instruction begins with a signal word that indicates the severity of the hazard. The various types of warnings and safety instructions and their structure are explained below.



DANGER!

The source of the hazard is described here.

This combination of a symbol and a signal word indicates an immediately dangerous situation that will result in death or serious injury unless avoided.

► The actions to prevent the hazard are identified here.



DANGER!

The source of an electrical hazard is described here.

This combination of a symbol and a signal word indicates an immediately dangerous situation related to electricity that will result in death or serious injury unless avoided.

► The actions to prevent the hazard are identified here.



WARNING!

The source of the hazard is described here.

This combination of a symbol and a signal word indicates a potentially dangerous situation that may result in death or serious injury unless avoided.

► The actions to prevent the hazard are identified here.



CAUTION!

The source of the hazard is described here.

This combination of a symbol and a signal word indicates a potentially dangerous situation that may result in light or moderate injury unless avoided.

► The actions to prevent the hazard are identified here.

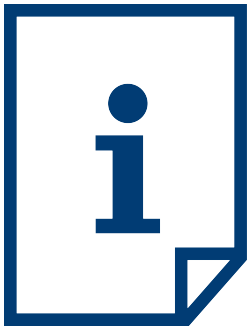


NOTICE!

The source of the hazard is described here.

This combination of a symbol and a signal word indicates a potentially dangerous situation that may result in property or environmental damage unless avoided.

► The actions to prevent the hazard are identified here.



NOTICE!

This indicates a reference to another place in this text or another document.

This combination of a symbol and a signal word indicates a reference to another place in this text or in a different document.

► The places in the text or references to other documents are identified here.



TIPS AND RECOMMENDATIONS!

► Simple tips and recommendations from our long years of experience are provided here.

2.3 Copyright protection

The contents of this manual are protected by copyright. Their use is permitted within the scope of the use of the installation. No further use is permitted without the written permission of the manufacturer. This manual may not be copied, given to any third party, reproduced in any form or by any means, including, but not limited to, exploitation and / or communication of the contents without the written permission of the manufacturer, except for internal purposes.

2.4 Disclaimer

The information in this document has been compiled in consideration of applicable standards and regulations, accepted rules of engineering, as well as our years of knowledge and experience.

The manufacturer shall not be liable for damages resulting from:

- Failure to observe the technical documentation
- Uses other than the intended use
- Use by personnel without the required training
- Unauthorized modifications or technical changes
- Use of non-approved spare parts or accessories

The actual scope of delivery may vary from the descriptions and images in this document in case of custom versions, the selection of additional order options, or due to latest technical changes.

The obligations agreed in the supply contract, the general terms and conditions and the terms and conditions of delivery, and the laws and regulations applicable at the time the contract was signed all apply.

We reserve the right to make technical changes to improve the usability and for further development.

2.5 Customer service

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Fax: +49(0) 2307 704-4 44
59174 Kamen, GERMANY
Email: info@vahle.de
Web: http://www.vahle.de
Country of origin: Germany

2.6 Warranty

2.6.1 Warranty terms and conditions

The information in this document has been compiled in consideration of applicable standards and regulations, accepted rules of engineering, as well as our accumulated years of knowledge and experience.

The warranty period and the scope of the warranty are defined in the terms of the contract and the general terms and conditions of delivery of Vahle GmbH & Co. KG.

Our general terms of warranty and delivery are published on our website. www.vahle.de



⚠ WARNING!

No liability in case of unauthorized changes, modifications, or accessories!

Changes or modifications to the delivered product require the permission of the manufacturer. Genuine spare parts and manufacturer-approved accessories provide safety. The use of non-approved parts voids any liability of the manufacturer.

► Always consult the manufacturer first!

The warranty immediately expires if one or several of the following situations arise(s):

- If the product is modified without permission from Vahle.
- If the operator independently performs repairs during the warranty period or has repairs performed by third parties.
- If the product has been handled or maintained inappropriately.
- If parts are used that are not original parts approved by Vahle.
- If the information in this documentation is not observed.

3 SAFETY INSTRUCTIONS

3.1 Safety

This section gives an overview of all important safety aspects relating to the protection of personnel as well as the safe use and fault-free operation. Other, task-specific safety instructions can be found in the sections on the individual phases of the product's life.



DANGER!

Failure to observe the safety instructions may result in risks to life and health!

3.2 Intended use

Insulated conductor rails (type U10) are contact-protected 1-pin conductor rails. The 1-pin conductor rail profile can be combined with any number of pins and allows direct routing in track supports and support profiles. The conductor rail is only to be used for indoor installations. They can be arranged hanging or on their side.

Appropriate use also includes observance of all information provided in these instructions.

Any use beyond or other than the appropriate use, any conversion, or other modification, is considered misuse and is prohibited.



WARNING!

Danger in case of improper use!

Misuse may cause dangerous situations.

- ► Using the system in any way that is not in compliance with its intended use is prohibited.
- ► Using the system in any way that is not in compliance with the safety instructions is prohibited.
- ► People who have not received appropriate instruction are not permitted to operate the system.
- ► Improper changes or conversions to the conductor rail are prohibited.

Claims for damages resulting from improper use shall be invalid.

3.3 General risks

The following section describes residual risks that arise even if the product is used as intended. Observe the safety instructions listed here in the other sections of these instructions to reduce the risk of injuries or damage to property and equipment and to avoid dangerous situations.

Do not change or modify the system inappropriately!



⚠ WARNING!

Risk of death from improper replacement or removal!

Errors during the removal or replacement of components may cause life-threatening situations or significant property damage

► Observe the safety instructions before beginning any removal work.

3.3.1 Danger from electrical energy

Perform the following safety work according to VDE 0105-100 (this work must be carried out by a qualified electrician, see chapter: "2 security").

Activate

The required separation distances must be established.

Secure against restart

During work, a prohibition sign must be attached reliably on switching handles or drives of switches, control units, pressure and sensing devices, safety parts, circuit breakers that have been used to unlock a system part or that can be used to connect electricity. If this is not possible, then the clearly associated prohibition sign must be nearby. Existing mechanical interlocking devices against restart must be used for manually operated switches.

Determine absence of voltage

Absence of voltage is to be determined at or as close as possible to the work site at all pins. Absence of voltage must be checked with a voltage tester immediately before and after use.

Grounding and short-circuiting

Parts on which work will be performed at the work place must first be grounded and then short circuited. Grounding and short-circuiting must be visible from the workplace. Deviating from the above, it is permitted to ground and short-circuit near the work place if this is required due to local conditions or for safety reasons. Devices for grounding and short-circuiting must always first be connected with the grounding system or the ground electrode and afterwards with the parts to be grounded. Grounding and short circuiting may be waived in certain low-voltage systems (see VDE 0100-100).

Cover adjacent, live parts or isolate them

Before starting work, check whether it is appropriate to make adjacent parts voltage-free.



DANGER!

Danger of death due to electrical current!

Contact with live parts can result in life-threating injuries.

► Make sure that the relevant components are not live or under voltage, and that there is no unauthorized approximation.

3.3.2 Risks from hazardous materials



WARNING!

Improper use of hazardous materials

There is a risk of health in the case of improper use of hazardous materials.

► Observe the manufacturer safety data sheets for hazardous materials used.

The following hazardous materials are used for cleaning:

- RIVOLTA S.L.X. 1000 safety cleaner

3.4 Responsibilities of the operating company

Definition of the operating company

The owner is listed in the order confirmation and has the following owner obligations:

Owner obligations

The system is put to commercial use. The owner of the system is therefore subject to laws and regulations on workplace health and safety. In addition to the safety instructions in this document, the safety, accident prevention, and environmental regulations for the system's field of application must be followed. The following applies in particular:

- The owner ensures protection against electric shock (contact protection).
- The owner must inform himself about applicable workplace health and safety regulations and conduct a risk assessment for additional hazards that may arise from the special operating conditions at the installation site. These must be implemented as facility instructions for the operation of the system.
- Over the entire time, the owner has to verify that the instructions drafted by him for the operation of the system conform to the current state of applicable regulations and adapt the instructions as necessary.
- The owner must clearly define responsibilities for the installation, operation, maintenance, and cleaning of the system.
- The owner must ensure that all employees who handle the system have read and understood the operating instructions. The owner is also required to provide training periodically and instruct personnel about the risks.

The owner is also responsible for ensuring that the system is always in good technical condition. The following therefore applies:

- The owner must ensure that the maintenance intervals described in this documentation are observed.
- Control and safety devices provided by the owner for the operation of the system must be checked for completeness and functional safety.
- The owner must ensure that assembly and installation comply with EN 60204.
- The owner must ensure that all components are de-energized in the event of an emergency off. This applies in particular to the parallel busbar.

3.5 Personnel requirements

3.5.1 Qualifications

The tasks described in this manual present various requirements to the qualifications of the persons performing them.



⚠ WARNING!

Hazard in case of insufficient qualification of personnel!

Insufficiently qualified persons are unable to judge the risks when working on the system, which puts them and others at risk of severe or fatal injuries.

- ► All work must be performed by qualified personnel only.
- ► Insufficiently qualified personnel must stay out of the work area.

Operator

The operator has been instructed by the owner about the tasks assigned to him and the risks of inappropriate actions. An operator may perform tasks that go beyond normal operation only if this is indicated in the instructions and the owner has expressly assigned him with such a task.

Electrically qualified person (see VDE 0105-100)

Due to their professional training, knowledge, experience, and knowledge of the relevant standards and regulations, professional electricians are able to carry out work on electrical installations and to independently recognize and avoid possible hazards. The professional electrician has been specifically trained for his/her professional working environment and is conversant with the relevant standards and regulations.

Qualified personnel

Qualified personnel are able, based on their technical training, knowledge, experience, and familiarity with applicable regulations, to perform the assigned tasks and independently detect and avoid potential hazards.

Instructed personnel

The instructed person has been instructed by the owner about the assigned tasks and the risks of inappropriate actions. Such persons must also have read and understood these safety instructions and observe them during their work.

This may need to be confirmed by the customer/user with a signature.

3.6 Personal protective equipment

Every person who is instructed to work on the system or in the vicinity of the system (support personnel) must wear personal protective clothing/equipment for the suitable type of their work. Personal protective equipment has the purpose of protecting personnel against hazards to their health and safety at work. The owner is responsible for ensuring that protective equipment is worn.

Personal protective equipment is described below:



Safety shoes

Safety shoes protect against falling parts as well as against slipping.



Protective goggles

Protective goggles protect against flying particles and liquid sprays.



Helmet

Helmets protect against falling or flying parts and materials.



Gloves

Gloves protect hands against chafing and abrasion, cuts and punctures, as well as against contact with hot surfaces.



Protective work clothes

Work clothing is close fitting and resistant to tearing, with close-fitting sleeves and without any projecting parts. It is designed to protect against being caught by moving parts of machinery. However, it must not reduce mobility. Do not wear rings, necklaces, or other jewelry. Long hair must be covered (cap, hat, hairnet or similar). Fall-arrest equipment, face and hearing protection acc. to DGUV Regulation 112-189.



Hearing protection

To protect against severe and permanent hearing loss.



Breathing protection

To protect against severe and chronic conditions of the airways.

3.7 Safety devices



WARNING!

Hazard from non-functional safety devices!

In the case of non-functional safety equipment or that which has been put out of action there is the danger of suffering the most severe injuries or even death.

- ► Check before starting work whether all safety equipment is functional and installed correctly.
- ► Never put safety equipment out of action or bridge it.
- ► The usual national safety regulations must be observed.

3.8 Conduct in case of danger or accident

Precautions:

- Have first-aid equipment (first-aid kit, blankets etc.) and fire extinguisher ready.
- Maintain free access for emergency services vehicles.

Conduct in case of accident:

- Secure site of accident and call first aid personnel.
- Alert emergency services.
- Provide first aid

3.9 Signage

The following symbols and instruction signs are located in the work area. They relate to the immediate environment in which they are installed.



DANGER!

Danger of death due to electrical current!

Contact with live parts can result in life-threating injuries.

► Make sure that the relevant components are not live or under voltage, and that there is no unauthorized approximation.

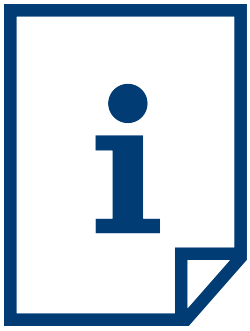


WARNING!

Danger from illegible signs!

Over time, labels and signs can get dirty or can become unreadable in other ways, which means that the dangers are not identified and that operating instructions cannot be followed.

► Always keep all safety, warning and operating instructions in a legible condition.



NOTICE!

Follow instructions!

Only use the designated product after this documentation has been completely read and understood.

4 TECHNICAL DATA

Technical specifications - mechanical	
Travel direction	Reversing operation
Conductor rail length [m]	6 standard, shorter lengths possible
Max. traveling speed [m/min]	400
Distance between poles [mm]	14
Max. hanger spacing (straight) [mm]	600
Max. hanger spacing (curves) [mm]	300
Radius (without prebending), max. [mm]	5000
Radius horizontal curve [mm]	5000 - 750
Radius inner/outer curve [mm]	5000 - 750
On request: Curves with R ≤ [mm]	750

Operating conditions	
Operating temperature [°C]	- 30 to + 55
Operating temperature heat-resistant version [°C]	- 30 to + 85
Max. air humidity at [%] Ambient temperature 10 °C to 40 °C	98
Max. deviation of operating temperature [K]	50
Flammability	Flame-retardant, self-extinguishing, UL 94 V0
Application	Indoor installations

Conductor rail values	U10/25C	U10/25E
Creepage distance of insulation [mm]	30	30
Max. nominal voltage(1) [V]	690	690
Nominal current at 100 % duty cycle [A]	100	10
Resistance [Ω / 1 0 0 0 m]	0,744	31,328
Impedance(2) [Ω / 1 0 0 0 m]	0,748	31,325

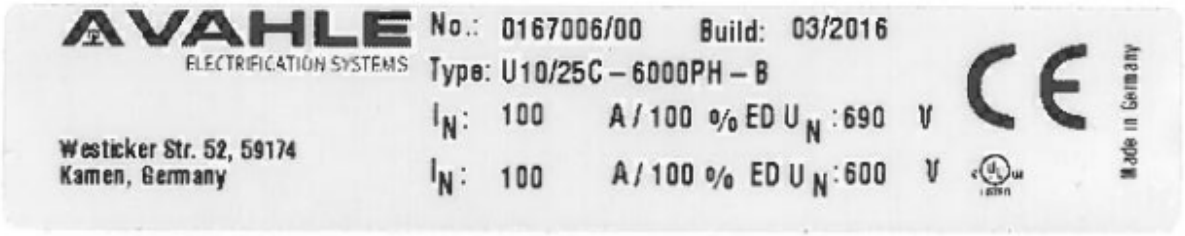
Insulation profile values (electrical)	Standard version, green	Heat-resistant version, gray
Protection class	IP21	IP21
Dielectric strength according to DIN 53481 [kV/mm]	> 25	> 25
Volume resistivity according to IEC 60093 [Ω x cm]	1×10^{16}	1×10^{14}
Surface resistance according to IEC 60093 [Ω]	2.1×10^{15}	2.1×10^{15}
Comparative tracking index according to IEC 60093	CTI 400 – 1,1	CTI 400 – 1,1

Insulation profile values (mechanical)	Standard version, green	Heat-resistant version, gray
Bending strength according to ISO 178	74 - 85 N/mm^2	90 - 100 N/mm^2
Tensile strength according to ISO 527	44 - 55 N/mm^2	47 - 65 N/mm^2
UV-resistant	Xenon test > 1500	Xenon test > 1500

(1) Not with UL approval UUL = 600 V

(2) At phase spacing of 14 mm and a frequency of 50 Hz

4.1 Type plate



The type plate is glued in the middle to the rear of every 20th phase or PE(-VP) conductor rail, however, at least once per order.

5 LAYOUT AND FUNCTION

5.1 System overview

The U10 insulated conductor rail is designed according to VDE 0100. It meets the requirements on the safety of a conductor rail and is contact-protected in acc. with VDE 0470, Part 1 (DIN EN 60529), contact-protected (protection class IP 21).

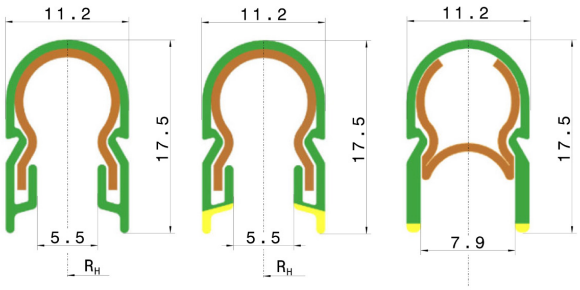
The current collectors are protected against contact only if the carbon brushes are fully located in the conductor rails. For conductor rail systems located at arm's length, where under normal operation the current collectors leave the conductor rails, contact protection must be provided on site, e.g.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

The U10 is only suitable for internal systems. Conductor rails can be put together with any number of poles. Only little space is required. The contact surface arrangement can be either suspended or lateral. Standard rail sections are 6 m long, shorter sections are available. The ground conductor is marked with two continuous yellow stripes on the insulating profile.

The PE-VP ground conductor and the ground conductor current collector are specially shaped. This prevents the PE-VP current collector from running into the phase rail and guarantees protection against mix-ups throughout the system.

5.2 Assembly overview

5.2.1 Conductor system



U10	
Standard lengths [m]	6
Suspension distance [m]	0.6 straight routing 0.3 routing in curves
Application	Indoor installations
Phase spacing [mm]	14
End finishing in the factory	

U10 curved sections	
Bending the conductor rail	
Without prebending [mm]	≥ R ≥ 5000
Horizontal curve [mm]	5000 ≥ R ≥ 750
Inner- [mm] /Outer curve	5000 ≥ R ≥ 750
Curves on request [mm]	R < 750

The supplied conductor rails are already provided with end finishing on both sides at the factory. The illustration shows the different cross-sections of the conductor rail profiles U10.

The conductor rails are supplied at a length of 6 m as standard. Shorter conductor rails (3 m and 5 m) are supplied for special applications such as cold or deep-freeze storage. The conductor rails are selected according to the current to be transmitted and the expected environmental influences.

Temperature range	t min. [°C]	t max. [°C]	Δ t [°C]	Rail length [m]
Normal	0	40	40	6
Normal 1	5	35	30	6
Normal 2	10	30	20	6
Cold storage	-8	20	28	5
Deep-freeze storage	-30	20	50	3

U10/25 C conductor rail with a copper conductor for main power, control power and data transmission.

U10/25 E conductor rail with a stainless steel conductor for main power, control power and data transmission in the case of corrosive influence. In the case of 100 % ED max. 10 A.

Type keys				
U	10	25	C / E	
Insulated conductor rail	Housing size [mm]	Conductor cross section [mm^2]	C = Copper conductor	E = Stainless steel conductor

For the following table the types must be added:

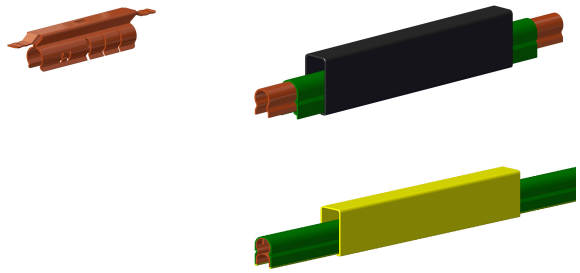
e.g. U10/25E-**6000**PH-B for 6 m phase, ID no. 167 026

The 4-digit number (in bold) in the type designation indicates the length of the straight section in mm.
The last digit of the ID no. • indicates the individual length in meters. Please add 1, 2, 3, 4, 5 or 6 to the ID no.

Type	Version	Housing color	Pin allocation	Weight [kg/m]	Ident-No.
U10/25C-....PH-B	Standard	Green	Phase	0,267	167 00•
U10/25E-....PH-B	Standard	Green	Phase	0,246	167 02•
U10/25C-....PE-A	Standard	Green/yellow	PE	0,267	167 06•
U10/25E-....PE-A	Standard	Green/yellow	PE	0,246	167 08•
U10/25C-....VPN-A	Standard	Green/yellow	PE	0,267	144 88•
U10/25C-....VPNG-A(1)	Standard	Green/yellow	PE	0,267	144 90•
U10/25C-....PH-D85	Heat-resistant	Gray	Phase	0,267	167 03•
U10/25E-....PH-D85	Heat-resistant	Gray	Phase	0,246	167 05•
U10/25C-....PE-C85	Heat-resistant	Gray/green-yellow	PE	0,267	167 09•
U10/25E-....PE-C85	Heat-resistant	Gray/green-yellow	PE	0,246	167 11•
U10/25C-....VPN-C85	Heat-resistant	Gray/green-yellow	PE	0,267	144 89•
U10/25C-....VPNG-A-C85(1)	Heat-resistant	Gray/green-yellow	PE	0,267	144 92•
U10/25CW-3000PH-B	Heat-treated	Green	Phase	0,267	144 403
U10/25CW-3000VPN-A	Heat-treated	Green/yellow	PE	0,267	144 897
U10/25CW-3000VPNG-A (1)	Heat-treated	Green/yellow	PE	0,267	144 899

(1) For inner and outer curves

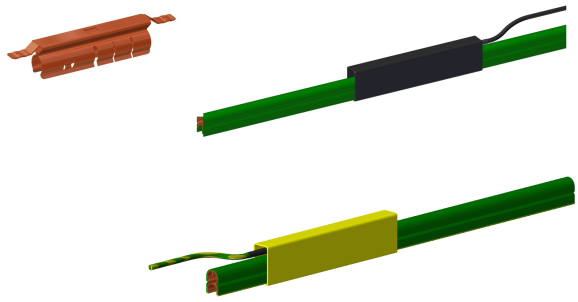
5.2.2 Joint splice/feed



Feed connectors	
VM-UEV10/C	165 006
VM-UEV10VPN/C	143 213
Nominal current at 100 % ED [A]	2 x 40
Weight [kg]	0,026

- Feed connectors are used to electrically and mechanically connect the conductor rail sections.
- Every joint is protected against contact with a corresponding joint cap.
- The change in length of the conductor rail due to changes in the ambient temperature is compensated by the feed connector.
- The adjustment of the air gap depends on the installation temperature.
- Also compensates for length expansion in the case of temperature fluctuations.

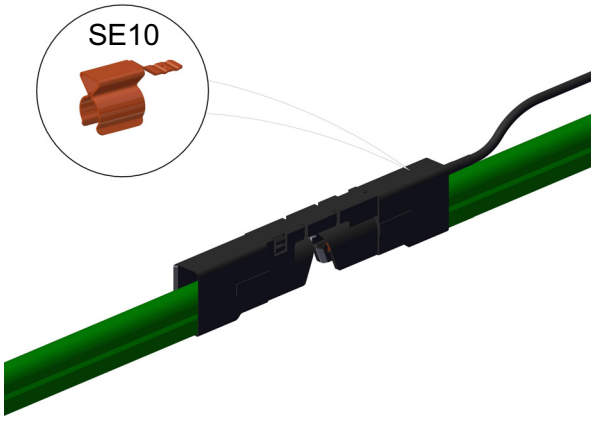
5.2.3 Line feed



Line feed	
ES-UES10	165 212
ES-UES10VPN	143 214
Nominal current at 100 % ED [A]	2 x 50
Weight [kg/m]	0,026

If the feed at the joint or mechanical transition (SE10) is not possible, line feeds can be set as an additional feed option. Observe the position of the customer's cables.

5.2.4 Isolating section



Isolating section	
Max. nominal current at 100 % ED [A] Per isolating section halves	40
Connection	SE 10 with flat plug connection 6.3 x 0.8 mm
The two isolating section halves are joined during assembly by pressing them together laterally.	
Min. 1 compact holder extra per isolating section.	

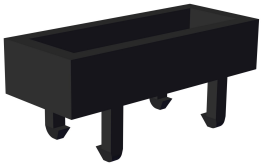
Feed clamp	
Ident-No.	165 178

- For electrical interruption of the conductor rail
- Use for travel zone separations and other control tasks
- Arrangement only in straight sections, not in curves

Type	Description	Weight [kg]	Scope of delivery	Ident-No.
ST-LT/LT10		0,017	2 x LT/U 10	165 025
ST-LT/LTE10		0,021	2 x LT/U 10 1 x feed clamp SE 10	165 114
ST-LTE/LTE10		0,025	2 x LT/U 10 2 x feed clamp SE 10	165 026

5.2.5 Spacer clamp

The spacer clamp is attached to the isolating section and prevents bending of the isolating section at heights > 10.5 mm when the current collector is passed. (Height = contact surface to attachment surface of compact holder)



EU-DK10/16.5	
Ident-No.	165 682
Weight [kg]	0,002
Height [mm]	16,5
EU-DK10/14	
Ident-No.	165 681
Weight [kg]	0,002
Height [mm]	14
EU-DK10/13.2	
Ident-No.	144 114
Weight [kg]	0,002
Height [mm]	13,2

5.2.6 Expansion section

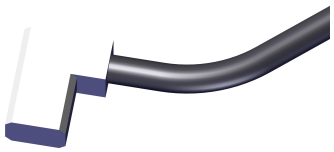
- Expansion sections are used to compensate the change in length between EMS profile (aluminum) and conductor rail (copper) depending on the ambient temperature.
- Expansion sections are used where the EMS profile has an expansion joint.
- The number of expansion sections in the area of the EMS expansion joint is calculated from the maximum possible expansion movement of the EMS expansion joint.
- Expansion sections consist of a feed connector and multiple perforations on both sides of the incoming conductor rail ends.
- An expansion movement of max. 15 mm can be compensated per expansion section.
- In case of expansions, the rail section must be mounted between two expansion sections with at least two compact holders.
- A feed terminal in the area of the expansion section is not permitted.

Standard	Weight [kg]	Expansion movement, up to [mm]	Ident-No.
VM-UDV10/C-15	0,025	15	143 059
VM-UDV10/C-30	0,052	30	166 542
VM-UDV10/C-45	0,075	45	166 543
VM-UDV10/C-60	0,104	60	166 544

PE-VPN	Weight [kg]	Expansion capacity, up to [mm]	ID no.
VM-UDV10VPN/C-15	0.026	15	143 355
VM-UDV10VPN/C-30	0.052	30	143 356
VM-UDV10VPN/C-45	0.078	45	143 357
VM-UDV10VPN/C-60	0.104	60	143 358

5.2.7 Connecting cable

For current collector, feed terminal, transfer guide, and isolating section (for current collector KDR and KUFR connection line WFLA 2,5).



WFLA	
Length [m]	0,5
With angled flat receptacle 6.3 mm x 0.8 mm	
Longer connecting cable available	



FLA/FKA	
Length [m]	1
With flat plug connection 6.3 x 0.8 mm	
Longer connecting cable available	

Connecting cable, highly flexible, double insulated

For current collector or rail feed

Type	Cross section [mm²]	Ø mm		Weight [kg]		Ident-No.	
		PH	PE	PH	PE	Phase Black	PE Green/ yellow
AL-FLA2.5PH1-6,3	2,50	3,9	-	0,037	-	165 049	-
AL-FLA2.5PE1-6,3	2,50	-	3,6	-	0,035	-	165 050
AL-FLA4PH1-6,3	4,00	5,4	-	0,064	-	165 051	-
AL-FLA4PE1-6,3	4,00	-	5,2	-	0,059	-	165 052
AL-FLA6PH1-6,3	6,00	5,7	-	0,086	-	166 368	-
AL-FLA6PE1-6,3	6,00	-	5,7	-	0,083	-	166 369
AL-WFLA2,5PH0,5-6,3	2,50	3,9	-	0,020	-	168 107	-
AL-WFLA2,5PE0,5-6,3	2,50	-	3,6	-	0,018	-	168 108

Connecting cable, highly flexible, singly insulated

Only for rail feed

Type	Cross section [mm²]	Ø mm		Weight [kg]		Ident-No.	
		PH	PE	PH	PE	Phase Black	PE Green/ yellow
AL-IFKA1,5PH1-6,3	1,50	3,0	-	0,020	-	166 557	-
AL-IFKA1,5PE1-6,3	1,50	-	3,0	-	0,020	-	166 558
AL-IFKA2,5PH1-6,3	2,50	3,7	-	0,032	-	166 238	-
AL-IFKA2,5PE1-6,3	2,50	-	3,7	-	0,032	-	166 239
AL-IFKA4PH1-6,3	4,00	4,3	-	0,050	-	166 240	-
AL-IFKA4PE1-6,3	4,00	-	4,3	-	0,050	-	166 241
AL-IFKA6-PH1-6,3	6,00	4,9	-	0,064	-	166 242	-
AL-IFKA6-PE1-6,3	6,00	-	4,9	-	0,064	-	166 243

Flat receptacles, single

Type	For cable cross section mm^2	Weight [kg]	Ident-No.
FH2,5	2,5	0,002	165 120
FH4-6	4-6	0,002	165 121
WFH2,5	2,5	0,002	168 109

Connection cable AEA



AEA	
highly flexible for current collector with screw connection "S"	
Length [m]	1
Longer connection cable available	
Temperature range [°C]	-10 to +70

Type	Weight [kg]	A [mm^2]	$Ø_{max.}$ [mm]	ID no. Phase black	PE yellow
AL-AEA2.5PE-32-3.7-1000-D	0.038	2.50	3.90	-	143 079
AL-AEA2.5PH-32-4-1000-A	0.038	2.50	3.90	143 080	-
AL-AEA4PE-40-4.4-1000-D	0.063	4.00	5.40	-	143 077
AL-AEA4PH-40-5.6-1000-A	0.063	4.00	5.40	143 078	-
AL-AEA6PE-55-5.5-1000-D	0.085	6.00	5.70	-	143 075
AL-AEA6PH-55-5.9-1000-A	0.085	6.00	5.70	143 076	-
AL-AEA10PE-63-8.2-1000-D	0.160	10.00	8.20	-	143 073
AL-AEA10PH-63-8.4-1000-A	0.160	10.00	8.20	143 074	-

5.2.8 Transfer guide

- Used for mechanical interruptions at switches, lifting stations and mobile rail part sections.
- Can be used as contact protection for rail ends (end caps).
- The combination of BFU 10 and US 10 is a fixed point.
- USE 10 version with feed in possibility.
- Transfer guides are single-use parts and cannot be used again after dismantling.
- EMS rail sections (switches/lifting station) must be aligned before conductor rail assembly, see Figure US 10 transfer guide and fastening for the BFU 10 transfer guide page 111.
- When mounting transfer guides, please note that opposite rail ends must be exactly aligned in order to avoid disturbances when passing over the current collectors.
- Transfer guides must not protrude over the reference edge, see Figure US 10 transfer guide and fastening for the BFU 10 transfer guide page 111.
- Maximum height and side offset of opposite rail ends is ± 3 mm to one another.
- Maximum air gap between the transfer guides is 6 mm.

Transfer guide PH- and PE-standard



US 10 straight



US 10S oblique

Transfer guide	
Lateral / vertical offset, max. [mm]	3
Nominal current at 100 % duty cycle, max. [A]	40

Type	Weight [kg/m]	Version	Feed terminal	Ident-No.
MU-US10	0,008	Straight	none	165 008
MU-US10S	0,008	oblique	none	165 009
MU-USE10	0,012	Straight	with	165 010
MU-USE10S	0,012	oblique	with	165 011

Transfer guide PE-VPN



US 10 PE-VPN straight



US 10s PE-VPN oblique



US 10SP PE-VPN oblique positive

Transfer guide PE-VPN	
Vertical and horizontal offset, max. [mm]	3
Nominal current at 100 % ED, max. [A]	40

Type	Weight [kg/m]	Version	Feed terminal	ID no.
MU-US10-VPN	0.007	Straight	Without	144 863
MU-US10S-VPN	0.007	Oblique	Without	144 865
MU-US10SP-VPN	0.008	Oblique positive	Without	144 867
MU-USE10-VPN	0.011	Straight	With	144 864
MU-USE10S-VPN	0.011	Oblique	With	144 866
MU-USE10SP-VPN	0.012	Oblique positive	With	144 868

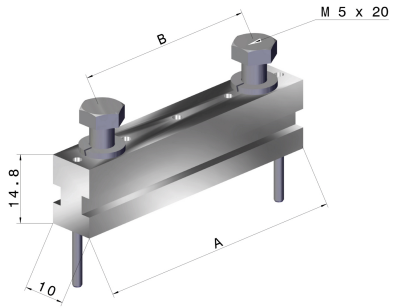
5.2.9 Fastening for transfer guide

5.2.9.1 BFU for screwing on from the rear

For screwing on at the guide rail.

- 1 x aluminum profile bar,
- 2 x hexagon head screw M5 with spring washer
- 2 x locking pins 2 x 20 (delivered loosely)

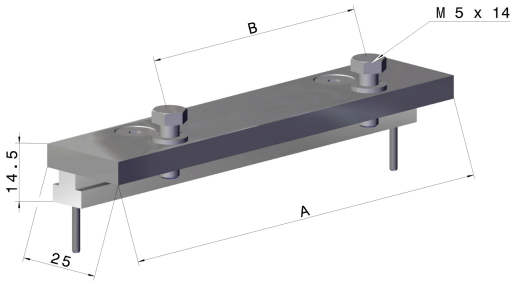
BFU 10A



BFU 10A	
For height [mm]	16,5

Type	Number of poles	A [mm]	B [mm]	Weight [kg]	Ident-No.
MU-BFU10H4/16,5/14-59/42	1 - 4	59	42	0,032	144 442
MU-BFU10H6/16,5/14-90/42	1 - 6	90	42	0,040	144 499
MU-BFU10H8/16,5/14-118/70	1 - 8	118	70	0,048	165 168
MU-BFU10H10/16,5/14-143/70	1 - 10	143	70	0,056	165 176

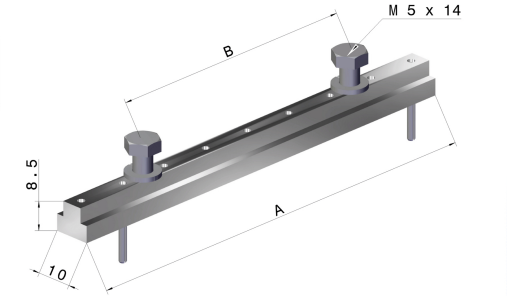
BFU 10B



BFU 10B	
For height [mm]	16,5
Use with sloping cut of the guide rail	

Type	Number of poles	A [mm]	B [mm]	Weight [kg]	Ident-No.
MU-BFU10H4/16,5/14-59/42-25	1 - 4	59	42	0,053	144 419
MU-BFU10H6/16,5/14-90/42-25	1 - 6	90	42	0,065	143 982
MU-BFU10H8/16,5/14-118/70-25	1 - 8	118	70	0,077	165 272
MU-BFU10H10/16,5/14-143/70-25	1 - 10	143	70	0,089	165 274

BFU 10



BFU 10	
For height [mm]	10,5

Type	Number of poles	A [mm]	B [mm]	Weight [kg]	Ident-No.
MU-BFU10H4/10/14-62/42	1 - 4	62	42	0,022	144 022
MU-BFU10H6/10/14-90/42	1 - 6	90	42	0,026	143 983
MU-BFU10H8/10/14-118/70	1 - 8	118	70	0,030	165 115

BFU for screwing on from the rear

The fastening screws are inserted from behind through the EMS profile and screwed into the BFU.

Designation	Installation height [mm]	Ident-No.
MU-BFU10B8/10E14-115/98-F30	10	0142060/00
MU-BFU10H8/10E14-115/74-F30	10	0142039/00
MU-BFU10 H8/10BI14-124/102	10	0142314/00
MU-BFU10H10/10R14-143/122	10	0142328/00
MU-BFU10H6/10/14-88/42	10	0142619/00
MU-BFU10H8/10E14-136/126	10	0142723/00
MU-BFU10H10/10SW14-143/75	10	0142813/00
MU-BFU10H6/10/14-88/70	10	0142879/00
MU-BFU10H6/10E14-90,6/42	10	0143065/00
MU-BFU10H6/10R14-88/28	10	0143274/00
MU-BFU10H7/10R14-98/56	10	0143346/00
MU-BFU10H10/10R14-140/98	10	0143473/00
MU-BFU10-H14/10/14-199/70	10	0143711/00
MU-BFU10H6/10/14-90/42	10	0143983/00
MU-BFU10H4/10/14-62/42	10	0144022/00
MU-BFU10H4/10T14-100/SMGM	10	0144089/00
MU-BFU10H5/10,5S/14-74/50	10	0144142/00
MU-BFU10-H8/10/14-118/70	10	0165115/00
MU-BFU10-H10/10/14-143/70	10	0165123/00
MU-BFU10-H12/10/14-171/70	10	0165641/00
MU-BFU10H9/10/14-129/84	10	0165644/00
MU-BFU10H8/10ST14-118/40	10	0166040/00
MU-BFU10H12/10TL14-171/70-37	10	0166235/00
MU-BFU10H8/10E14-128,5/120,5	10	0166237/00
MU-BFU10H10/10KR14-143/128	10	0166372/00
MU-BFU10H8/10V14-138/126	10	0166493/00
MU-BFU10H10/10V14-141/70	10	0166553/00
MU-BFU10H8/10E14-118/98	10	0166562/00
MU-BFU10H5/10TH14-76/42	10	0166694/00
MU-BFU10V3/10TH14-49/14	10	0166697/00
MU-BFU10H8/10SH14-118/75	10	0166727/00
MU-BFU10H10/10V14-140/70	10	0166797/00
MU-BFU10H-5/10Y14-76/28	10	0166798/00
MU-BFU10H9/10A14-129,4/70-F60	10	0166843/00
MU-BFU10H7/10SW14-101/56	10	0167349/00
MU-BFU10H10/10SH14-118/42	10	0167354/00
MU-BFU10H8/10E14-118/42	10	0167387/00
MU-BFU10H12/10/14-171/70	10	0167433/00
MU-BFU10H6/10/14-88/64-F45	10	0167436/00

Designation	Installation height [mm]	Ident-No.
MU-BFU10H6/10E18-123/90	10	0167711/00
MU-BFU10H13/10R14-185/140	10	0167788/00
MU-BFU10H5/10PH14-74/56	10	0167799/00
MU-BFU10H6/10S14-78/60	10	0167919/00
MU-BFU10H8/10TL14-117,5/40	10	0167923/00
MU-BFU10H1/10/14-21/0	10	1015866/00
MU-BFU10H2/10/14-35/0	10	1015867/00
MU-BFU10H3/10/14-49/14	10	1015888/00
MU-BFU10H5/10/14-63/28	10	1015889/00
MU-BFU10H5/10/14-77/42	10	1015890/00
MU-BFU10H6/10/14-91/56	10	1015891/00
MU-BFU10H7/10/14-105/70	10	1015892/00
MU-BFU10H11/10/14-161/70	10	1015893/00
MU-BFU10-H2/10PH14-31/14	10	1018703/00
MU-BFU10H2/10T14-36/0	10	1021409/00
MU-BFU10H3/10T14-50/22	10	1021410/00
MU-BFU10H4/10T14-64/36	10	1021411/00
MU-BFU10H5/10T14-78/50	10	1021412/00
MU-BFU10H6/10T14-92/64	10	1021413/00
MU-BFU10H7/10T14-106/81	10	1021414/00
MU-BFU10H8/10T14-120/92	10	1021416/00
MU-BFU10H9/10T14-134/106	10	1021417/00
MU-BFU10H10/10T14-148/120	10	1021418/00
MU-BFU10H2/10T14-28/0	10	1021670/00
MU-BFU10H3/10T14-42/14	10	1021671/00
MU-BFU10H4/10T14-56/28	10	1021672/00
MU-BFU10H5/10T14-70/42	10	1021673/00
MU-BFU10H6/10T14-84/58	10	1021674/00
MU-BFU10H7/10T14-98/70	10	1021675/00
MU-BFU10H9/10T14-128/98	10	1021677/00
MU-BFU10H10/10T14-140/112	10	1021678/00
MU-BFU10H8/10T14-112/84	10	1021732/00
MU-BFU10-H6/10C14-110/93	10	1022227/00
MU-BFU10H6/10C14-118/70	10	1022253/00
MU-BFU10H5/10/14-73/42	10	2507022/00
MU-BFU10H2/12/14-34/14	12	0166906/00
MU-BFU10H3/12/14-48/28	12	0166907/00
MU-BFU10H4/12/14-62/42	12	0166908/00
MU-BFU10H5/12/14-76/56	12	0166909/00
MU-BFU10H6/12/14-90/70	12	0166910/00
MU-BFU10H7/12/14-104/84	12	0166911/00

Designation	Installation height [mm]	Ident-No.
MU-BFU10H8/12/14-118/98	12	0166912/00
MU-BFU10H9/12/14-132/112	12	0166913/00
MU-BFU10H10/12/14-146/126	12	0166914/00
MU-BFU10H4/13,2/14-62/42	13,2	0144113/00
MU-BFU10-H8/14TL14-118/70	14	0165747/00
MU-BFU10H6/14TL20-120/60	14	0166196/00
MU-BFU10H6/14TL20-120/60-25	14	0166198/00
MU-BFU10H8/14S14-118/37-40-F60	14	0166610/00
MU-BFU10H8/14TL14-118/70-25	14	0167342/00
MU-BFU10H8/14ERC14-160/140-25	14	0167929/00
MU-BFU10H8/14,5SL14-118/75-32	14,5	0167976/00
MU-BFUH9/14,5CN14-129/56	14,5	2522029/00
MU-BFUH9/14,5CN14-129/56-25	14,5	2522227/00
MU-BFU10H6/15SH14-90/70	15	0144322/00
MU-BFU10H6/15SH14-90/70-32	15	0144323/00
MU-BFU10H10/15,5S14-143/105-50	15,5	0142201/00
MU-BFU10H8/15,5S14-118/70-50	15,5	0144217/00
MU-BFU10H8/15,5S14-118/70-65	15,5	0144218/00
MU-BFU10H10/15,5S14-143/117-50	15,5	0166009/00
MU-BFU10H10/15,5S14-143/117-65	15,5	0166010/00
MU-BFU10H8/15,5MG14-118/48-82-F60	15,5	0167849/00
MU-BFU10H8/15,5MG14-118/48-43-F45	15,5	0167850/00
MU-BFU10H12/16,5W14-171/80-25	16,5	0142089/00
MU-BFU10H9/16,5/14-112/84	16,5	0142099/00
MU-BFU10H10/16,5E14-143/118-25	16,5	0142144/00
MU-BFU10H10/16,5S14-143/117-90	16,5	0142146/00
MU-BFU10H8/16,5MN14-118/107-25	16,5	0142202/00
MU-BFU10H12/16,5JW14-171/25	16,5	0142589/00
MU-BFU10H6/16,5V14-88/70	16,5	0142693/00
MU-BFU10H4/16,5/14-62/42	16,5	0142737/00
MU-BFU10H4/16,6TH14-62/42	16,5	0142752/00
MU-BFU10H5/16,5R14-76/56	16,5	0143333/00
MU-BFU10H3/16,5R14-44/28	16,5	0143471/00
MU-BFU10H14/16,5/14-199/70	16,5	0143641/00
MU-BFU10H8/16,5S14-118/70-50	16,5	0143686/00
MU-BFU10H8/16,5S14-118/70-65	16,5	0143687/00
MU-BFU10H14/16,5/14-199/70-25	16,5	0143712/00
MU-BFU10H6/16,5/14-90/42-25	16,5	0143982/00
MU-BFU10H6/16,5R/14-90/28	16,5	0144211/00
MU-BFU10H6/16,5R/14-90/28-25	16,5	0144247/00
MU-BFU10H6/16,5R/14-90/28-25	16,5	0144248/00

Designation	Installation height [mm]	Ident-No.
MU-BFU10H4/16,5/14-59/42-25	16,5	0144419/00
MU-BFU10H4/16,5/14-59/42	16,5	0144422/00
MU-BFU10H5/16,5/14-73/56	16,5	0144436/00
MU-BFU10H5/16,5/14-73/56-25	16,5	0144437/00
MU-BFU10H6/16,5/14-90/42	16,5	0144499/00
MU-BFU10H6/16,5/14-90/70	16,5	0144532/00
MU-BFU10H5/16,5/14-90/70-25	16,5	0144533/00
MU-BFU10H4/16,5CN14-59/18	16,5	0144621/00
MU-BFU10H4/16,5CN14-59/17-25	16,5	0144622/00
MU-BFU10H3/16,5/14-45/26	16,5	0148033/00
MU-BFU10H8/16,5/14-118/70	16,5	0165168/00
MU-BFU10H8/16,5ST14-118/70	16,5	0165175/00
MU-BFU10H10/16,5/14-143/70	16,5	0165176/00
MU-BFU10H8/16,5/14-118/70-25	16,5	0165272/00
MU-BFU10H10/16,5/14-143/70-25	16,5	0165274/00
MU-BFU10H12/16,5/14-171/70	16,5	0165642/00
MU-BFU10H12/16,5/14-171/70-25	16,5	0165643/00
MU-BFU10H11/16,5JB14-160/84	16,5	0166168/00
MU-BFU10H11/16,5JB14-160/84-25	16,5	0166169/00
MU-BFU10H10/16,5F14-143/40	16,5	0166416/00
MU-BFU10H10/16,5F14-143/40-25	16,5	0166417/00
MU-BFU10H8/16,5S14-118/25-25-F60	16,5	0166608/00
MU-BFU10H8/16,5S14-118/25-40-F60	16,5	0166609/00
MU-BFU10H12/16,5C14-171/70-25	16,5	0166674/00
MU-BFU10H6/16,4TH14-88/42-25-F45	16,5	0166676/00
MU-BFU10H5/16,5TH14-76/42-25	16,5	0166693/00
MU-BFU10H11/16,5TH14-160/56-25	16,5	0166786/00
MU-BFU10H8/16,5S14-118/25-F60	16,5	0166795/00
MU-BFU10H8/16,5S14-118/48-45	16,5	0166796/00
MU-BFU10H10/16,5A14-143/70-25	16,5	0166888/00
MU-BFU10H8/16,5FA14-118/70-50	16,5	0167315/00
MU-BFU10H10/16,5S14-9/84	16,5	0167629/00
MU-BFU10H4/16,5-E14-62/30	16,5	0167723/00
MU-BFU10H8/16,5E14-118/100-30	16,5	0167740/00
MU-BFU10H8/16,5MG14-118/48-80-F60	16,5	0167848/00
MU-BFU10H8/16,5MG14-118/48-95-F60	16,5	0167853/00
MU-BFU10H8/16,5MG14-118/48-95-F60	16,5	0167854/00
MU-BFU10H8/16,5MG14-118/48-66-F60	16,5	0167855/00
MU-BFU10H8/16,5MG14-118/48-77,5-F60	16,5	0167856/00
MU-BFU10H6/16,5SCH14-90/60	16,5	0167920/00
MU-BFU10H5/16,5SY14-76/56	16,5	10005044

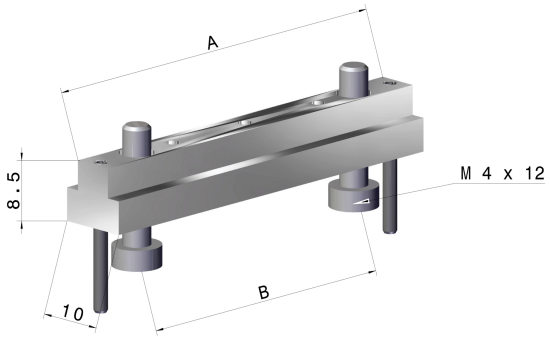
Designation	Installation height [mm]	Ident-No.
MU-BFU10H5/16,5SY14-76/56	16,5	10005243
MU-BFU10H2/16,5/14-31/14	16,5	10006745
MU-BFU10H3/16,5SSI14-48-0	16,5	2517884/00
MU-BFU10H6/18,1SEW14-90/15	18,1	0144631/00
MU-BFU10H6/18,1SEW14-90/42	18,1	0144632/00
MU-BFU10H6/18,1SEW14-90/15-40	18,1	0144633/00
MU-BFU10H12/18,5C14-171/70A	18,5	0166482/00
MU-BFU10H12/18,5C14-171/70B	18,5	0166483/00
MU-BFU10H8/21,5M14-120/72-F60	21,5	0167949/00

5.2.9.2 BFU for screwing on from the front

For screwing on at the guide rail.

- 1 x aluminum profile bar,
- 2 x cylinder screws M4
- 2 x locking pins 2 x 20 (delivered loosely)

BFU 10V



BFU 10V	
For height [mm]	10,5

Type	Number of poles	A [mm]	B [mm]	Weight [kg]	Ident-No.
MU-BFU10V4/10/14-59/42	1 - 4	59	42	0,015	144 355
MU-BFU10V6/10/14-90/42	1 - 6	90	42	0,021	144 513
MU-BFU10V8/10/14-118/70	1 - 8	118	70	0,026	144 514

BFU for screwing on from the front

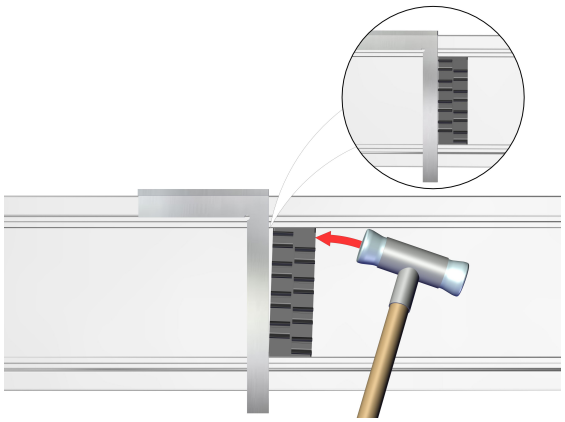
The fastening screws are inserted into the BFU from the front and screwed to the EMS profile.

Designation	Installation height [mm]	Ident-No.
MU-BFU10B8/10E14-115/98-F30	10	0142060/00
MU-BFU10V6/10C14-88/42	10	0142143/00
MU-BFU10-V5/10E14-73/42-F30	10	0142876/00
MU-BFU10V4/10A14-60/28	10	0143020/00
MU-BFU10V4/10S14-70/55	10	0143071/00
MU-BFU10-V6/10E14-87/42-F30	10	0143145/00
MU-BFU10V4/10S14-71/56	10	0143239/00
MU-BFU10-V4/10A14-59/28-F30	10	0143249/00

Designation	Installation height [mm]	Ident-No.
MU-BFU10V3/10IWT14-49/0	10	0143319/00
MU-BFU10V2/10A14-32/14	10	0143538/00
MU-BFU10V5/10E14-87/70-F30	10	0143807/00
MU-BFU10-V8/10E14-115/56-F30	10	0143907/00
MU-BFU10V6/10E14-87/70-F30	10	0144108/00
MU-BFU10-V5U6/10E14-87/42-F30	10	0144153/00
MU-BFU10V8/10E14-118/42	10	0144223/00
MU-BFU10V4/10/14-59/35	10	0144260/00
MU-BFU10V4/10S/14-59/28	10	0144283/00
MU-BFU10V4/10/14-59/42	10	0144355/00
MU-BFU10V6/10/14-90/42	10	0144513/00
MU-BFU10V8/10/14-118/70	10	0144514/00
MU-BFU10V6/10E14-90/42	10	0144583/00
MU-BFU10V9/10EE14-136,5/0-F27	10	0148029/00
MU-BFU10V8/10JB14-118/70	10	0165889/00
MU-BFU10V6/10/14-88/28-F45	10	0166735/00
MU-BFU10V3/10F14-49/0	10	0167947/00
MU-BFU10V8/10F14-118/28	10	0167972/00
MU-BFU10-V7/10E14-101/56-F30	10	10001394
MU-BFU10V4/10S14-70/55	10	10006323
MU-BFU10V8/15,5S14-118/70-50	15,5	0144232/00
MU-BFU10V8/15,5S14-118/25-40	15,5	0166024/00
MU-BFU10V8/16,5S14-118/107-25	16,5	0142769/00
MU-BFU10V7/16,5S14-101/40-50-F45	16,5	0142830/00
MU-BFU10V7/16,5S14-101/40-65-F45	16,5	0142831/00
MU-BFU10V8/16,5H14-118/84	16,5	0143601/00
MU-BFU10V4/16,5/14-59/28	16,5	0144245/00
MU-BFU10V5/16,5/14-73/56	16,5	0144537/00
MU-BFU10V5/16,5/14-73/56-25	16,5	0144538/00
MU-BFU10V4/16,5S/14-59/28	16,5	0148058/00
MU-BFU10V8/16,5C014-118/28	16,5	0166613/00
MU-BFU10V10/16,5F14-143/40-25	16,5	0167941/00
MU-BFU10V8/20/14-118/40-75	20	0167878/00
MU-BFU10V10/30E14-143/70-37	30	10006771

5.2.10 Compact hanger

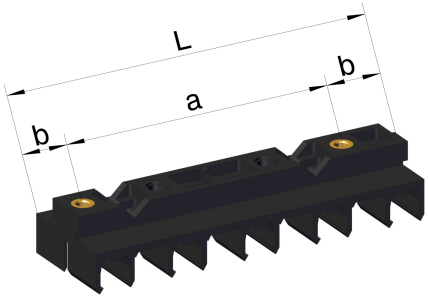
Basically, all compact holders (screw-on, clip-on, screw-in, compact holders with adhesive tape or similar) must be attached at exact right angles to the guide rail or EMS profile. The correct installation position is checked with a (stop) angle.



Only this procedure ensures that the holder is not misaligned, which would lead to unintended fixed points with clamping effects between clamp and conductor rail.

Standard compact bracket

With the compact holders, it is possible to assemble any number of poles.



Type	Max. number of poles	L	a	b	Weight [kg]	Ident-No.
AH-KA10L-2/16,5-N-PA-14	2	29	0	20,5	0,012	142 072
AH-KA10L-4/16,5-10N-PA-14	4	57	42	7,5	0,024	142 073
AH-KA10L-6/16,5-10N-PA-14	6	85	42	21,5	0,033	142 757
AH-KA10L-8/16,5-10N-PA-14	8	113	42	35,5	0,045	142 075
AH-KA10L-10/16,5-N-PA-14	10	141	100	20,5	0,056	142 076

Compact holder, screw-on KA10

In the compact holder there are two M5 threaded inserts on the back. Through-holes for M5, preferably with a drilling template (not supplied), must be drilled into the EMS profile or other profiles. Then screw on the compact holders. If the profile thickness has been given by the customer, the screw material is included in the delivery.

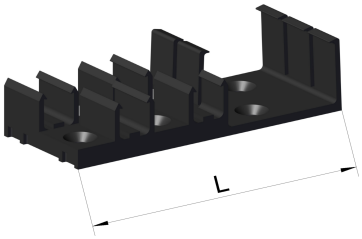


Fig.: U10-4-pol + SMGM

Type	Max. number of poles	L	Weight [kg]	Ident-No.
AH-KA10-4/10,5-UNI-PA-SMG-14	4	100	0,027	144 354
AH-KA10-6/10,5-UNI-PA-SMG-14	6	128	0,036	100 102 11

Overview of compact holder, to screw on

Designation	Ident-No.
AH-KA10F-5/16,5-E-PA-14SL88	0142014/00
AH-KA10F-2/16,5-E-PA-14SL	0142022/00
AH-KA10F-5/16,5-E-PA-14SL83	0142042/00
AH-KA10F-8/16,5-NO-PA-14	0142044/00
AH-KA10F-4/16,5-E-PA-14SL100	0142046/00
AH-KA10F-7/16,5-PA-14	0142055/00
AH-KA10F-8/16,5-FA-PA-14	0142128/00
AH-KA10F-8/16,5-SH-PA-14	0142134/00
AH-KA10F-9/16,5-FA-PA-14	0142209/00
AH-KA10F-12/31,5-IVM-PA-14	0142261/00
AH-KA10F-10/30-NSW-PA-14	0142285/00
AH-KA10F-10/10-CF-PC-14	0142363/00
AH-KA10F-12/17,6-L-P	0142379/00
AH-KA10F-8/10-D-PC-14	0142475/00
AH-KA10F-2/16,5-B-PA-14SL43	0142514/00
AH-KA10F-8/16,5-N-PA-14	0142544/00
AH-KA10F-8/10-H-PC-14	0142559/00
AH-KA10F-8/10-TW-PC-14	0142569/00
AH-KA10F-5/10-8MT-PC-14	0142592/00
AH-KA10F-4/10-8M-PC-14	0142647/00
AH-KA10F-5/16,5-B-PA-14SL71	0142665/00
AH-KA10F-6/29-A-PA-14	0142731/00
AH-KA10F-6/15,5-8S-PA-BCB-14	0142908/00
AH-KA10F-6/15,5-8S2-PA-BCB-14	0142948/00

Designation	Ident-No.
AH-KA10F-9/16,5-N-PA-14SO	0143042/00
AH-KA10F-8/19,5-A-PA-14	0143106/00
AH-KA10F-6/10-8R-PC-14	0143284/00
AH-KA10F-3/10-10IWT-PC-14	0143317/00
AH-KA10F-7/10-10R2-PC-BCB-14	0143344/00
AH-KA10F-10/10-A-PC-14	0143472/00
AH-KA10F-4/11-L-PC-BCB-LEW-14	0143673/00
AH-KA10F-4/16,5-PA-14SL63	0143689/00
AH-KA10F-7/16,5-PA-14SL105	0143690/00
AH-KA10F-8/16,5-PA-14SL119	0143694/00
AH-KA10F-6/10-PA-14	0143862/00
AH-KA10F-6/16,5-8N-PA-LEW-14	0143870/00
AH-KA10F-10/10-10SW-PC-14	0143961/00
AH-KA10F-4/10,5-PA-BCB-SHL-14	0144175/00
AH-KA10F-4/10,5-PA-14	0144196/00
AH-KA10F-6/10-2-PA-14	0144374/00
AH-KA10F-6/8,6-10-PC-BCB-LEW-14	0144595/00
AH-KA10F-8/14,5-SEH-PA-14	0144646/00
AH-KA10F-6/10,5-6-PA-14	0144656/00
AH-KA10F-6/10,5-PA-14	0144665/00
AH-KA10F-8/14,5-SEH-PA-14-116	0148034/00
AH-KA10F-1/16,5-PA-14	0165014/00
AH-KA10F-2/16,5-PA-14	0165015/00
AH-KA10F-3/16,5-PA-14	0165016/00
AH-KA10F-4/16,5-PA-14	0165017/00
AH-KA10F-5/16,5-PA-14	0165018/00
AH-KA10F-6/16,5-PA-14	0165019/00
AH-KA10F-7/16,5-PA-14	0165020/00
AH-KA10F-8/16,5-PA-14	0165021/00
AH-KA10F-9/16,5-PA-14	0165022/00
AH-KA10F-10/16,5-PA-14	0165023/00
AH-KA10F-8/16,5-AC-PA-14SL139	0165631/00
AH-KA10F-6/16,5-E-PA-14-SL100	0165653/00
AH-KA10F-7/16,5-FA-PA-14SL139	0165676/00
AH-KA10F-8/16,5-F-PA-14SL118	0165678/00
AH-KA10F-6/16,5-FA-PA-14SL139	0165869/00
AH-KA10F-5/16,5-FA-PA-14SL139	0166191/00
AH-KA10F- 4/16,5-PTC-PC-20	0166233/00
AH-KA10F-4/16,5-PA-14SL70	0166314/00
AH-KA10F-8/15-S-PC-14	0166526/00
AH-KA10F-8/16,5-PA-14SL152,2	0166653/00

Designation	Ident-No.
AH-KA10F-6/16,5-TH-PA-14SL85	0166675/00
AH-KA10F-5/16,5-TH-PA-14	0166686/00
AH-KA10F-6/16,5-FA-PA-14SL139	0166690/00
AH-KA10F-3/10-10TH-PC-14BV	0166696/00
AH-KA10F-8/16,5-FA-PA-14SL133	0166753/00
AH-KA10F-8/16,5-E-PA-14SL119	0166836/00
AH-KA10F-7/16,5-PA-14	0166863/00
AH-KA10F-9/10-E-PC-14	0166884/00
AH-KA10F-6/16,5-E-PA-14SL91	0166900/00
AH-KA10F-2/16,5-PH-PA-14SL54	0166961/00
AH-KA10F-7/16,5-E-PA-14SL105	0166967/00
AH-KA10F-6/16,5-PTC-PA-14SL97	0166974/00
AH-KA10F-4/16,5-PTC-PA-14SL60	0167312/00
AH-KA10F-5/16,5-C-PA-14SL100	0167326/00
AH-KA10F-6/16,5-PA-14SL85	0167606/00
AH-KA10F-5/16,5-PA-14SL71	0167644/00
AH-KA10F-6/16,5-E-PA-14SL90	0167665/00
AH-KA10F-5/16,5-E-PA-14SL77	0167686/00
AH-KA10F-3/16,5-IN-PA-14SL43	0167692/00
AH-KA10F-4/16,5-E-PA-14SL63	0167767/00
AH-KA10F-8/16,5-PA-14SL113	0167802/00
AH-KA10F-3/16,5-E-PA-14SL54	0167814/00
AH-KA10F-3/16,5-PH-PA-14SL82	0167820/00
AH-KA10F-6/10-TT-PA-14	0167888/00
AH-KA10F-8/21,5-M-PA-14	0167948/00
AH-KA10F-6/16,5-E-14SL90	0167973/00
AH-KA10F-2/10-10TP-PC-14BV	0167985/00
AH-KA10F-6/16,5-A-PA-14SL102	0167996/00
AH-KA10F-4/10,4-S-PA-LEW-14	10000374
AH-KA10F-7/10,4-8E-PA-14	10000832
AH-KA10F-10/31,2-E-PA-14-SO	10006705
AH-KA10F-8/16,5-PA-14 112B	2503068/00
AH-KA10F-8/16,5-PA-14 118E	2503069/00

Compact holder for turning in

Designation	Ident-No.
AH-KD10F-8/10-PN-PC-14	0142228/00
AH-KD10F-8/10-PN2-PC-14	0142249/00
AH-KD10F-8/10-SW2-PC-14	0142318/00
AH-KD10F-8/10-BI-PC-14	0142320/00
AH-KD10F-8/10-FA2-PC-14	0142466/00
AH-KD10F-12/17,5-R2-PC-14	0142474/00

Designation	Ident-No.
AH-KD10F-8/10-DS-PC-14	0142487/00
AH-KD10F-12/16,5-DU-PA-14	0142584/00
AH-KD10F-8/10-DU-PA-14	0142629/00
AH-KD10F-12/16,5-WL-PA-14	0142641/00
AH-KD10F-8/10-ST-PC-14	0142789/00
AH-KD10F-8/10,5-DAI-PA-14	0142844/00
AH-KD10F-8/10,5-BP-PA-14	0142858/00
AH-KD10F-6/16,5-8R-PA-BCB-LEW-14	0143164/00
AH-KD10F-10/10-R-PA-14	0143602/00
AH-KD10F-7/10-R-PA-BCB-14	0143727/00
AH-KD10F-8/16,5-R-PA-BCB-14	0143728/00
AH-KD10F-10/16,5-CN-PA-14	0143906/00
AH-KD10F-4/10,4-10-SRL2-PA-14B20	0143920/00
AH-KD10F-4/10,4-SRL-PA-14B20	0143921/00
AH-KD10F-5/10,4-10-SRL2-PA-14B20	0143922/00
AH-KD10F-5/10,4-SRL-PA-14B20	0143923/00
AH-KD10F-4/10-CN-PA-BCB-LEW-14	0143963/00
AH-KD10F-8/10,5-A-PA-14B20	0143992/00
AH-KD10F-6/10,5-A-PA-BCB-14	0144000/00
AH-KD10F-4/10,5-BP-PA-BCB-SHL-14	0144021/00
AH-KDF10-4/10,5-BP-PA-AO-SMGM-14	0144200/00
AH-KD10F-10/16,5 CIM-PA-14	0144268/00
AH-KD10F-4/13,2-STU-PA-BCB-SHL-14	0144270/00
AH-KD10F-4/16,5-R-PA-BCB-SHL-14	0144273/00
AH-KD10F-4/10,5-BP2-PA-AO-SMGM-14	0144297/00
AH-KD10F-5/16,5-R-PA-BCB-SMGM-14	0144391/00
AH-KD10F-4/10,5-BP3-PA-AO-SMGM-14	0144444/00
AH-KD10F-4/16,5-R-PA-SMGM-14	0144488/00
AH-KD10F-6/16,5-DU-PA-AO-SMGM-14	0144498/00
AH-KD10F-7/10-PN-PC-14	0144500/00
AH-KD10F-6/18,1-SEW-PA-14	0144536/00
AH-KD10F-10/16,5 CIM2-PA-14	0144554/00
AH-KD10F-4/16,5-R-PA-BCB-SHL-14-GE	0144598/00
AH-KD10F-6/10,5-BP-PA-SHL-14	0144662/00
AH-KD10F-6/16,5-PA-14	0148032/00
AH-KD10F-8/10,5-SOL-PA-14	0148037/00
AH-KD10F-6/10,5-BP-PA-SMGM-14	0148041/00
AH-KD10F-4/16,5-S2-PA-AO-SMGM-14	0148057/00
AH-KD10F-10/10-R-PC-14	0165675/00
AH-KD10F-12/16,5-R-PC-14	0165911/00
AH-KD10F-10/10-TR-PC-14	0166005/00

Designation	Ident-No.
AH-KD10F-12/18,5-C-PC-14	0166252/00
AH-KD10F-8/10-FA-PC-14	0166253/00
AH-KD10F-8/10-DE-PC-14	0166254/00
AH-KD10F-8/10-CTI-PC-14	0166260/00
AH-KD10F-8/13-C-PA-14	0166261/00
AH-KD10F-9/10-C-PC-14	0166262/00
AH-KD10F-10/10-V-PC-14	0166265/00
AH-KD10F-8/10-TL-PC-14	0166266/00
AH-KD10F-8/10-FA-PC-14	0166267/00
AH-KD10F-6/14-TL-PC-20	0166268/00
AH-KD10F-12/16,5-ST-PC-14	0166269/00
AH-KD10F-12/30-TL-PC-14	0166270/00
AH-KD10F-8/14-TL-PC-14	0166271/00
AH-KD10F-8/13-PP-PC-14	0166272/00
AH-KD10F-8/10-PT-PA-14	0166273/00
AH-KD10F-8/10-SAF2-PC-14	0166274/00
AH-KD10F-8/10-SAF-PC-14	0166275/00
AH-KD10F-8/10-SH-PC-14	0166276/00
AH-KD10F-8/10-TH-PC-14	0166277/00
AH-KD10F-8/10-ST-PC-14	0166278/00
AH-KD10F-7/10-SW-PC-14	0166279/00
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AH-KD10F-8/10-EC-PC-14SL135	0166284/00
AH-KD10F-10/10-SW-PC-14	0166288/00
AH-KD10F-8/10-TL-PC-14	0166291/00
AH-KD10F-8/10-P-PA-14	0166295/00
AH-KD10F-10/10-KP-PC-14	0166296/00
AH-KD10F-7/16,5-DK-PC-14	0166424/00
AH-KD10F-8/10-C-PC-14	0166438/00
AH-KD10F-12/16,5-C-PC-14	0166440/00
AH-KD10F-8/16,5-FA-PC-14	0166456/00
AH-KD10F-9/10-SI-PC-14	0166487/00
AH-KD10F-11/16,5-TH-PA-14	0166692/00
AH-KD10F-8/10-SH-PA-14	0166720/00
AH-KD10F-5/10-Y-PA-14	0166778/00
AH-KD10F-9/10-PT-PC-14	0166851/00
AH-KD10F-8/10-TH-PC-14	0166866/00
AH-KD10F-11/16,5-TH-PA-14	0166883/00
AH-KD10F-10/16,5-12SRL-PC-14	0166898/00

Designation	Ident-No.
AH-KD10F-8/19,5-FA-PC-14	0166988/00
AH-KD10F-8/10-PT-PC-14	0166996/00
AH-KD10F-10/10-V-PC-14	0167334/00
AH-KD10F-12/16,5-PN-PA-14	0167495/00
AH-KD10F-8/10-PT-PC-14SL127	0167690/00
AH-KD10F-12/16,5-V-PC-14	0167773/00
AH-KD10F-8/10-PN-PC-14	0167793/00
AH-KD10F-11/16,5-PN-PA-14	0167834/00
AH-KD10F-8/10-G-PC-14	0167876/00
AH-KD10F-8/14,5-SH-PA-14	0167966/00
AH-KD10F-8/10-JB-14SL113	0167983/00
AH-KD10F-6/10,5-A2-PA-BCB-14	10005313

Compact holder for clipping in

Designation	Ident-No.
AH-KK10F-6/10-E-PA-18	0142006/00
AH-KK10F-8/10-E-PA-14	0142021/00
AH-KK10F-8/10-AN-PA-14	0142635/01
AH-KK10F-8/10-A-PC-14	0142675/00
AH-KK10F-5/10,6-E-PA-BCB-14B20	0142839/00
AH-KK10F-6/10,4-E-PA-BCB-14B20	0143031/00
AH-KK10F-4/10,4-S-PA-BCB-LEW-14	0143054/00
AH-KK10L-8/10-TS-PA-14	0143305/00
AH-KK10F-8/10-TS-PA-14	0143306/00
AH-KK10F-8/15,5-S-PA-14	0143390/00
AH-KK10F-8/15,5-S2-PA-14	0143391/00
AH-KK10F-8/10-E-PA-LEW-18	0143456/00
AH-KK10F-8/10-E2-PA-LEW-18	0143568/00
AH-KK10F-9/10-E-PA-18	0143644/00
AH-KK10F-8/15,5-S-PA-14SL113	0143688/00
AH-KK10F-6/10-R-PA-14	0143710/00
AH-KK10F-8/10-SRL-PA-BCB-14B20	0143786/00
AH-KK10F-6/10-E-PA-BCB-14B20	0143823/00
AH-KK10F-6/10-E-PA-14	0143848/00
AH-KK10F-9/14,5-CN-PA-14	0143904/00
AH-KK10F-8/10,4-CN-PA-14	0143965/00
AH-KK10F-4/13,2-A-PA-BCB-SHL-14	0144043/00
AH-KK10F-5/10,5-S-PA-BCB_SHL-14	0144141/00
AH-KK10F-7/10,4-E-PA-BCB-14B20	0144272/00
AH-KK10F-4/10,5-S-PA-SMGM-AO-14	0144290/01
AH-KK10F-6/10,4-E-PA-BCB-14B20	0144330/00
AH-KK10F-7/10,4-E2-PA-BCB-14B20	0144606/00

Designation	Ident-No.
AH-KK10F-10/15-A-PC-14	0166255/00
AH-KK10F-8/10-KP-PC-14	0166259/00
AH-KK10F-9/29-TL-PA-14	0166283/00
AH-KD10F-7/10-8E-PC-14	0166292/00
AH-KK10F-11/16,5-JB-PC-14	0166293/00
AH-KK10F-12/16,5-LI-PC-14	0166294/00
AH-KK10F-10/10-T-PA-14	0166664/00
AH-KK10F-6/10-NO-PA-14	0166722/00
AH-KK10F-8/10-E-PA-14	0167329/00
AH-KK10F-8/10-E-PA-14	0167660/00
AH-KK10F-12/16,5-A-PA-14	0167852/00
AH-KK10F-6/10-L-PA-14	10004490
AH-KK10F-6/10-A-PA-14	10005861

Compact holder for inserting

Designation	Ident-No.
AH-KS10F-10/16,5-PC-14	0165058/00
AH-KS10F-12/16,5-W-PA-14	0142068/00
AH-KS10F-3/16,5-PA-14	0148031/00
AH-KS10F-4/10,4-B-PA-14	0142873/00
AH-KS10F-4/10-AF-PA-14	0143000/00
AH-KS10F-4/16,5-CTI-PA-14	0167313/00
AH-KS10F-6/10,4-B-PA-14	0142869/00
AH-KS10F-6/10-A-PA-14	0142581/00
AH-KS10F-6/16,5-PC-14-LEW	0144487/00
AH-KS10F-8/10-AF-PA-14	0144063/00
AH-KS10F-8/10-F-PA-14	0165947/01
AH-KS10F-8/10-PTE-PA-14	0167857/00
AH-KS10F-8/15-S-PC-14	0166195/00
AH-KS10F-9/16,5-AC-PC-14	0165669/00
AH-KS10L-10/16,5-PC-14-LEW	10014612
AH-KS10L-4/10-A-PA-BCB-14	0143056/00
AH-KS10L-6/39-R-PA-14	0165635/00
KS10F-4/10,5-SSI-PA-14	10005450

Compact holder with additional adhesive protection

Designation	Ident-No.
AH-KK10L-5/10,6-E-PA-BCB-14B20	0142838/00
AH-KK10L-6/10,4-E-PA-BCB-14B20	0143030/00
AH-KK10L-6/10-E-PA-BCB-14B20	0143822/00
AH-KK10L-7/10,4-E-PA-BCB-14B20	0144271/00

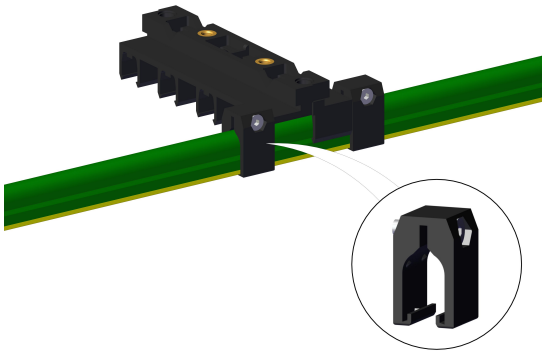
Compact holder with cast-in channel

Designation	Ident-No.
AH-KH10H-10/16,5-N-PA-14	0142077/00
COMPACT HOLDER KH 10-14 N,280MM LG.	0143001/00
AH-KH10H-4/16,5-N-PA-14	0143846/00
COMPACT HOLDER KH 10-7 PA LWL	0143978/00
COMPACT HOLDER KH 10-14 N,600MM LG.	0148051/00

5.2.11 Locating clamps

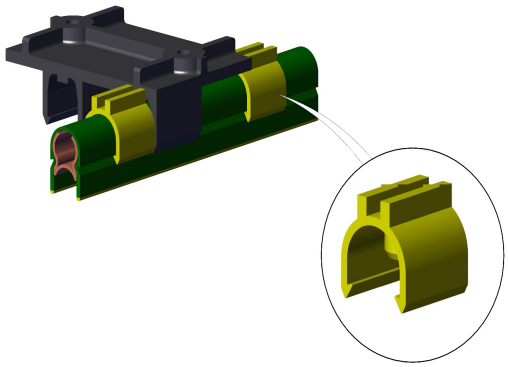
Locating clamps are used to fasten the conductor rail (fixed point) in order to prevent movement in a longitudinal direction. Per fixed point 2 USK 10 per conductor rail.

Standard locating clamp



USK10	
Ident-No.	165 645
Weight [kg]	0,006

Locating clamp PE-VPN



USK10A-VPN		
ID no.		144 876
Weight	[kg]	0.002

5.2.12 Compact current collector

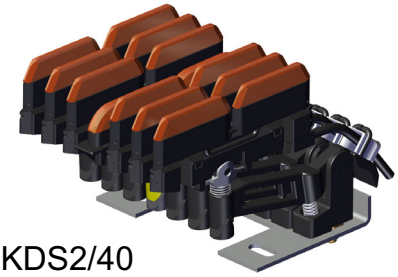
- Selection of current collectors according to the system equipment and functionality
- Connecting cables, highly-flexible
- The laying of connecting cables must not impede full mobility
- Loops must not touch the conductor rail

5.2.13 Compact current collector KDS2/40

Compact current collector KDS2/40



KDS2/40



KDS2/40
with straight base plate

Compact current collector KDS2/40	
PE-VP for EMS systems	
max. current: 1 connecting cable [A] 2 connecting cables [A]	 25 40
Installation dimensions [mm]	98 90 with straight base plate
Stroke [mm]	± 15
Lateral deflection [mm]	± 15
Contact pressure [N]	approx. 3.5 per carbon brush
Connecting cable	0.5 m highly flexible is also delivered. 2.5 mm^2 Type WFLA 2,5
PE on no. 4 (other configuration possible)	
PE moves forward when folding into the conductor rail	

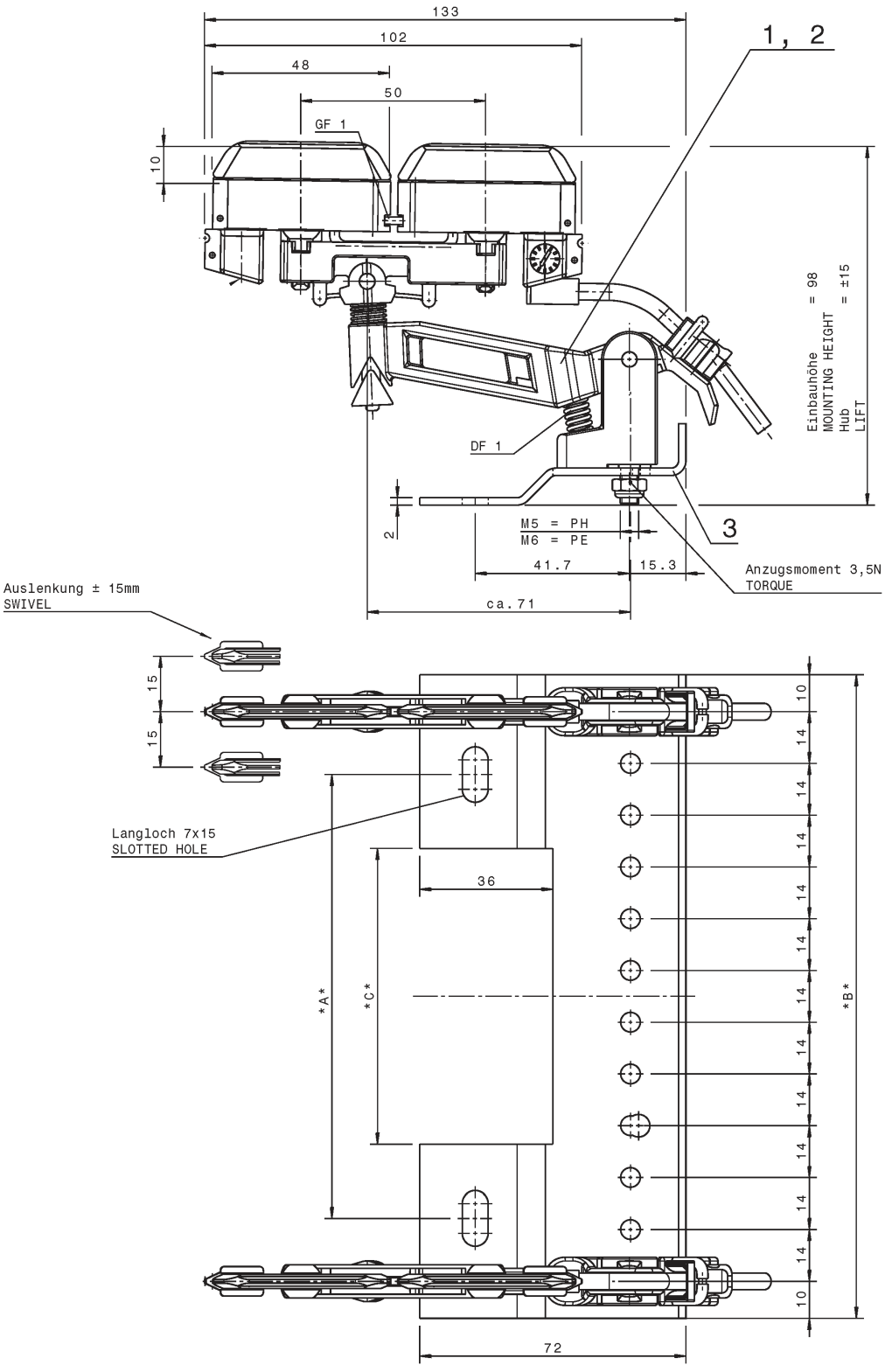
Type	Number of poles	A [mm]	B [mm]	C [mm]	Weight [kg]	Base plate	Ident-No.	
							PE-VP	PE
SA-KDS2/40/4/14VP0,5/4/4	4	28	62	-	0,428	4-pin	143 277	-
SA-KDS2/40/4/14HS0,5/4/4	4	28	62	-	0,428	4-pin	-	168 082
SA-KDS2/40/5/14VP0,5/4/6/6	5	56	90	-	0,549	6-pin (No. 6 free)	143 332	-
SA-KDS2/40/5/14HS0,5/4/6/6	5	56	90	-	0,549	6-pin (No. 6 free)	-	168 083
SA-KDS2/40/6/14VP0,5/4/6	6	56	90	-	0,637	6-pin	143 219	-
SA-KDS2/40/6/14HS0,5/4/6	6	56	90	-	0,637	6-pin	-	168 084
SA-KDS2/40/7/14VP0,5/4/8/8	7	80	118	53	0,744	8-pin (No. 8 free)	143 377	-
SA-KDS2/40/7/14HS0,5/4/8/8	7	80	118	53	0,744	8-pin (No. 8 free)	-	168 085
SA-KDS2/40/8/14VP0,5/4/8	8	80	118	53	0,832	8-pin	143 220	-
SA-KDS2/40/8/14HS0,5/4/8	8	80	118	53	0,832	8-pin	-	168 086
SA-KDS2/40/9/14VP0,5/4/10/10	9	80	156	53	0,959	10-pin (No. 10 free)	143 378	-
SA-KDS2/40/9/14HS0,5/4/10/10	9	80	156	53	0,959	10-pin (No. 10 free)	-	168 087
SA-KDS2/40/10/14VP0,5/4/10	10	80	156	53	1,047	10-pin	143 379	-
SA-KDS2/40/10/14HS0,5/4/10	10	80	156	53	1,047	10-pin	-	168 088

Single current collector with 0.5 m cable connection	Weight [kg]	Base plate	Phase Black	PE Yellow
SA-KDS2/40/04PH-88/15-0,5	0,091	none	168 073	-
SA-KDS2/40/04VP-79/15-0,5	0,105	none	-	143 218
SA-KDS2/40/04PE-88/15-0,5	0,090	none	-	168 074

Current collector trailer

1-pin on base plate, PE standard on no. 4, other assignment possible.

Type	A [mm]	B [mm]	C [mm]	Weight [kg]	Base plate	Ident-No.	
						PE-VP	PE
SA-KDS2/40/1/14VP0,5/4/4/1-3	28	62	-	0,164	4-pin	143 361	-
SA-KDS2/40/1/14HS0,5/4/4/1-3	28	62	-	0,164	4-pin	-	168 079-D
SA-KDS2/40/1/14VP0,5/4/6/1-3U5-6	56	90	-	0,197	6-pin	143 369	-
SA-KDS2/40/1/14HS0,5/4/6/1-3U5-6	56	90	-	0,197	6-pin	-	167 454
SA-KDS2/40/1/14VP0,5/4/8/1-3U5-8	80	118	53	0,216	8-pin	143 635	-
SA-KDS2/40/1/14HS0,5/4/8/1-3U5-8	80	118	53	0,216	8-pin	-	167 830



Compact current collector KDS2/40 - VP

Designation	Ident-No.
SA-KDS2/40/1/14VP0,5D/4/6/1-3U5-6	0143598/00
SA-KDS2/40/1/14VP1,0/4/8/1-3U5-8	0143635/00-1

Designation	Ident-No.
SA-KDS2/40/10/14VP0,5/4/10	0143379/00
SA-KDS2/40/11/14VP0,5/4/12/12	0143380/00
SA-KDS2/40/12/14VP0,5/4/12	0143381/00
SA-KDS2/40/2/14VP0,5/4/4/1U2	0143375/00
SA-KDS2/40/4/14VP0,0/5/6/1U6	0143927/00-0E
SA-KDS2/40/4/14VP0,52/5/6/1U6/Z	0143981/00
SA-KDS2/40/4/14VP0,67/5/6/1U6/Z	0143990/00
SA-KDS2/40/4/14VP1,0/4/4	0143277/00-1
SA-KDS2/40/4/14VP2,0/4/4	0143277/00-2
SA-KDS2/40/5/14VP1,0/5/6/1	0143447/00
SA-KDS2/40/6/14VP0,0/6/8/1-2	0143617/00-0F
SA-KDS2/40/6/14VP0,5/4/6/Z	0143569/00
SA-KDS2/40/6/14VP0,5/4/6Z	0143219/00-AUFD
SA-KDS2/40/6/14VP0,5D/4/6/Z	0143590/00
SA-KDS2/40/7/14VP0,5/3/10/4U6U10	0143397/00-C
SA-KDS2/40/7/14VP1,0D/3/8/8	0143839/00-1C
SA-KDS2/40/7/14VP1,5/4/8/8	0143377/00-1.5
SA-KDS2/40/8/14VP1,0/4/10/9-10	0143508/00-1
SA-KDS2/40/9/14VP0,5/4/10/10	0143378/00
SA-KDS2/40/9/14VP0,5/7/10/1	0143378/00-G
SA-KDS2/40A1/6/14VP2,0/4/6/6/Z	0143370/01-2
SA-KDS2/40A1/7/14VP0,5/4/8/8	0148010/01
SA-KDS2/40A2/7/14VP0,5/5/1/8/8	0143696/01
SA-KDS2/40A2/8/14VP0,5/5/1/8	0143604/01
SA-KDS2/40DU/1/14VP0,5D6/6A/1-5U7-10	0143607/00
SA-KDS2/40DU/6/14VP0,5D4/6A/Z	0143606/00
SA-KDS2/40E/1/14VP0,5/6/7/1-5U7	10000196
SA-KDS2/40E/1/14VP1,0/4/6/1-3U5-6	0143697/00-1
SA-KDS2/40E/5/14VP1,0/3/6/1	0143914/00-1
SA-KDS2/40E/5/14VP1,0/4/6/6	0143698/00-1
SA-KDS2/40L/1/14VP0,5/2/5/8/1-4U6-8/Z	0143360/00
SA-KDS2/40SH/1/14VP0,5/4/8/1-3U5-8	0143827/00
SA-KDS2/40SH/6/14VP0,5/4/8/7U8	0143821/00
SA-KDS2/40/1/14VP0,3/2/6/1U3-6	0143369/00-B0.3
SA-KDS2/40/1/14VP0,31/4/4/1-3/Z	0144739/00-0.31
SA-KDS2/40/1/14VP0,35/2/4/1U3-4	0144072/00-0.35B
SA-KDS2/40/1/14VP0,35/4/6/1-3U5-6	0144432/00-0.35
SA-KDS2/40/1/14VP0,5/2/6/1U3-6	0143369/00-B
SA-KDS2/40/1/14VP0,5/3/4/1-2U4	0143361/00-C
SA-KDS2/40/1/14VP0,5/3/6/1-2U4-6	0143369/00-C
SA-KDS2/40/1/14VP0,5/4/4/1-3	0143361/00

Designation	Ident-No.
SA-KDS2/40/1/14VP0,5/4/6/1-3U5-6	0143369/00
SA-KDS2/40/1/14VP0,5/4/6/1-3U5-6	0144432/00
SA-KDS2/40/1/14VP0,5/5/6/1-4U6	0143369/00-E
SA-KDS2/40/1/14VP1,0/4/4/1-3	0143361/00-1
SA-KDS2/40/1/14VP1,0/4/6/1-3U5-6	0143369/00-1
SA-KDS2/40/1/14VP1,5/1/4/2-4	10003893
SA-KDS2/40/1/14VP1,5/4/4/1-3	0143361/00-1.5
SA-KDS2/40/1/14VP1,5/4/6/1-3U5-6	0143369/01-1.5
SA-KDS2/40/1/14VP2,0/4/4/1-3	0143361/00-2
SA-KDS2/40/10/14VP0,0/4/10	0143379/00-0
SA-KDS2/40/10/14VP0,0/7/10	10000617
SA-KDS2/40/14/14VP0,5/4/14	0143639/00
SA-KDS2/40/2/14VP1,0/4/4/1U2	0143375/00-1
SA-KDS2/40/3/14VP0,5/3/4/4	0143376/00
SA-KDS2/40/4/14VP0,0/4/4	0143277/00-0
SA-KDS2/40/4/14VP0,5/1/4	0143277/00-A
SA-KDS2/40/4/14VP0,5/3/4	0143277/00-C
SA-KDS2/40/4/14VP0,5/4/4	0143277/00
SA-KDS2/40/4/14VP0,5/6/6/1-2	10000700
SA-KDS2/40/4/14VP0,75/4/4/Z	10004388
SA-KDS2/40/5/14VP0,3/2/6/6	0143332/00-B0.3
SA-KDS2/40/5/14VP0,3/2/6/6	0143332/01-B0.3
SA-KDS2/40/5/14VP0,5/2/6/6	0143332/00-B
SA-KDS2/40/5/14VP0,5/4/6/6	0143332/00
SA-KDS2/40/5/14VP0,5/5/6/6	0143332/00-E
SA-KDS2/40/5/14VP1,0/4/6/6	0143332/00-1
SA-KDS2/40/5/14VP2,0/1/6/6	0143332/00-A2
SA-KDS2/40/5/14VP2,0/4/6/6	0143332/00-2
SA-KDS2/40/5/14VP2,0/6/6/1	0143332/00-F2
SA-KDS2/40/5/14VP3,0/4/6/6	0143332/00-3
SA-KDS2/40/5/14VP5,0/4/6/6	0143332/00-5
SA-KDS2/40/5/14VP8,0/4/6/6	0143332/00-8
SA-KDS2/40/6/14VP0,0/4/6	0143219/00-0
SA-KDS2/40/6/14VP0,0/4/8/7-8	0143617/00-0
SA-KDS2/40/6/14VP0,31/0,28/4/6Z	0144738/00
SA-KDS2/40/6/14VP0,35/4/6Z	0144071/00-0.35
SA-KDS2/40/6/14VP0,35/4/6Z	0144431/00-0.35
SA-KDS2/40/6/14VP0,5/1/6	0143219/00-A
SA-KDS2/40/6/14VP0,5/2/8/1U6	0144835/00-B
SA-KDS2/40/6/14VP0,5/3/6	0143219/00-C
SA-KDS2/40/6/14VP0,5/4/6	0143219/00

Designation	Ident-No.
SA-KDS2/40/6/14VP0,5/4/6/Z	0143468/00
SA-KDS2/40/6/14VP0,5/4/6/Z	0148024/00
SA-KDS2/40/6/14VP0,5/4/6G	0144585/00
SA-KDS2/40/6/14VP0,5/4/6Z	0143219/00-Z1
SA-KDS2/40/6/14VP0,5/5/8/1U8	0143930/00-E
SA-KDS2/40/6/14VP0,5/6/8/4+5/Z	0144778/00-EF
SA-KDS2/40/6/14VP1,0/4/6	0143219/01-1
SA-KDS2/40/6/14VP1,0/4/6/Z	0143468/00-1
SA-KDS2/40/6/14VP1,0/4/6/Z	0144390/00
SA-KDS2/40/6/14VP1,0/6/8/1U2	0143599/00
SA-KDS2/40/6/14VP1,0D/4/8/7-8	0143463/01-1
SA-KDS2/40/6/14VP1,5/6/8/1-2	10003892
SA-KDS2/40/7/14VP0,3/4/8/8/Z	10002227
SA-KDS2/40/7/14VP0,5/3/8/8	0143377/00-C
SA-KDS2/40/7/14VP0,5/5/8/1	0144231/00-E
SA-KDS2/40/7/14VP0,5/5/8/8	0143377/00-E
SA-KDS2/40/7/14VP3/4/8/8	0143377/00-3
SA-KDS2/40/8/14VP0,5/4/8	0143220/00
SA-KDS2/40/8/14VP0,5/5/10/1U10	10003753
SA-KDS2/40/8/14VP3,0/4/8	0143220/00-3
SA-KDS2/40A1/6/14VP0,5/4/6/6/Z	0143370/01
SA-KDS2/40A01/14VP0,3/5/8/1-4+6-8	0144205/00-0.3E
SA-KDS2/40A01/14VP0,5/5/8/1-4U.6-8	0144219/00-E
SA-KDS2/40A01/14VP0,5/6/8/1-5U.7+8	0144219/00-F
SA-KDS2/40A01MS2/4/14VP0,5/6/6/Z	0144644/00
SA-KDS2/40A01MS3/4/14VP0,5/8/8/4/Z	0144356/00-H
SA-KDS2/40A06/14VP0,3/5/8/1-2	0144204/00-0.3E
SA-KDS2/40A06/14VP0,5/3/8/7+8	0144178/00-C
SA-KDS2/40A06/14VP0,5/6/8/1-2	0144127/00-F
SA-KDS2/40A06/14VP0,5/6/8/1-2/Z	0144128/00-F
SA-KDS2/40A07/14VP0,5/5/8/1	0144207/00-E
SA-KDS2/40DU/1/14VP0,5D4/4/1-3	10006651
SA-KDS2/40DU/1/14VP0,5D4/4A/1-3	10006653
SA-KDS2/40DU/4/14VP0,5D4/4/Z	10006650
SA-KDS2/40DU/4/14VP0,5D4/4A/Z	10006652
SA-KDS2/40H/1/14VP0,5/1/4/2-4	0144648/00-A
SA-KDS2/40H/6/14VP0,5/2/6	0144647/00-B
SA-KDS2/40L/7-14VP0,5/4/8/8/Z	10006713
SA-KDS2/40MS1/1/14VP0,5/3/6/2U.4-6	0144294/00-C
SA-KDS2/40MS1/1/14VP0,5/5/5/2-4/Z	0144491/00
SA-KDS2/40MS1/1/14VP0,5/5/5/2-4/Z	0144493/00

Designation	Ident-No.
SA-KDS2/40MS1/1/14VP0,5/5/5/2-4/Z	0144544/00
SA-KDS2/40MS1/1/14VP0,5/6/6/2-5	0144294/00-F
SA-KDS2/40MS1/1/14VP0,5/6/6/2-5/Z	0144664/00
SA-KDS2/40MS1/1/14VP0,5D/5/5/2-4/Z	0144495/00
SA-KDS2/40MS1/4/14VP0,5/3/6/2	0144293/00-C
SA-KDS2/40MS1/4/14VP0,5/5/5/Z	0144389/00
SA-KDS2/40MS1/4/14VP0,5/5/5/Z	0144492/00
SA-KDS2/40MS1/4/14VP0,5/5/5/Z	0144543/00
SA-KDS2/40MS1/4/14VP0,5/6/6/2	0144293/00-F
SA-KDS2/40MS1/4/14VP0,5/6/6/2/Z	0144558/00-F
SA-KDS2/40MS1/4/14VP0,5D/5/5/Z	0144494/00
SA-KDS2/40MS1/5/14VP2,0/3/7/2	0144798/00-C
SA-KDS2/40MS11/5/14VP0,5/2/12/6-10U12/Z	0144399/00-B
SA-KDS2/40MS1A2/4/14VP0,5/6/6/Z	0144663/00
SA-KDS2/40MS1AO2L/4/14VP0,5/6/6/Z	0144304/00-F
SA-KDS2/40MS1AO3U4/6/14VP0,5/8/10	0144210/00
SA-KDS2/40MS1L/1/14VP0,5/6/6/Z	0144305/00-F
SA-KDS2/40MS1S/1/14VP0,5/5/5/2-4/Z	0144288/00
SA-KDS2/40MS1S/4/14VP0,5/5/5/Z	0144287/00
SA-KDS2/40MS1U2/1/14VP0,5/9/10/3-8U10/Z	0144710/00-I
SA-KDS2/40MS1U2/5/14VP0,5/9/10/3U4U10/Z	0144709/00-I
SA-KDS2/40MS1U2AO3U4/4/14VP0,5/8/8	0144172/00
SA-KDS2/40MS3/1/14VP0,5/8/8/1-2U4-7/Z	0144357/00-H
SA-KDS2/40MS6/1/14VP0,5/1/6/2-5	0144414/00-A
SA-KDS2/40MS6/4/14VP0,5/1/6/5	0144413/00-A
SA-KDS2/40R1/14VP0,5/4/4/1-3	10005310
SA-KDS2/40R7/14VP0,5/3/8/8	10003058
SA-KDS2/40R7/14VP0,5/4/8/8	10006156
SA-KDS2/40R7/14VP0,5/5/8/8	10005309
SA-KDS2/40R7/14VP0,5/6/8/1	10003057

Compact current collector KDS2/40 - VP with straight base plate

Designation	Ident-No.
SA-KDS2/40E/1/14VP0,5/2/6/1U3-6	0143697/00-B
SA-KDS2/40E/1/14VP0,5/3/6/1-2U4-6	0143697/00-C
SA-KDS2/40E/1/14VP0,5/4/6/1-3U5-6	0143697/00
SA-KDS2/40E/1/14VP0,5/4/7/1-3U5-7	0144610/00
SA-KDS2/40E/1/14VP0,5/5/6/1-4U6	0143697/00-E
SA-KDS2/40E/1/14VP1,0/3/6/1-2U4-6	0143697/00-1C
SA-KDS2/40E/4/14VP0,25V/5/8U/1-4/Z	10002153
SA-KDS2/40E/5/14VP0,25V/5/8U/6-8/Z	10002152
SA-KDS2/40E/5/14VP0,5/3/6/1	0143914/00

Designation	Ident-No.
SA-KDS2/40E/5/14VP0,5/4/6/6	0143698/00
SA-KDS2/40E/6/14VP0,5/2/6	0143699/00-B
SA-KDS2/40E/6/14VP0,5/4/6	0143699/00
SA-KDS2/40E/6/14VP0,5/5/6	0143699/00-E
SA-KDS2/40E/6/14VP1,0/3/6	0143699/00-1C
SA-KDS2/40E/6/14VP1,0/4/6	0143699/00-1
SA-KDS2/40E/7/14VP0,5/4/7	0144609/00
SA-KDS2/40E/7/14VP0,5/6/7	10000195
SA-KDS2/40KE/1/14VP0,5/3/6/1-2U4-6	0144463/00-C
SA-KDS2/40KE/1/14VP0,5/4/6/1-3U5-6	0144463/00
SA-KDS2/40KE/6/14VP0,5/3/6	0144462/00-C
SA-KDS2/40KE/6/14VP0,5/4/6	0144462/00
SA-KDS2/40RE1/14VP0,5/3/6/1-2U4-6	0144281/00-C
SA-KDS2/40RE1/14VP0,5/4/6/1-3U5-6	10003186
SA-KDS2/40RE1/14VP0,5/6/7/1-5U7	10004762
SA-KDS2/40RE5/14VP0,5/4/6/6	10003185
SA-KDS2/40RE6/14VP0,5/3/6	0144280/00-C
SA-KDS2/40RE7/14VP0,5/6/7	10004761

Compact current collector KDS2/40 - HS

Designation	Ident-No.
SA-KDS2/40/10/14HS2,0/4U8/10	0143947/00-2
SA-KDS2/40/10/14HS3,0/4/10	0167528/00
SA-KDS2/40/10/14HS3,0/7/10	0167528/00-G
SA-KDS2/40/10/14HS3,0D/4/10	0167539/00
SA-KDS2/40/10/14HS5,0/4/10	0168088/00-5
SA-KDS2/40/12/14HS0,5/1/12	0168090/00-A
SA-KDS2/40/12/14HS0,5/12/12	0168090/00-L
SA-KDS2/40/12/14HS0,5/4/12	0168090/00
SA-KDS2/40/12/14HS1,0/12/12	0168090/00-1L
SA-KDS2/40/12/14HS1,5/7/12	0168090/00-1.5G
SA-KDS2/40/12/14HS2,0/4/12	0168090/00-2
SA-KDS2/40/12/14HS3,0/4/12	0168090/00-3
SA-KDS2/40/17/14HS1,0/17/17	0143285/00
SA-KDS2/40/2/14HS0,5/2/4/3-4	0168080/00
SA-KDS2/40/2/14HS2,0/2/4/3-4	0168080/00-2
SA-KDS2/40/3/14HS0,0/2/4/1	0143917/00-0B
SA-KDS2/40/3/14HS0,0/2/4/4	0168081/00-0B
SA-KDS2/40/3/14HS0,0/3/4/4	0168081/00-0
SA-KDS2/40/3/14HS0,5/1/4/4	0168081/00-A
SA-KDS2/40/3/14HS0,5/4/4/1	0168081/00-D
SA-KDS2/40/3/14HS0,5/4/6/1U5U6	0143892/00

Designation	Ident-No.
SA-KDS2/40/3/14HS0,5/5/10/1-4U8-10	0143933/00
SA-KDS2/40/3/14HS1,0/3/4/4	0168081/00-1C
SA-KDS2/40/3/14HS2,0/3/4/4	0168081/00-2
SA-KDS2/40/3/14HS3,0/3/4/4	0168081/00-3
SA-KDS2/40/3/14HS3,0/6/10/1-3U7-10	0143935/00
SA-KDS2/40/3/14HS7,0/3/4/4	0168081/00-7
SA-KDS2/40/4/14HS0,0/4/4	0168082/00-0
SA-KDS2/40/4/14HS0,5/1/4	0168082/00-A
SA-KDS2/40/4/14HS0,5/2/8/1U3-5	0143953/00
SA-KDS2/40/4/14HS0,5/4/10/5-10	0142007/00
SA-KDS2/40/4/14HS0,5/4/6/5-6	0167945/00
SA-KDS2/40/4/14HS0,5/9/10/1-5U10	0142007/00-I
SA-KDS2/40/4/14HS1,0/1/4	0168082/00-1A
SA-KDS2/40/4/14HS1,0/4/10/5-10	0142007/00-1
SA-KDS2/40/4/14HS1,0D/4/4	0167620/00
SA-KDS2/40/4/14HS10,0/4/4	0168082/00-10
SA-KDS2/40/4/14HS10,0D/4/4	0167620/00-10
SA-KDS2/40/4/14HS15,0/4/4	0168082/00-15
SA-KDS2/40/4/14HS2,0/4/6/5-6	0167945/00-2
SA-KDS2/40/4/14HS2,5/4/4	0168082/00-2.5
SA-KDS2/40/4/14HS3,0/4/4	0168082/00-3
SA-KDS2/40/4/14HS4,0D/4/4	0167620/00-4
SA-KDS2/40/4/14HS5,0/4/4	0168082/00-5
SA-KDS2/40/5/14HS0,5/2/8/6-8	0142428/00-B
SA-KDS2/40/5/14HS0,5/3/5	0142719/00
SA-KDS2/40/5/14HS0,5/5/6/1	0143062/00-E
SA-KDS2/40/5/14HS0,5/7/8/1U6U8	0142428/00-G
SA-KDS2/40/5/14HS1,0/3/5	0142719/00-1
SA-KDS2/40/5/14HS1,0/3/6/6	0168083/00-1C
SA-KDS2/40/5/14HS1,0/4/6/6	0168083/00-1
SA-KDS2/40/5/14HS1,0/5/6/6	0168083/00-1E
SA-KDS2/40/5/14HS1,0/6/6/1	0143062/00-1F
SA-KDS2/40/5/14HS2,0/6/6/1	0143062/00-2F
SA-KDS2/40/5/14HS4,0/4/6/6	0168083/00-4
SA-KDS2/40/6/14HS0,0/2/6	0168084/00-0B
SA-KDS2/40/6/14HS0,0/4/8/7U8	0167250/00-0
SA-KDS2/40/6/14HS0,5/1/6H/Z	0166829/00
SA-KDS2/40/6/14HS0,5/3/6H/Z	0166829/00-C
SA-KDS2/40/6/14HS0,5/4/6/Z	0167870/00
SA-KDS2/40/6/14HS0,5/4/6/Z	0168437/00
SA-KDS2/40/6/14HS0,5/4/6H/Z	0166829/00-D

Designation	Ident-No.
SA-KDS2/40/6/14HS0,5/5/8/1U8	0168164/00-E
SA-KDS2/40/6/14HS0,5/6/6	0168084/00-F
SA-KDS2/40/6/14HS0,5/6/8/1U5	0143537/00-F
SA-KDS2/40/6/14HS0,5/7/8/6U8	0142406/00-G
SA-KDS2/40/6/14HS0,5/8/8/6U7Z	0142334/00-H
SA-KDS2/40/6/14HS1,0/4/8/7U8Z	0142334/00-1
SA-KDS2/40/6/14HS1,0/4/9G7-9	0142157/00-1
SA-KDS2/40/6/14HS1,0/5/8/1-2	0143546/00-E
SA-KDS2/40/6/14HS3,0/5/8/1U8	0168164/00-3E
SA-KDS2/40/6/14HS3,0D/4/10/7-10/Z	0167563/00
SA-KDS2/40/6/14HS4,0/3/6	0168084/00-4C
SA-KDS2/40/6/14HS5,0/4/6	0168084/00-5
SA-KDS2/40/7/14HS0,0/4/10/8-10	0167525/00-0
SA-KDS2/40/7/14HS0,0/4/8/8	0168085/00-0
SA-KDS2/40/7/14HS0,0/5/8/1	0168085/00-0E
SA-KDS2/40/7/14HS0,5/1/8/8	0168085/00-A
SA-KDS2/40/7/14HS0,5/3/10/4-5U10	0143388/00-C
SA-KDS2/40/7/14HS0,5/3/10/5-6U10	0143396/00-C
SA-KDS2/40/7/14HS0,5/4/10/8-10	0167669/00
SA-KDS2/40/7/14HS0,5/5/8/8	0168085/00-E
SA-KDS2/40/7/14HS0,5/6/8/1	0143483/00
SA-KDS2/40/7/14HS0,5/7/8/8	0168085/00-G
SA-KDS2/40/7/14HS0,5/8/10/1U9-10	0167669/00-H
SA-KDS2/40/7/14HS0,5/8/8/7	0168085/00-H
SA-KDS2/40/7/14HS0,5/9/10/1U8U10	0167669/00-I
SA-KDS2/40/7/14HS1,0/3/8/8	0168085/00-1C
SA-KDS2/40/7/14HS1,0/4/8/8/Z	0167497/00
SA-KDS2/40/7/14HS1,0/4/9/8U9	0143047/00-1
SA-KDS2/40/7/14HS1,5/4/8/8	0168085/00-1.5
SA-KDS2/40/7/14HS1,5/5/8/8	0168085/00-1.5E
SA-KDS2/40/7/14HS1,5D4/8/8	0142706/00
SA-KDS2/40/7/14HS3,0/4/8/8	0168085/00-3
SA-KDS2/40/7/14HS3,0D/4/10/8-10/Z	0167561/00
SA-KDS2/40/7/14HS3,0D4/10/8-10	0166801/00
SA-KDS2/40/7/14HS5,0/4/8/8	0168085/00-5
SA-KDS2/40/7/14HS7,0/4/10/8-10	0167669/00-7
SA-KDS2/40/7/14HS7,0/4/8/8	0168085/00-7
SA-KDS2/40/8/14HS0,0/4/10/9-10/Z	0167562/00-0
SA-KDS2/40/8/14HS0,0/4/8	0168086/00-0
SA-KDS2/40/8/14HS0,25/4/8	0168086/00-0.25
SA-KDS2/40/8/14HS0,5/1/8	0168086/00-A

Designation	Ident-No.
SA-KDS2/40/8/14HS0,5/10/10/1U9	0142065/00-J
SA-KDS2/40/8/14HS0,5/2/10/1U4-7	0143968/00
SA-KDS2/40/8/14HS0,5/3/8	0168086/00-C
SA-KDS2/40/8/14HS0,5/4/8/Z	0143085/00
SA-KDS2/40/8/14HS0,5/4/8/Z	0143125/00
SA-KDS2/40/8/14HS0,5/4/8/Z	0167721/00-0.5
SA-KDS2/40/8/14HS0,5/5/10/1U10	0142065/00-E
SA-KDS2/40/8/14HS0,5/6/8	0168086/00-F
SA-KDS2/40/8/14HS0,5/9/10/8U10	0142119/00-I
SA-KDS2/40/8/14HS1,0D/4/8	0167614/00-1
SA-KDS2/40/8/14HS1,2/4/8	0168086/00-1.2
SA-KDS2/40/8/14HS1,5/4/8/Z	0143085/00-1.5
SA-KDS2/40/8/14HS1,5/6/10/1U10	0143934/00
SA-KDS2/40/8/14HS10,0/4/8	0168086/00-10
SA-KDS2/40/8/14HS2,0/1/8	0168086/00-2A
SA-KDS2/40/8/14HS2,0/4/8	0168086/00-2
SA-KDS2/40/8/14HS3,0 4/10/9-10	0167526/00
SA-KDS2/40/8/14HS3,0/1/8	0168086/00-3A
SA-KDS2/40/8/14HS3,0/4/8	0168086/00-3
SA-KDS2/40/8/14HS3,0D/4/10/9-10/Z	0167562/00
SA-KDS2/40/8/14HS3,0D4/10/9-10	0166802/00
SA-KDS2/40/8/14HS3,5/4/8	0168086/00-3.5
SA-KDS2/40/8/14HS5,0/4/8	0168086/00-5
SA-KDS2/40/8/14HS6,0/4/8	0168086/00-6
SA-KDS2/40/9/14HS0,5/3/10/10	0168087/00-C
SA-KDS2/40/9/14HS0,5/5/10/10	0168087/00-E
SA-KDS2/40/9/14HS0,5/6/10/10	0168087/00-F
SA-KDS2/40/9/14HS0,5/7/10/1	0168087/00-G
SA-KDS2/40/9/14HS0,5D/4/10/10	0142129/00
SA-KDS2/40/9/14HS1,0/9/10/10	0168087/00-1I
SA-KDS2/40/9/14HS2,0/4/10/10	0168087/00-2
SA-KDS2/40/9/14HS6,0D/4/10/10	0142129/00-6
SA-KDS2/40A1/11/14HS1,0/1//12/8/Z	0143551/01
SA-KDS2/40A1/11/14HS1,0/5//12/9/Z	0143549/01
SA-KDS2/40A1/8/14HS1,0/6/1/8/Z	0143554/01
SA-KDS2/40A2/6/14HS0,5/4/6/8G/7U8	0143828/00
SA-KDS2/40A3/7/14HS0,5/5/1/8/8	0143872/00
SA-KDS2/40FA/8/14HS0,5/4/8G	0142047/00
SA-KDS2/40H/E/1/14HS0,21/5/8/1-4U6-8/Z	0168392/00
SA-KDS2/40H/SH/6/14HS0,5/4/8/7U8/Z	0167402/00
SA-KDS2/40HE/1/14HS0,0/5/8/1-4U6-8	0143021/00

Designation	Ident-No.
SA-KDS2/40HE/1/14HS0,0/5/8/1-4U7-8	0143035/00
SA-KDS2/40HE/6/14HS0,5/5/6	0168424/00
SA-KDS2/40HE/8/14HS0,5/4/8	0143044/00
SA-KDS2/40K/1/14HS0,5/1/4/2-4	0143018/00
SA-KDS2/40K/4/14HS0,5/4/4	0143019/00
SA-KDS2/40K/6/14HS0,5/4/6	0143531/00
SA-KDS2/40SH/7/14HS0,0/4/8/3	0168262/00
SA-KDS2/40T/7/14HS1,5/4/10/8-10	0168340/00
SA-KDS2/40T/7/14HS2,5D4/10/8-10	0142705/00-2.5
SA-KDS2/40TGW/8/14HS1,5D4/10/9U10	0142691/00

Compact current collector KDS2/40 - HS with straight base plate

Designation	Ident-No.
SA-KDS2/40E/1/14HS0,21/4/8/1-3U5-8Z	0143032/00
SA-KDS2/40E/1/14HS0,25V/4/8U/1-3U5-8/Z	0162361/00
SA-KDS2/40E/1/14HS0,3/4/8/1-3U5-8	0167472/00-0.3
SA-KDS2/40E/1/14HS0,5/1/8/2-8	0167472/00-A
SA-KDS2/40E/1/14HS0,5/4/8/1-3U5-8	0167472/00
SA-KDS2/40E/1/14HS0,5/4/8/1-3U5-8	0168411/00
SA-KDS2/40E/1/14HS0,5/4/8U/1-3U5-8	0143829/00
SA-KDS2/40E/1/14HS0,5/5/6/1-4U6	0143039/00-E
SA-KDS2/40E/1/14HS0,5/6/8/1-5U7-8	0167472/00-F
SA-KDS2/40E/1/14HS0,7/4/8/1-3U5-8	0167472/00-0.7
SA-KDS2/40E/1/14HS1,0/4/8/1-3U5-8	0167472/00-1
SA-KDS2/40E/1/14HS1,0/5/6/1-4U6	0143039/00-1E
SA-KDS2/40E/1/14HS5,0/5/6/1-4U6	0143039/00-5E
SA-KDS2/40E/5/14HS0,2/4/8/6-8Z	0143033/00
SA-KDS2/40E/5/14HS0,25/4/8/6-8	0168416/00
SA-KDS2/40E/5/14HS1,0/5/6/1	0168400/00-1
SA-KDS2/40E/5/14HS5,0/5/6/1	0168400/00-5
SA-KDS2/40E/6/14HS0,3/4/8/7-8	0168202/00-0.3
SA-KDS2/40E/6/14HS0,5/4/8/7-8	0168202/00
SA-KDS2/40E/6/14HS0,5/6/8/1U2	0142822/00
SA-KDS2/40E/6/14HS0,7/4/8/7-8	0168202/00-0.7
SA-KDS2/40E/6/14HS1,0/4/8/7-8	0168202/00-1
SA-KDS2/40E/6/14HS2,0/4/8/7-8	0168202/00-2
SA-KDS2/40E/7/14HS0,5/4/8/8	0167879/00
SA-KDS2/40E/7/14HS1,0/4/8/8	0167879/00-1
SA-KDS2/40E/8/14HS0,3/4/8	0168413/00
SA-KDS2/40E/8/14HS0,5/4/8	0167471/00
SA-KDS2/40E/8/14HS0,5/4/8	0168413/00-0.5

Compact current collector KDS2/40 - SS

Designation	Ident-No.
SA-KDS2/40/1/14SS0,5/4/2-4	0168091/00
SA-KDS2/40/10/14SS0,0/10	0168100/00-0
SA-KDS2/40/10/14SS0,5/10	0168100/00
SA-KDS2/40/10/14SS2,0/10	0168100/00-2
SA-KDS2/40/10/14SS3,0/10/Z	0167538/00
SA-KDS2/40/11/14SS0,5/12/12	0168101/00
SA-KDS2/40/11/14SS1,0/12/12	0168101/00-1
SA-KDS2/40/12/14SS0,5/12	0168102/00
SA-KDS2/40/12/14SS1,0/12/Z	0142963/00-1
SA-KDS2/40/2/14SS0,5/4/1-2	0142264/00
SA-KDS2/40/2/14SS0,5/4/1-4	0144140/00
SA-KDS2/40/2/14SS0,5/4/3-4	0168092/00
SA-KDS2/40/2/14SS0,5/4/8/3-8	0142560/00
SA-KDS2/40/2/14SS0,5/6/1-4	0167673/00
SA-KDS2/40/2/14SS0,5/8/1-6	0142633/00
SA-KDS2/40/2/14SS1,0/8/1-4U7-8	0143342/00
SA-KDS2/40/2/14SS1,0/8/1-4U7U8	0168293/00-1
SA-KDS2/40/3/14SS0,0/4/4	0168093/00-0
SA-KDS2/40/3/14SS0,5/4/2	0144832/00
SA-KDS2/40/3/14SS0,5/4/3	0144833/00
SA-KDS2/40/3/14SS0,5/4/4	0168093/00
SA-KDS2/40/3/14SS1,0/4/1	0168093/00-1
SA-KDS2/40/3/14SS1,0/4/4/Z	0167498/00
SA-KDS2/40/3/14SS2,0/4/4	0168093/00-2
SA-KDS2/40/3/14SS3,0/4/4	0168093/00-3
SA-KDS2/40/4/14SS0,5/4	0168094/00
SA-KDS2/40/4/14SS0,5/4	0168094/00-R
SA-KDS2/40/4/14SS1,0/4	0168094/00-1
SA-KDS2/40/4/14SS2,0/4	0168094/00-2
SA-KDS2/40/5/14SS0,5/6/3	0143916/00
SA-KDS2/40/5/14SS0,5/6/6	0168095/00
SA-KDS2/40/5/14SS0,5/6/6	0168095/00-R
SA-KDS2/40/5/14SS1,0/6/6	0168095/00-1
SA-KDS2/40/5/14SS2,0/6/6	0168095/00-2
SA-KDS2/40/5/14SS4,0/6/6	0168095/00-4
SA-KDS2/40/6/14SS0,5/6	0143166/00
SA-KDS2/40/6/14SS0,5/6	0168096/00
SA-KDS2/40/7/14SS0,5/8/8	0168097/00
SA-KDS2/40/7/14SS0,5/8/8/Z	0167296/00
SA-KDS2/40/8/14SS0,0/8	0168098/00-0

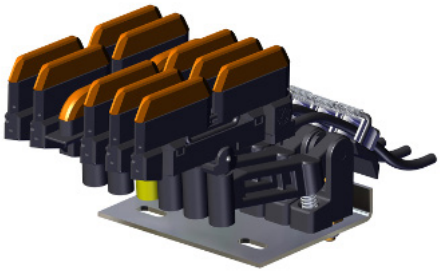
Designation	Ident-No.
SA-KDS2/40/8/14SS0,5/8	0168098/00
SA-KDS2/40/8/14SS0,5/8-X	0168098/00-R
SA-KDS2/40/8/14SS0,5/8/Z	0167743/00
SA-KDS2/40/8/14SS1,0/8	0168098/00-1
SA-KDS2/40/8/14SS10,0/8	0168098/00-10
SA-KDS2/40/8/14SS2,0/8	0168098/00-2
SA-KDS2/40/8/14SS3,0/8	0168098/00-3
SA-KDS2/40/9/14SS0,2/10/10	0168099/00-2
SA-KDS2/40/9/14SS0,5/10/10	0168099/00
SA-KDS2/405/14SS0,5/6/1	0144048/00
SA-KDS2/40A1/12/14SS1,0/12/12	0143556/01
SA-KDS2/40A1/3/14SS0,5/1/4/4	0143320/02
SA-KDS2/40A1/6/14SS1,0/1/8/7U8	0143547/01
SA-KDS2/40R5/14SS0,5/6/3	10004292

5.2.14 Compact current collector KUFR2/40

Compact current collector KUFR2/40



KUFR2/40



KUFR2/40
with straight base plate

Compact current collector KUFR2/40	
For lines with reversing operation	
max. current: 1 connecting cable [A] 2 connecting cables [A]	 25 40
Installation dimensions [mm]	98 90 with straight base plate
Stroke [mm]	± 15
Lateral deflection [mm]	± 15
Contact pressure [N]	approx. 3.5 per carbon brush
Connecting cable	0,5 m highly flexible is also delivered. 2.5 mm^2 Type WFLA 2,5
PE on no. 4 (other configuration possible)	
PE moves forward when folding into the conductor rail	

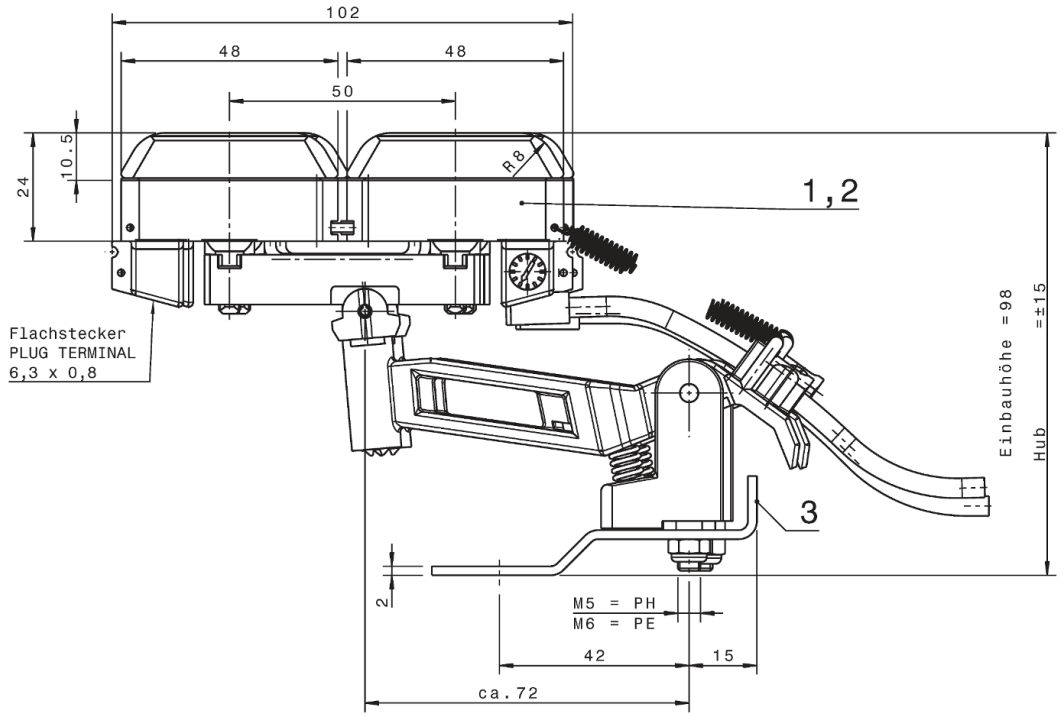
Type	Number of poles	A [mm]	B [mm]	C [mm]	Weight [kg]	Base plate	Ident-No.	
							PE-VP	PE
SA-KUFR2/40/4/14VP0,5/4/4	4	28	62	-	0,448	4-pin	144 474	-
SA-KUFR2/40/4/14HS0,5/4/4	4	28	62	-	0,448	4-pin	-	165 927
SA-KUFR2/40/5/14VP0,5/4/6/6	5	56	90	-	0,573	6-pin (No. 6 free)	144 475	-
SA-KUFR2/40/5/14HS0,5/6/6	5	56	90	-	0,573	6-pin (No. 6 free)	-	165 928
SA-KUFR2/40/6/14VP0,5/4/6	6	56	90	-	0,666	6-pin	144 476	-
SA-KUFR2/40/6/14HS0,5/6	6	56	90	-	0,666	6-pin	-	165 929
SA-KUFR2/40/7/14VP0,5/4/8/8	7	80	118	53	0,779	8-pin (No. 8 free)	144 478	-
SA-KUFR2/40/7/14HS0,5/8/8	7	80	118	53	0,779	8-pin (No. 8 free)	-	165 930
SA-KUFR2/40/8/14VP0,5/4/8	8	80	118	53	0,872	8-pin	144 479	-
SA-KUFR2/40/8/14HS0,5/8	8	80	118	53	0,872	8-pin	-	165 931
SA-KUFR2/40/9/14VP0,5/4/10/10	9	80	156	53	1,004	10-pin (No. 10 free)	144 480	-
SA-KUFR2/40/9/14HS0,5/10/10	9	80	156	53	1,004	10-pin (No. 10 free)	-	165 932
SA-KUFR2/40/10/14VP0,5/4/10	10	80	156	53	1,097	10-pin	144 481	-
SA-KUFR2/40/10/14HS0,5/10	10	80	156	53	1,097	10-pin	-	165 963

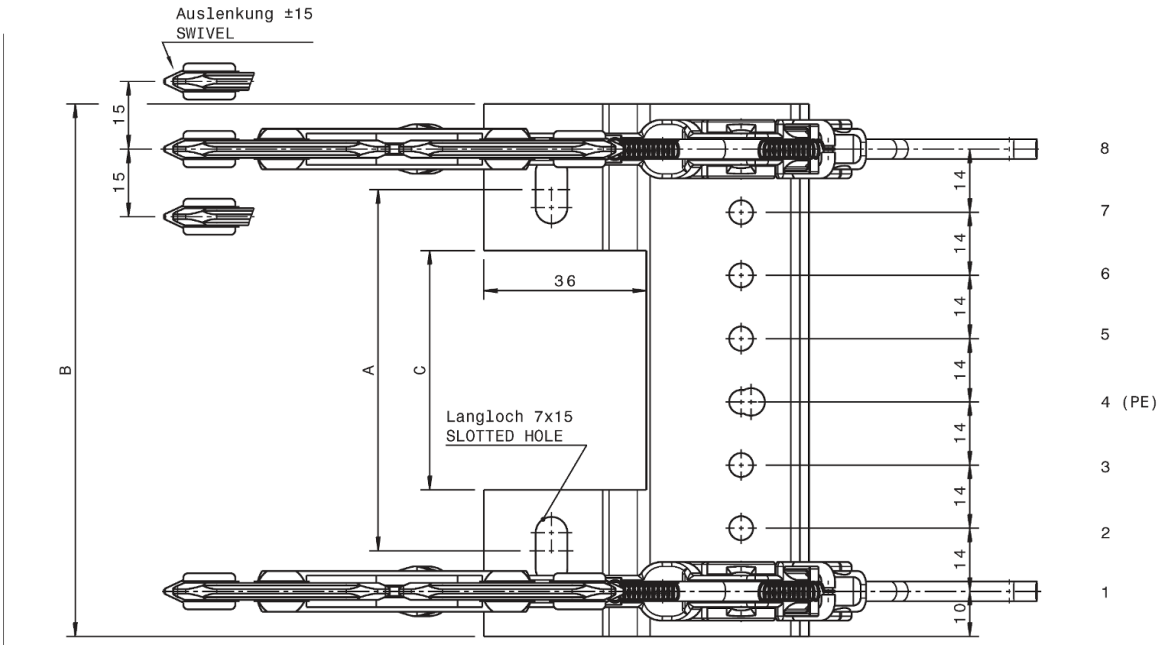
Single current collector with 0.5 m cable connection	Weight [kg]	Base plate	Phase Black	PE Yellow
SA-KUFR2/40/04PH-88/15-0,5	0,093	none	165 955	-
SA-KUFR2/40/04PE-88/15-0,5	0,091	none	-	165 956
SA-KUFR2/40/04VP-79/15-0,5	0,105	none	-	143 776

Current collector trailer

1-pin on base plate, PE standard on no. 4, other assignment possible.

Type	A [mm]	B [mm]	C [mm]	Weight [kg]	Base plate	Ident-No.	
						PE-VP	PE
SA-KUFR2/40/1/14VP0,5/4/4/1-3	28	62	-	0,164	4-pin	143 774	-
SA-KUFR2/40/1/14HS0,5/4/4/1-3	28	62	-	0,164	4-pin	-	166 491
SA-KUFR2/40/1/14VP0,5/4/6/1-3U5-6	56	90	-	0,197	6-pin	143 836	-
SA-KUFR2/40/1/14HS0,5/4/6/1-3U5-6	56	90	-	0,197	6-pin	-	167 573
SA-KUFR2/40/1/14VP0,5/4/8/1-3U5-8	80	118	53	0,216	8-pin	144 482	-
SA-KUFR2/40/1/14HS0,5/4/8/1-3U5-8	80	118	53	0,216	8-pin	-	167 661


102
48
48
50
24
10.5
R.8
1,2
Flachstecker
PLUG TERMINAL
6,3 x 0,8
Einbauhöhe = 98
±15
Hub
3
2
M5 = PH
M6 = PE
42
15
ca.72


Auslenkung ±15
SWIVEL
15
15
B
A
C
36
Langloch 7x15
SLOTTED HOLE
14
14
14
14
14
14
14
10
8
7
6
5
4 (PE)
3
2
1

Compact current collector KUFR2/40 - VP

Designation	Ident-No.
SA-KUFR2/40/04VP-79/15-2	0143776/00-2
SA-KUFR2/40/1/14VP0,5D/4/6/1-3/5U6/Z	0143800/00
SA-KUFR2/40/1/14VP0,5D/4/6/1-3U5U6	0143826/00
SA-KUFR2/40/6/14VP0,5D/4/6	0143798/00
SA-KUFR2/40/6/14VP0,5D/4/6/Z	0143799/00
SA-KUFR2/40/6/14VP3,0D/4/6	0143970/00-3
SA-KUFR2/40/1/14VP0,5/1/4/2-4	0143774/00-A
SA-KUFR2/40/1/14VP0,5/3/4/1-2U4	0143774/00-C
SA-KUFR2/40/1/14VP0,5/3/8/1+2U4-8	0148046/00-C
SA-KUFR2/40/1/14VP0,5/4/4/1-3	0143774/00
SA-KUFR2/40/1/14VP0,5/4/6/1-3U5U6	0143836/00
SA-KUFR2/40/10/14VP0,5/4/10	0144481/00
SA-KUFR2/40/4/14VP0,5/1/4	0144474/01-A
SA-KUFR2/40/4/14VP0,5/4/4	0144474/01
SA-KUFR2/40/4/14VP1,0/4/4	0144474/01-1
SA-KUFR2/40/4/14VP1,0/4/6/5-6	0144841/00
SA-KUFR2/40/5/14VP0,5/4/6/6	0144475/00
SA-KUFR2/40/5/14VP0,5/4/8/6-8	0144212/00
SA-KUFR2/40/6/14VP0,5/3/6	10002329
SA-KUFR2/40/6/14VP0,5/3/8/1+2	0148045/00-C
SA-KUFR2/40/6/14VP0,5/4/6	0144476/00
SA-KUFR2/40/6/14VP0,5/4/6	10005347
SA-KUFR2/40/6/14VP1,0/5/6	10006144
SA-KUFR2/40/7/14VP0,5/4/8/8	0144478/00
SA-KUFR2/40/8/14VP0,5/4/8	0144479/00
SA-KUFR2/40A2E/6/14VP1,0/4/6/6G	0143860/00-1
SA-KUFR2/40K/4/14VP0,5/4/4	0144386/00
SA-KUFR2/40MOL/1/14VP0,5/2/5/1U3-5	0144122/00-B
SA-KUFR2/40MOL/5/14VP0,5/2/5	0144121/00-B
SA-KUFR2/40MOL/5/14VP0,5/4/5	0144152/00
SA-KUFR2/40MS1/1/14VP0,5/3/8/2+4-8	0148048/00-C
SA-KUFR2/40MS1/1/14VP0,5/5/5/2-4/Z	0144718/00-E
SA-KUFR2/40MS1/4/14VP0,5/3/8/2+7+8	0148047/00-C
SA-KUFR2/40MS1/4/14VP0,5/5/5/Z	0144717/00-E
SA-KUFR2/40MS1/6/14VP0,5/6/8/2	0144725/00-F
SA-KUFR2/40MS1A02L/4/14VP0,5/6/6/Z	0144549/00-F
SA-KUFR2/40MS8/6/14VP0,5/3/8/7	0144726/00-C

Compact current collector KUFR2/40 - VP with straight base plate

Designation	Ident-No.
SA-KUFR2/40E/1/14VP0,5/4/6G1-3U5U6	0143861/00
SA-KUFR2/40E/1/14VP0,5/4/8/1-3U5-8	0143812/00
SA-KUFR2/40E/5/14VP2,0/5/6/1	0143808/00-2E
SA-KUFR2/40E/1/14VP0,5/4/6/1-3U5-6	0144107/00
SA-KUFR2/40E/1/14VP0,5D4/6/1-3U5-6	0144817/00
SA-KUFR2/40E/1/14VP1,0/4/6/1-3U5-6	0144107/00-1
SA-KUFR2/40E/1/14VP1,0/4/7/1-3U5-7	0144679/00-1
SA-KUFR2/40E/1/14VP1,0/4/8/1-3U5-8	0143812/00-1
SA-KUFR2/40E/1/14VP1,0/5/8/1-4U6-8	0143812/00-1E
SA-KUFR2/40E/1/14VP1,0/6/8/1-5U7-8	0143812/00-1F
SA-KUFR2/40E/1/14VP1,0D4/8/1-3U5-8	10003875
SA-KUFR2/40E/1/14VP1,0D5/8/1-4U6-8	0143812/00-E2AL
SA-KUFR2/40E/3/14VP1,0/5/8/1-4U8	0144637/00-1E
SA-KUFR2/40E/4/14VP0,5/4/6/5+6	0144526/00
SA-KUFR2/40E/4/14VP0,5D4/6/5U6	0144816/00
SA-KUFR2/40E/4/14VP1,0/5/8/4U6-8	0144636/00-1E
SA-KUFR2/40E/5/14VP0,5/4/8/6-8	10006634
SA-KUFR2/40E/5/14VP1,0/5/8/6-8	0144638/00-1E
SA-KUFR2/40E/6/14VP0,5/4/6	0144106/00
SA-KUFR2/40E/6/14VP1,0/4/6	0144106/00-1
SA-KUFR2/40E/7/14VP0,5/4/8/8	0144061/00
SA-KUFR2/40E/7/14VP1,0/4/7	0144678/00-1
SA-KUFR2/40E/7/14VP1,0/4/8/8	0144061/00-1
SA-KUFR2/40E/7/14VP1,0/6/8/8	0144061/00-1F
SA-KUFR2/40E/8/14VP0,5/4/8	0143811/00
SA-KUFR2/40E/8/14VP0,5/6/8	0143811/00-F
SA-KUFR2/40E/8/14VP1,0/4/8	0143811/00-1
SA-KUFR2/40E/8/14VP1,0D4/8	10003874
SA-KUFR2/40E8/14VP1,0/5/8	0143811/00-1E
SA-KUFR2/40E8/14VP1,0D5/8	0143811/00-E2AL

Compact current collector KUFR2/40 - HS

Designation	Ident-No.
SA-KUFR2/40/1/14HS0,5/4/4/1-3	0167252/00
SA-KUFR2/40/1/14HS1,5/4/4/1-3	0167252/00
SA-KUFR2/40/10/14HS0,5/5U10/10	0165933/00-2.PE
SA-KUFR2/40/11/14HS0,5/4/12/12	0165934/00
SA-KUFR2/40/2/14HS0,5/2/2	0165925/00
SA-KUFR2/40/3/14HS0,5/3/4/4	0165926/00
SA-KUFR2/40/6/14HS0,0/3/6/Z	0143988/00-C

Designation	Ident-No.
SA-KUFR2/40/6/14HS0,5/1/6	0165929/00-A
SA-KUFR2/40/6/14HS2,0/4/6	0165929/00-2
SA-KUFR2/40/6/14HS3,0/1/6	0165929/00-3A
SA-KUFR2/40/7/14HS0,5/1/8/8	0165930/00-A
SA-KUFR2/40/8/14HS0,3/4/8	0165931/00-0.3
SA-KUFR2/40/8/14HS0,5/5/8	0165931/00-E
SA-KUFR2/40/8/14HS0,6/4/8	0165931/00-0.6
SA-KUFR2/40/8/14HS0,7/4/8	0165931/00-0.7
SA-KUFR2/40/8/14HS1,5/4/8	0165931/00-1.5
SA-KUFR2/40/8/14HS2,0/4/8	0165931/00-2
SA-KUFR2/40/8/14HS2,0/5/8	0165931/00-2E
SA-KUFR2/40/9/14HS0,5/4/10/10	0165932/00
SA-KUFR2/40/9/14HS2,0/4/10/10	0165932/00-2
SA-KUFR2/40K/7/14HS3,0D1/8/8	0781391/00-3A
SA-KUFR2/40K/7/14HS3,0D8/8/1	0781391/00-3H
SA-KUFR2/40/1/14HS0,5/1/2/2	0166618/00
SA-KUFR2/40/10/14HS0,5/4/10	0165933/00
SA-KUFR2/40/10/14HS0,5/5/10	0165933/00-E
SA-KUFR2/40/10/14HS1,0/4/10	0165933/00-R1
SA-KUFR2/40/12/14HS0,5/4/12	0165935/00
SA-KUFR2/40/4/14HS0,5/2/6/1U6	10001441
SA-KUFR2/40/4/14HS0,5/4/4	0165927/00
SA-KUFR2/40/4/14HS0,5/5/6/1U6	0143871/00
SA-KUFR2/40/4/14HS3,0/4/4	0165927/00-3
SA-KUFR2/40/5/14HS2,0/4/6/6	0165928/00-2
SA-KUFR2/40/6/14HS0,5/4/6	0165929/00
SA-KUFR2/40/6/14HS1,0/4/6	0165929/00-1
SA-KUFR2/40/6/14HS10,0/4/6	0165929/00-10
SA-KUFR2/40/6/14HS2,5/4/6	0165929/00-2.5
SA-KUFR2/40/7/14HS2,0/1/8/8	0165930/00-A-2
SA-KUFR2/40/7/14HS3,0/1/8/8	0165930/00-A-3
SA-KUFR2/40/8/14HS0,5/5/8/Z	10003916
SA-KUFR2/40/8/14HS1,0/4/8	0165931/00-1
SA-KUFR2/40/9/14HS1,0/4/10/10	0165932/00-R1
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SA-KUFR2/40R4/14HS0,0/1/4	0144251/00-0A
SA-KUFR2/40R4/14HS0,0/4/4	0144251/00-0
SA-KUFR2/40R4/14HS0,5/1/4	0144251/00-A

Compact current collector KUFR2/40 - HS with straight base plate

Designation	Ident-No.
SA-KUFR2/40E/1/14HS0,5/4/6/1-3U5-6	0144371/00

Designation	Ident-No.
SA-KUFR2/40E/4/14HS0,5/4/6/5-6	0144673/00
SA-KUFR2/40E/6/14HS0,5/3/6	0144112/00-C
SA-KUFR2/40E/6/14HS0,5/4/6	0144112/00
SA-KUFR2/40E/6/14HS0,5/4/8/7U8	0142868/00
SA-KUFR2/40E/6/14HS3,0/4/8/7U8	0142868/00-3

Compact current collector KUFR2/40 - SS

Designation	Ident-No.
SA-KUFR2/40/10/14SS1,5/10	0165944/00-1.5
SA-KUFR2/40/11/14SS0,5/12/12	0165945/00
SA-KUFR2/40/3/14SS0,5/4/4	0165937/00
SA-KUFR2/40/4/14SS0,5/4	0165938/00
SA-KUFR2/40/6/14SS0,5/6	0165940/00
SA-KUFR2/40/7/14SS0,5/8/8	0165941/00
SA-KUFR2/40/8/14SS0,5/8	0165942/00
SA-KUFR2/40/9/14SS0,5/10/10	0165943/00
SA-KUFR2/40/10/14SS0,5/10	0165944/00
SA-KUFR2/40/10/14SS2,0/10	0165944/00-2
SA-KUFR2/40/2/14SS0,5/2	0165936/00
SA-KUFR2/40/5/14SS0,5/6/6	0165939/00
SA-KUFR2/40/5/14SS0,5/6/6	0165939/00-R1
SA-KUFR2/40/6/14SS1,0/6	0165940/00-1

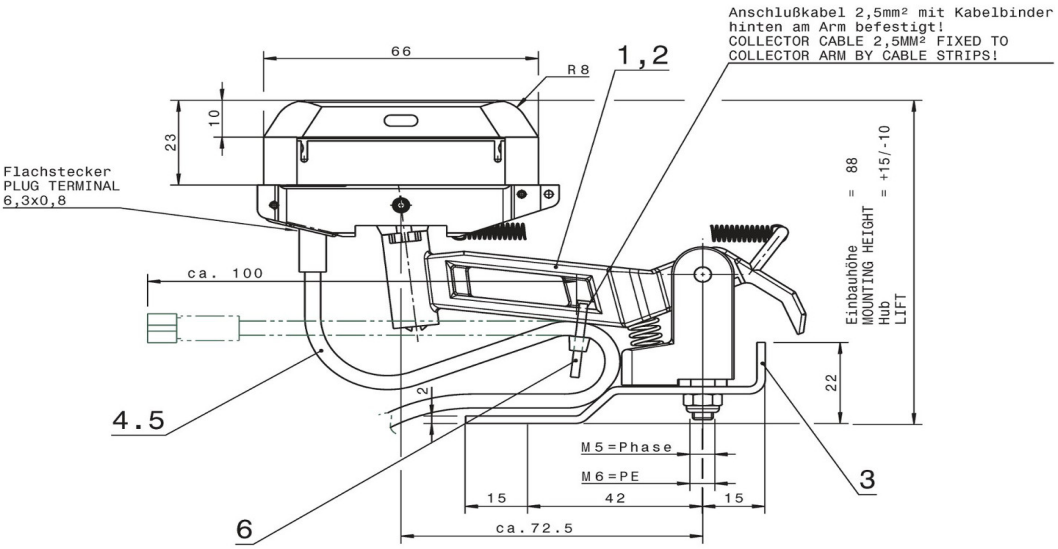
5.2.15 Compact current collector KUFU25

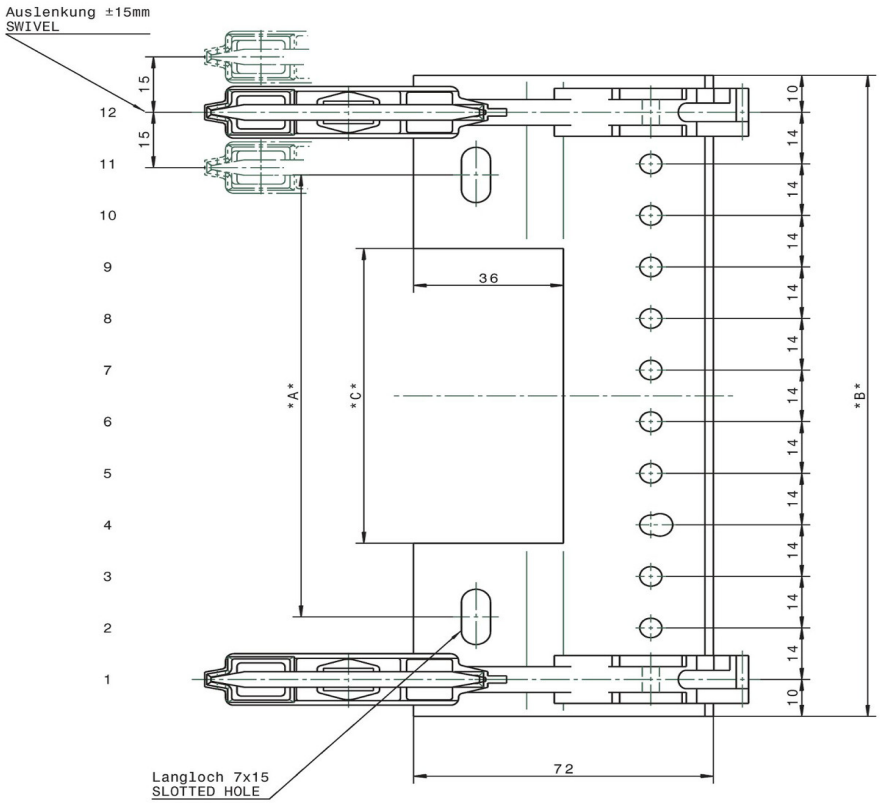


Compact current collector KUFU25	
For transfer funnel EFT10	
max. current [A]	25
Installation dimensions [mm]	88
Stroke [mm]	+ 15 / - 10
Lateral deflection [mm]	± 15
Contact pressure [N]	approx. 3.5 per carbon brush
Connecting cable	1 m is also delivered. Type FLA 2,5
PE on no. 4 (other configuration possible) 3-pin on no. 3, 2-pin on no. 2	
PE moves forward when folding into the conductor rail	

Type	Number of poles	A [mm]	B [mm]	C [mm]	Weight [kg]	Base plate	Ident-No.	
							PE	Without PE
SA-KUFU25/2/14HS1,0/2/2	2	-	34	-	0,228	2-pin	168 040	-
SA-KUFU25/2/14SS1,0/2	2	-	34	-	0,228	2-pin	-	168 051
SA-KUFU25/3/14HS1,0/3/4/4	3	28	62	-	0,340	4-pin (No. 4 free)	168 041	-
SA-KUFU25/3/14SS1,0/4/4	3	28	62	-	0,340	4-pin (No. 4 free)	-	168 052
SA-KUFU25/4/14HS1,0/4/4	4	28	62	-	0,428	4-pin	168 042	-
SA-KUFU25/4/14SS1,0/4	4	28	62	-	0,428	4-pin	-	168 053
SA-KUFU25/5/14HS1,0/4/6/6	5	56	90	-	0,549	6-pin (No. 5 free)	168 043	-
SA-KUFU25/5/14SS1,0/6/6	5	56	90	-	0,549	6-pin (No. 5 free)	-	168 054
SA-KUFU25/6/14HS1,0/4/6	6	56	90	-	0,637	6-pin	168 044	-
SA-KUFU25/6/14SS1,0/6	6	56	90	-	0,637	6-pin	-	168 055
SA-KUFU25/7/14HS1,0/4/8/8	7	80	118	53	0,744	8-pin (No. 8 free)	168 045	-
SA-KUFU25/7/14SS1,0/8/8	7	80	118	53	0,744	8-pin (No. 8 free)	-	168 056
SA-KUFU25/8/14HS1,0/4/8	8	80	118	53	0,832	8-pin	168 046	-
SA-KUFU25/8/14SS1,0/8	8	80	118	53	0,832	8-pin	-	168 057
SA-KUFU25/9/14HS1,0/4/10/10	9	80	146	53	0,959	10-pin (No. 10 free)	168 047	-
SA-KUFU25/9/14SS1,0/10/10	9	80	146	53	0,959	10-pin (No. 10 free)	-	168 058
SA-KUFU25/10/14HS1,0/4/10	10	80	146	53	1,047	10-pin	168 048	-
SA-KUFU25/10/14SS1,0/10	10	80	146	53	1,047	10-pin	-	168 059

Single current collector with 0.5 m cable connection	Weight [kg]	Base plate	Phase Black	PE Yellow
SA-KUFU25/20PH-78/15-0,0	0,051	none	168 015	-
SA-KUFU25/20PE-78/15-0,0	0,051	none	-	168 016


Anschlußkabel 2,5mm² mit Kabelbinder
hinten am Arm befestigt!
COLLECTOR CABLE 2,5MM² FIXED TO
COLLECTOR ARM BY CABLE STRIPS!
66
R8
1,2
23
10
Flachstecker
PLUG TERMINAL
6,3x0,8
ca. 100
Einbauhöhe = 88
MOUNTING HEIGHT = +15/-10
Hub
LIFT
22
4.5
2
M5=Phase
M6=PE
15
42
15
ca.72.5
3
6


Auslenkung ±15mm
SWIVEL
15
15
12
11
10
9
8
7
6
5
4
3
2
1
36
A
C
B
10
14
14
14
14
14
14
14
14
14
14
10
72
Langloch 7x15
SLOTTED HOLE

Compact current collector KUFU25 - HS

Designation	Ident-No.
SA-KUFU25/10/14HS1,0/4/10	0168048/00
SA-KUFU25/2/14HS1,0/2/2	0168040/00
SA-KUFU25/2/14HS1,0/3/4/1U4	0167483/00
SA-KUFU25/2/14HS1,5/4/10	0168048/00-1.5
SA-KUFU25/2/14HS3,0/4/10	0168048/00-3
SA-KUFU25/3/14HS0,0/1/4/4/Z	0143701/00-A
SA-KUFU25/3/14HS0,0F4/4/1/Z	0143701/00
SA-KUFU25/3/14HS0,5/1/4/4	0168041/00-0.5A
SA-KUFU25/3/14HS0,5/4/4/1	0168041/00-0.5D
SA-KUFU25/3/14HS1,0/1/4/4	0168041/00-A
SA-KUFU25/3/14HS1,0/3/4/4	0168041/00
SA-KUFU25/3/14HS1,0/4/4/1	0168041/00-D
SA-KUFU25/3/14HS2,5/1/4/4	0168041/00-2.5A
SA-KUFU25/3/14HS2,5/3/4/4	0168041/00-2.5
SA-KUFU25/3/14HS2,5/4/4/1	0168041/00-2.5D
SA-KUFU25/3/14HS5,0/3/4/4	0168041/00-5
SA-KUFU25/4/14HS0,0/1/4	0168042/00-0A
SA-KUFU25/4/14HS6,0/4/4	0168042/00-6
SA-KUFU25/5/14HS0,5/4/6/6	0168043/00-0.5
SA-KUFU25/5/14HS1,0/4/6/6	0168043/00
SA-KUFU25/6/14HS0,55/4/6	0168044/00-0.55
SA-KUFU25/6/14HS1,0/4/6/Z	0168184/00
SA-KUFU25/6/14HS1,5/4/6	0168044/00-1.5
SA-KUFU25/6/14HS5,0/4/6	0168044/00-5
SA-KUFU25/7/14HS0,0/4/8/8	0168045/00-0
SA-KUFU25/7/14HS1,0/4/8/8	0168045/00
SA-KUFU25/8/14HS1,0/5/8	0168046/00-E
SA-KUFU25/8/14HS3,0/4/8	0168046/00-3
SA-KUFU25/8/14HS3,0/5/8	0168046/00-3E
SA-KUFU25/9/14HS1,0/4/10/10	0168047/00
SA-KUFU25CTI/4/14HS10,0/4/4	0143435/00-10
SA-KUFU25/4/14HS1,0/1/4	0168042/00-A
SA-KUFU25/4/14HS1,0/4/4	0168042/00
SA-KUFU25/5/14HS1,0/2U3/6/1	0144282/00
SA-KUFU25/5/14HS1,0/4U5/6/6	0144243/00
SA-KUFU25/6/14HS1,0/3/6	0168044/00-C
SA-KUFU25/6/14HS1,2/4/6	0168184/00-1.2
SA-KUFU25/8/14HS1,0/1/8	0168046/00-A

Compact current collector KUFU25 - SS

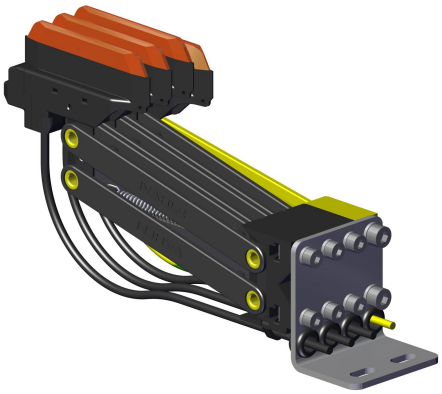
Designation	Ident-No.
SA-KUFU25/10/14SS1,0/10	0168059/00
SA-KUFU25/2/14SS1,0/2	0168051/00
SA-KUFU25/2/14SS1,0/4/1U4	0167478/00
SA-KUFU25/2/14SS5,0/2	0168051/00-5
SA-KUFU25/3/14SS0,5/4/1	0142485/00-0.5
SA-KUFU25/3/14SS0,5/4/4	0168052/00-0.5
SA-KUFU25/3/14SS1,0/4/4	0168052/00
SA-KUFU25/3/14SS2,5/4/1	0142485/00-2.5
SA-KUFU25/3/14SS2,5/4/4	0168052/00-2.5
SA-KUFU25/4/14SS1,0/4	0168053/00
SA-KUFU25/5/14SS0,5/6/6	0168054/00-0.5
SA-KUFU25/5/14SS1,0/6/6	0168054/00
SA-KUFU25/6/14SS0,0/6	0168055/00-0
SA-KUFU25/6/14SS1,0/6	0168055/00
SA-KUFU25/6/14SS5,0/6	0168055/00-5
SA-KUFU25/7/14SS1,0/8/8	0168056/00
SA-KUFU25/8/14SS1,0/8	0168057/00
SA-KUFU25/9/14SS1,0/10/10	0168058/00

5.2.16 Compact current collector KSTUR63

Compact current collector SKID63/KSTUR63 for U10

NOTICE!

The compact current collector KSTUR63 is only compatible with the transfer funnel EFT10 for KSTUR63 (see 5.2.19 Transfer funnel) and may not be used in combination with other transfer funnels.

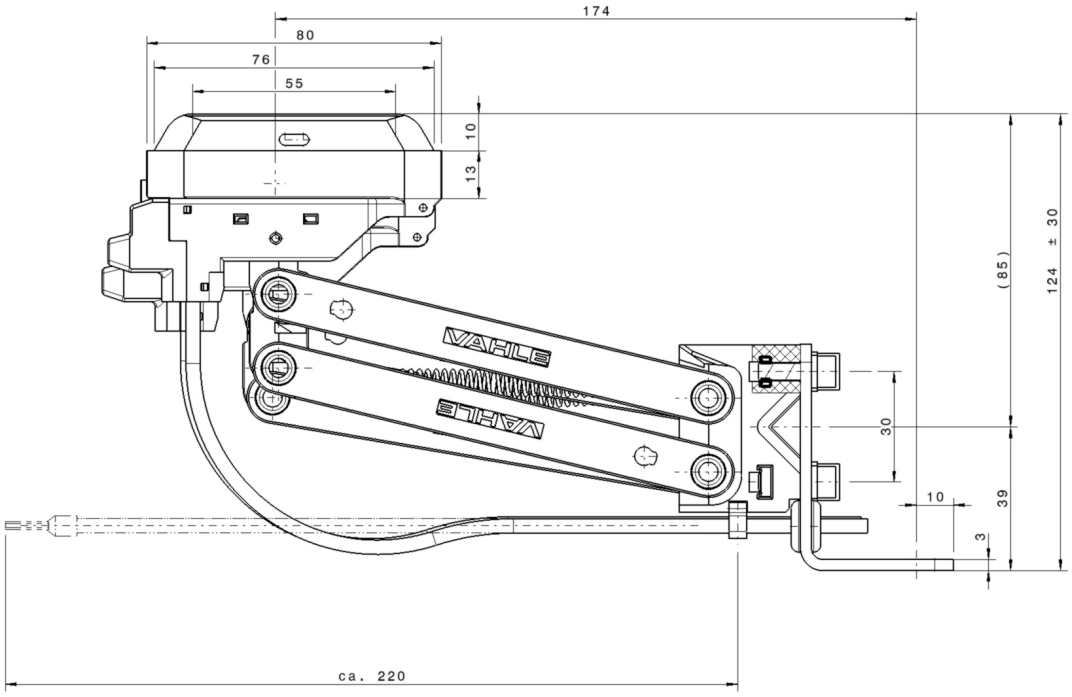


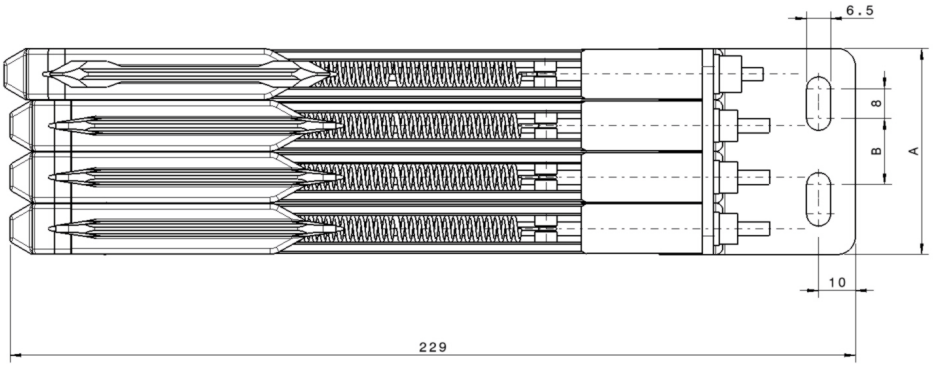
Compact current collector KSTUR63 for U10	
Reversing operation and funnel operation	
max. current [A]	63
Installation dimensions [mm]	124
Stroke [mm]	± 30
Lateral deflection [mm]	± 30
Contact pressure [N]	approx. 7.5 per carbon brush
Traveling speed [m/min]	180 100 funnel retraction
Connecting cable	1 m connecting cable 2.5 mm² FLA is supplied pre-assembled.
Other cable lengths, diameter and pole counts also available on request	

Type	Number of poles	PE layer	A [mm]	B [mm]	Weight [kg]	Base plate	Ident-No.
SA-KSTUR32-4/14VP1.0/4/4	4	4	62	18	0,596	4-pin	0144683/00
SA-KSTUR32-4/14VP1.0/1/4	4	1	62	18	0,596	4-pin	0144683/00-A

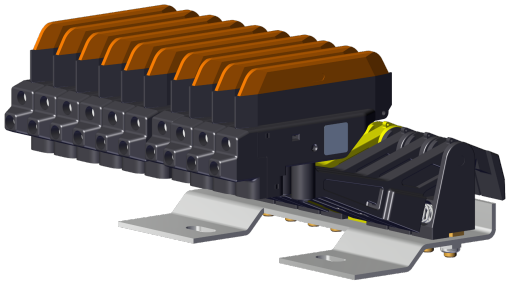
Single current collector with 1 m cable connection	Weight [kg]	Base plate	Ident-No.	
			Phase	PE-VP
SA-KSTUR32/14VP-20A-1000	0,110	none	-	0144696/00
SA-KSTUR32/14PH-31A-1000	0,110	none	0144695/00	-

Cross-section of connecting cable [mm²]	Current load [A]	Cable tie torque [with assembly tool MK9/MK9HT]
2,5	32	8
4	40	6
6	55	6
10	63	5


174
80
76
55
10
13
VAHLE
VAHLE
30
10
3
39
(85)
124 ± 30
ca. 220


6.5
8
B
A
10
229

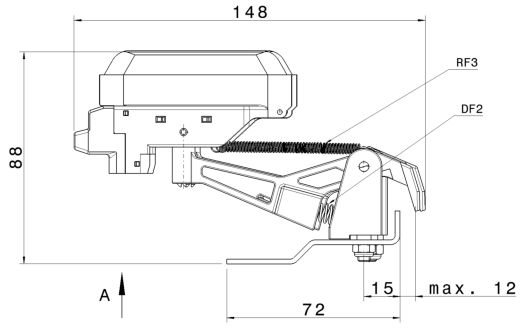
5.2.17 Compact current collector KESR 32-55

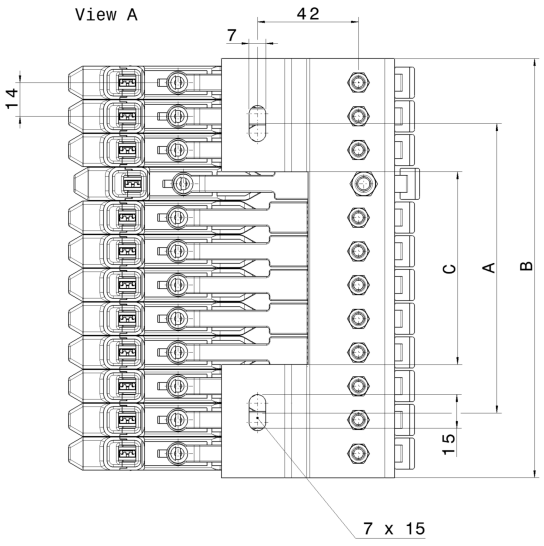


KESR 32-55	
Reverse operation and hopper operation	
Installation dimensions [mm]	88
Phase spacing [mm]	14
Stroke and lateral deflection [mm]	± 15
Contact pressure per carbon brush, approx. [N]	7
Connection cable	Delivery without connection cable
PE (green) on no. 4 (other configuration possible)	
PE moves forward when folding into the conductor rail	

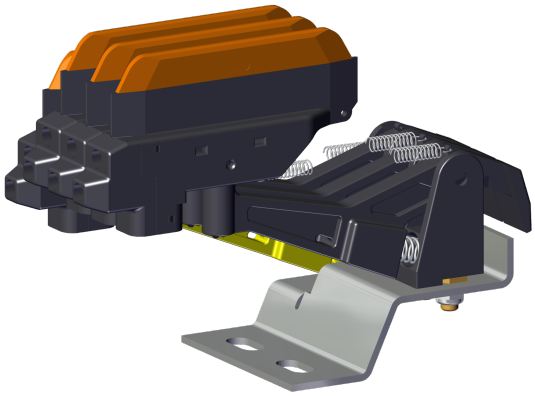
Connection cables for flat plug connection and screw connection see chapter 5.2.7 Connecting cable.

max. current [A]	Flat plug	Screw connection
32	FLA 2,5	AEA 2,5
40	FLA 4,0	AEA 4,0
55	FLA 6,0	AEA 6,0





KESR VP



Type	Weight [kg]	Position PE	Free pins	Base plate	Ident-No.
SA-KESR32-55/3/14VP0,0S/1/4/4	0,324	1	4	4-pin	0144599/00-A
SA-KESR32-55/3/14VP0,0S/4/4/1	0,324	4	1	4-pin	0144599/00
SA-KESR32-55/4/14VP0,0S/1/4	0,403	1	-	4-pin	0144607/00-A
SA-KESR32-55/4/14VP0,0S/4/4	0,403	4	-	4-pin	0144607/00

KESR-F

for connecting cable with flat plug.

Type	Weight [kg]	A [mm]	B [mm]	C [mm]	Num-ber of poles	Base plate	ID no.
SA-KESR32-55F-4-14HS-0-04-04	0.480	28	62	-	4	4-pin	143 170
SA-KESR32-55F-5-14HS-0-04-06-06	0.540	56	90	-	5	6-pin (pin 6 free)	143 373
SA-KESR32-55F-6-14HS-0-04-06	0.600	56	90	-	6	6-pin	143 113
SA-KESR32-55F-7-14HS-0-04-08-08	0.660	80	118	53	7	8-pin (pin 8 free)	143 114
SA-KESR32-55F-8-14HS-0-04-08	0.720	80	118	53	8	8-pin	143 115
SA-KESR32-55F-9-14HS-0-04-10-10	0.780	80	146	53	9	10-pin (pin 10 free)	143 116
SA-KESR32-55F-10-14HS-0-04-10	0.840	80	146	53	10	10-pin	143 117

Can be delivered singly Type	Weight [kg]					Ident-No. Phase	PE
SA-KESR32-55F/14...-31-0	0,060					143 111	143 112

KESR-S

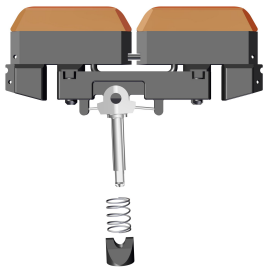
Type	Weight [kg]	A [mm]	B [mm]	C [mm]	Num-ber of poles	Base plate	ID no.
SA-KESR32-55S-4-14HS-0-04-04	0.504	28	62	-	4	4-pin	142 937
SA-KESR32-55S-5-14HS-0-04-06-06	0.570	56	90	-	5	6-pin (pin 6 free)	142 938
SA-KESR32-55S-6-14HS-0-04-06	0.636	56	90	-	6	6-pin	142 939
SA-KESR32-55S-7-14HS-0-04-08-08	0.702	80	118	53	7	8-pin (pin 8 free)	142 940
SA-KESR32-55S-8-14HS-0-04-08	0.768	80	118	53	8	8-pin	142 941
SA-KESR32-55S-9-14HS-0-04-10-10	0.834	80	146	53	9	10-pin (pin 10 free)	142 942
SA-KESR32-55S-10-14HS-0-04-10	0.890	80	146	53	10	10-pin	142 943

Can be supplied individually Type	Weight [kg]					ID no. Phase	ID no. PE
SA-KESR32-55F/14...-31-0	0.066					143 120	143 121

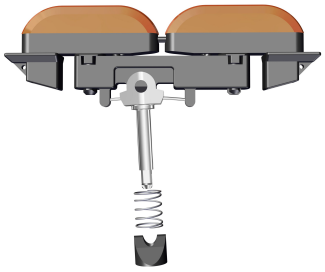
Compact current collector KESR2/40 - VP

Designation	Ident-No.
SA-KESR32-55/1/14VP0,0S/1/4/2-4	0144608/00-A
SA-KESR32-55/1/14VP0,0S/4/4/1-3	0144608/00
SA-KESR32-55/2/14VP3,0S/1/4/3U4	0148070/00-A
SA-KESR32-55/3/14VP0,0S/1/4/4	0144599/00-A
SA-KESR32-55/3/14VP0,0S/4/4/1	0144599/00
SA-KESR32-55/4/14VP0,0S/1/4	0144607/00-A
SA-KESR32-55/4/14VP0,0S/4/4	0144607/00
SA-KESR32-55/5/14VP1,0S/1U5	0144755/00-AE
SA-KESR32-55/6/14VP1,0S/3/6	0144504/00-C
SA-KESR32-55/6/14VP1,0S/4/6	0144504/00
SA-KESR32/4/14VP1,0S/1/6J5	0144085/00
SA-KESR32/4/14VP1,0S/6/6J2	0144086/00
SA-KESR32/5/14VP0,0S/1/6J	0144634/00
SA-KESR32/5/14VP0,0S/5/6J	0144793/00
SA-KESR32/5/14VP0,0S/6/6J	0144635/00
SA-KESR32/5/14VP1,0S/5/6J	0144761/00
SA-KESR32/6/14VP0,0S/4/6J01	0144685/00
SA-KESR32/6/14VP0,0S/4/7J07	0144684/00

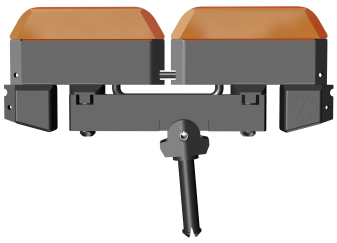
5.2.18 Carbon brushes



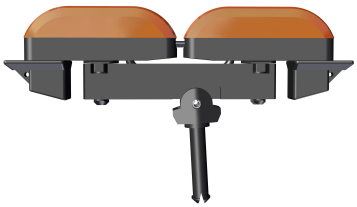
SK-DSW2/40-04-14-FN	
for current collector	KDS2/40
Ident-No.	168 151
Weight [kg]	0,049
Remaining height mind. [mm]	3
Width [mm]	3,8



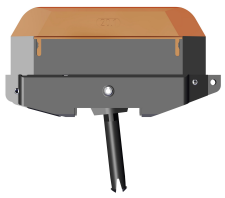
SK-DSW2/40VP-04-14-FN-R15	
for current collector	KDS2/40 PE-VP
Ident-No.	144 059
Weight [kg]	0,060
Remaining height mind. [mm]	3
Width [mm]	3,8



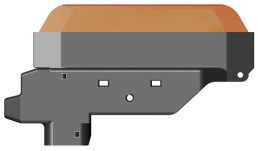
SK-KMKF2/40-04-14	
for current collector	KUFR2/40
Ident-No.	144 277
Weight [kg]	0,050
Remaining height mind. [mm]	3
Width [mm]	3,8



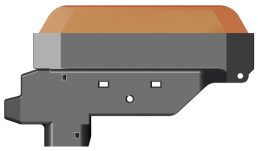
SK-KMKF2/40VP-04-14	
for current collector	KUFR2/40VP
Ident-No.	143 777
Weight [kg]	0,060
Width [mm]	3,8
Width [mm]	3,8



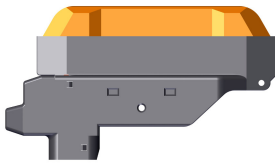
SK-KMKU25-20-14	
for current collector	KUFU25
Ident-No.	168 284
Weight [kg]	0,030
Remaining height mind. [mm]	3
Width [mm]	3,8



SK-MK55F-31-14	
for current collector	KESR 32-55
Ident-No.	0780920
Weight [kg]	0,038
Remaining height mind. [mm]	3
Width [mm]	4,2



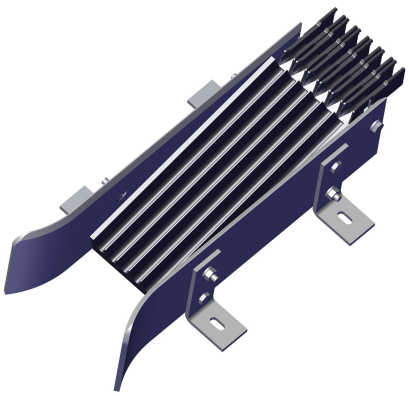
SK-MK63S-31-14	
for current collector	KSTUR PH
Ident-No.	144 691
Weight [kg]	0,050
Remaining height mind. [mm]	3
Width [mm]	4,2



SK-MK63S-VP-20-14	
for current collector	KSTUR PE-VP
Ident-No.	144 692
Weight [kg]	0,052
Remaining height mind. [mm]	3
Width [mm]	7

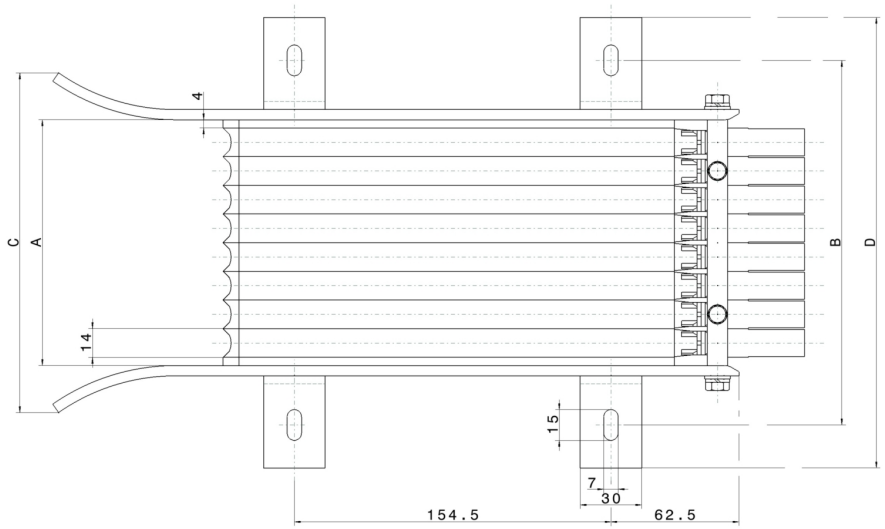
5.2.19 Transfer funnel

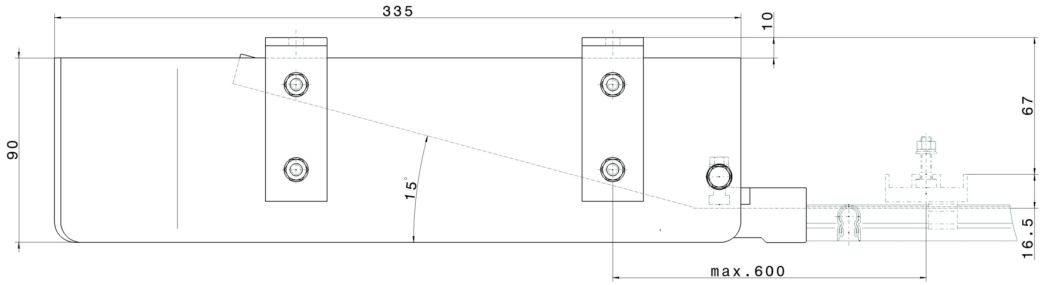
- The transfer funnels are delivered ready for assembly with transfer guides.
- They are mounted on solid, vibration-free support brackets, or similar.
- Precise alignment is required. Horizontal and vertical maximum ±2 mm installation tolerance to track.
- The air gaps between the transfer funnels can be of any length.
- Only suitable for current collectors KUFU 25 and KESR 32.
- Maximum entry speed V_{max} = 100 m/min.
- The stroke and deflection tolerances of the current collectors in the entrance area of the funnels are limited to max: maximum. 10 mm in all directions.

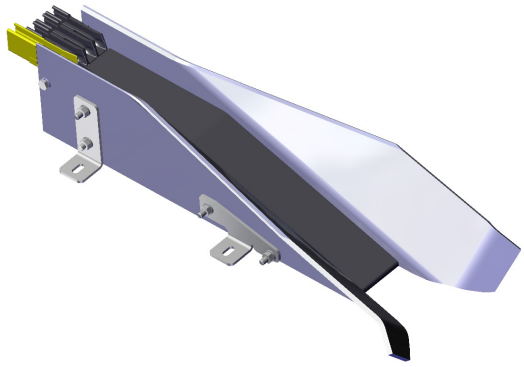


Transfer funnel EFT 10	
For current collectors KUFU 25 and KESR 32	
The transfer funnel must be run currentless by the current collector.	
Entry speed max. [m/min]	100
Entrance tolerance	
Horizontal [mm]	± 10
Vertical [mm]	± 10

Type	Number of poles	A [mm]	B [mm]	C [mm]$^{+0,5}$	D [mm]	Weight [kg]	Ident-No.
MU-EFT10-2-KUFU	2	36	94	82	136	1,145	167 675
MU-EFT10-3-KUFU	3	50	108	96	150	1,230	167 676
MU-EFT10-4-KUFU	4	64	122	110	164	1,315	167 677
MU-EFT10-5-KUFU	5	78	136	124	178	1,400	167 678
MU-EFT10-6-KUFU	6	92	150	138	192	1,485	167 679
MU-EFT10-7-KUFU	7	106	164	152	206	1,570	167 680
MU-EFT10-8-KUFU	8	120	178	166	220	1,655	167 681
MU-EFT10-9-KUFU	9	134	192	180	234	1,740	167 682
MU-EFT10-10-KUFU	10	148	206	198	248	1,825	167 683

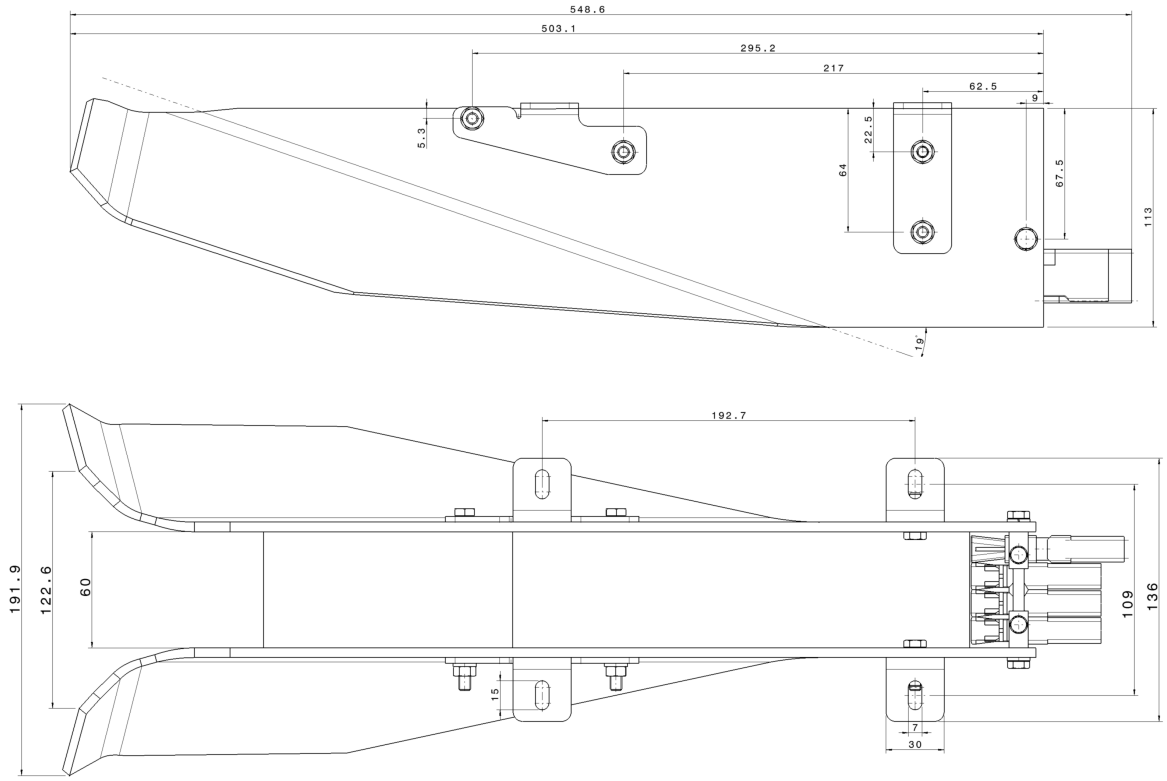






EFT10 for KSTUR63 for U10	
for compact current collector KSTUR63 4-pin for U10	
The transfer funnel must be run currentless by the current collector until the PE current collector achieves full contact with the rail.	
For pulling and pushing versions	
Illustration is of the 4R option (4-pin right)	
Entry speed max. [m/min]	100
Entrance tolerance Horizontal [mm] Vertical [mm]	 ± 30 ± 30
Weight [kg]	2,133

Construction type	Designation	Ident-No.
01	MU-EFT10-4L-VP-4-KSTUR63	0144752/00
02	MU-EFT10-4R-VP-4-KSTUR63	0144753/00



5.2.20 Terminal box





Terminal box AKE	
Type	ES-AKE1-PH7x2L6-PE2x2L6-M25
Weight [kg]	0,445
Ident-No.	169 462
For rail feed, with max. 7 x 6 mm^2 Terminal blocks phase and 2 x 6 mm^2 Ground conductor terminal. Other variants available upon request.	

Terminal boxes are used to feed power and data signals. Delivery is complete with fastening material and feed-through grommet.

Designation	Ident-No.
ES-AKE1E-PH7X2L6-PE2X2L6-M25	0142043/01
ES-AKE1-PH7X3L4-PE2X3L4-PG13,5/PG21	0142063/00
ES-AKE1EH-PH3X2L6-PE1X2L6-M32/M25	0142116/01
ES-AKW1EH-PH8X2L2,5-PE5X2L2,5-M32/M32	0142117/01
ES-AKD1EH-PH6X2L6-PE2X2L6-M25	0142145/01
ES-AKE1-PH10X3L2,5-PE2X3L2,5-M25	0142170/00
ES-AKE2E-PH4X2L6-PE1X2L6-M25/M25/M16/M16	0142171/00
ES-AKE1-PH7X4L4-PE2X4L4-M32/M25	0142229/00
ES-AKE1TL-PH3X2L10-PE1X2L10-M32/M25	0142283/00
ES-AKE2TL-PH3XVK10-PE1X2L35-M50	0142284/00
ES-AKE1-PH4X2L6-PE2X2L6-M16/M25	0142488/00
ES-AKE1-PH12X3L2,5-PE2X3L2,5-M25/M25	0142506/00
ES-AKE2R-PH4X2L16-PE1X2L16-M40/M16	0142536/00
ES-KAKE1H-PH10X2L4-PE2X2L4-M25	0142554/00
ES-AKE1-PH7X2L6-PE2X2L6-M25	0142556/01
ES-AKE1-PH10X2L4-PE2X2L4-M25	0142565/00
ES-AKE1EH-PH7X2L4-PE2X2L4-M25	0142568/01
ES-AKE1F-PH3X2L10-PE2X2L10-M25	0142591/00
ES-AKE1F-PH4X2L10-PE2X2L10-M25	0142591/00-01
ES-KAKE1-PH3X2L6-PE1X2L6-M32/M25	0142627/00
ES-AKE1-PH6X2L2,5-PE2X2L2,5-M25/M25	0142642/00
ES-KAKE1H-PH3X2L6-PE2X2L6-M25	0142679/00
ES-KAKE1H-PH3X2L6-PE1X2L6-M25/M25	0142707/00
ES-AKE2-PH3XVK10-PE1X3L16-M40/M20	0142709/00
ES-AKE1-PH6X2L6-PE2X2L6-M20/M20	0142748/00
ES-AKE1-PH8X2L4-PE1X2L4-M16/M16	0142749/00
ES-AKE2-PH6X2L35-PE2X2L35-M40/M40	0142759/00
ES-AKE1-PH10X3L4-PE2X3L4-M25/M25	0142775/00
ES-KAKE1H-PH3X2L10-PE2X2L10-M25/M25	0142781/00
ES-KAKE1H-PH4X2L2,5-PE1X2L10-M25/M25	0142782/00

Designation	Ident-No.
ES-AKE1-PH2X2L10-PE2X2L10-M25/M25	0142797/00
ES-KAKE1H-PH3X2L10-PE1X2L10-M25/M32	0142826/00
ES-AKE1-PH3X2L4-PE2X2L4-M25	0142848/00
ES-AKE1-PH3X2L4-PE2X2L4-M25	0142849/00
ES-AKE1-PH10X3L4-PE2X3L4-M25	0142904/00
ES-KAKE2H-PH6X3L6-PE2X3L6-M25/M20	0142906/00
ES-AKE1-PH12X3L2,5-PE2X3L2,5-M32/M32	0142912/00
ES-AKE1-PH8X3L4-PE2X3L4-M32/M32	0142913/00
ES-AKE5-PH3X2L6-PE1X2L6-M20/M25	0142960/00
ES-AKE5-PH3XVK10-PE1X2L16-M20/M25	0142961/00
ES-KAKE1SS-PH3X2L10-PE2X2L10-M25/M25	0142988/00
ES-AKE1-PH7X2L6-PE2X2L6-M25	0142994/00
ES-AKE1A-PH4X2L16-PE2X2L16-M32/M25	0142999/00
ES-AKE1-PH3X3L4-PE1X2L4-M25	0143045/00
ES-AKE1E-PH3X3L6-PE1X2L6-M25	0143046/00
ES-AKE1-PH2X3L2,5-PE1X2L10-M20/M20	0143048/00
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ES-AKE1-PH7X2L4-PE2X2L4-M25	0143082/00
ES-KAKE7SS-PH3XVK10-PE2X2L16-M32	0143091/00
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ES-AKD1E-PH6X2L6-PE2X2L6-M25	0143094/00
ES-AKD1E-PH6X2L6-PE2X2L6-M25	0143094/01
ES-AKE2-PH3XVK10-PE1X3L16-M40/M20	0143124/00
ES-AKE1-PH8X2L4-PE2X2L4-M25	0143158/00
ES-AKE7-PH3XVK10-PE2X2L16-M32/M32	0143327/00
ES-AKE2R-PH4X3L16-PE1X3L16-M40/M16	0143392/00
ES-AKW1R-PH5X4L6-PE3X4L6-M25/M20/M16	0143393/00
ES-AKE1CTI-PH3X2L6-PE2X2L6-M25/M25	0143445/00
ES-AKE1CTI-PH3X2L6-PE2X2L6-M25/M25/M25	0143457/00
ES-AKE2CTI-PH3XVK10-PE1X2L35-M50/M25/M25	0143459/00
ES-KAKE3E-PH3XVK10-PE1X2L35-M40	0143474/00
ES-KAKE1E-PH4X2L2,5-PE2X2L2,5-SV/M25	0143480/00
ES-KAKE3E-PH3XVK10-PE1X2L35-M40/2XSV	0143490/00
ES-AKE1E-PH3X4L2,5-PE2X4L2,5-M32/M32	0143573/00
ES-AKD1E-PH4X2L2,5-PE1X4L2,5-M25	0143575/00
ES-AKE2-PH6X3L16-PE2X3L16-M32/M20	0143597/00
ES-KAKE7SS-PH3XVK10-PE2X2L35-M40	0143608/00
ES-KAKE7SH-PH3XVKL10-PE2X2L35-M32	0143632/00
ES-KAKE1E-PH3X2L2,5-PE2X2L2,5-SV/M25	0143633/00

Designation	Ident-No.
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ES-AKE1-PH13X2L2,5-PE1X3L2,5-M25	0143640/00
ES-AKE1-PH3X3L6-PE1X3L6-M25/M25	0143663/01
ES-AKE1-PH7X3L6-PE2X3L6-M32/M32	0143675/00
ES-AKE1-PH6X3L2,5-PE2X3L2,5-M20/M25	0143723/00
ES-AKE2-PH3X3L16-PE1X3L16-M40	0143725/00
ES-AKE2-PH3X3L16-PE1X3L16-M40/M40	0143726/00
ES-AKE1-PH6X2L6-PE2X2L6-M25	0143735/00
ES-AKE1-PH9X2L2,5-PE5X2L2,5-M32/M32	0143736/00
ES-AKE1-PH8X2L2,5-PE5X2L2,5-M32/M32	0143737/00
ES-AKE1-PH9X2L2,5-PE1X2L6-M25	0143788/00
ES-KAKE1EH-PH7X3L6-PE2X3L6-M32/M32	0143814/00
ES-KAKE1E-PH4X2L2,5-PE2X2L2,5-M25	0143815/00
ES-KAKE1EH-PH4X2L6-PE1X2L6-M25/M32	0143837/00
ES-KAKE1H-PH9X2L2,5-PE5X2L2,5-M32/M32	0143838/00
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ES-KAKE1-PH3X2L6-PE1X2L6-M25/M32	0143931/00
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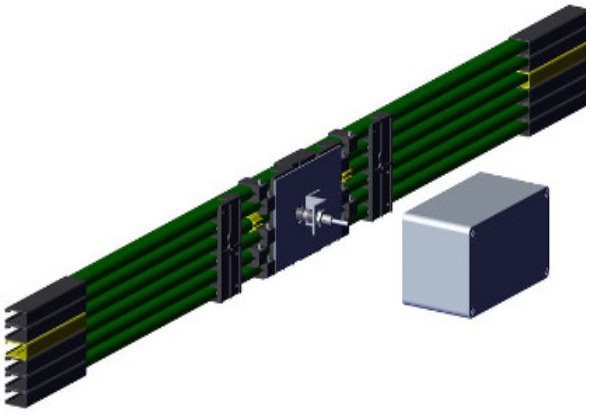
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ES-KAKE7-PH4X3L16-PE1X3L16-M32	0144192/00
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ES-AKE1-PH7X3L6-PE2X3L6-M25/M25	0144256/00
ES-AKE1-PH6X2L6-PE3X2L6-M25	0144257/00
ES-AKE1E-PH3X2L10-PE2X2L10-SV/M25	0144284/00
ES-KAKE7SS-PH3XVK10-PE2X2L35-M40/M25	0144291/00
ES-KAKD1S-PH6X2L6-PE2X2L6-M25	0144292/00
ES-KAKE7-PH5X3L6-PE2X3L6-M32/M32	0144326/00
ES-KAKE1EH-PH3X2L6-PE1X2L6-M32/M25	0144331/01
ES-AKE1-PH6X2L6-PE2X2L6-M16	0144358/00
ES-AKE2-PH6X2L16-PE2X2L16-M40/M40	0144445/00
ES-AKE1-PH6X2L6-PE3X2L6-M25/M25	0144446/00
ES-AKE2-PH4X3L16-PE2X3L16-M40/M40	0144496/00
ES-AKE1-PH8X3L4-PE2X3L4-M25/M25	0144515/00
ES-KAKE1E-PH4X2L6-PE2X2L6-SV/M25	0144541/00
ES-KAKE7-PH3X3L16-PE2X3L16-M32/M32	0144545/00
ES-AKE1-PH4X3L6-PE2X3L6-M25/M25	0144552/01
ES-KAKE1E-PH3X2L4-PE2X2L4-SV/M25	0144561/00
ES-AKE1-PH3X2L4-PE2X2L4-M25	0144562/00
ES-AKE1-PH7X2L6-PE2X2L6-M32/M32	0144586/00
ES-AKE1-PH4X2L2,5-PE2X2L2,5-M16/M16	0144587/00
ES-KAKE1-PH6X3L6-PE3X3L6-M25	0144603/00
ES-KAKW1EH-PH8X2L2,5-PE3X4L2,5-M32/M32	0144611/00
ES-KAKE1DU-PH7X2L6-PE2X2L6-M32/SV	0144641/00
ES-AKE7E-PH3X3L16-PE1X3L16-M32/M32	0144649/00
ES-KAKE7E-PH3X3L16-PE1X3L16-M32/M32	0144650/00
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ES-AKE1-PH6X3L6-PE3X3L6-M25/M25	0144654/00
ES-AKE1-PH7X3L6-PE2X3L6-M25/M25	0144666/00
ES-AKE7E-PH3X3L16-PE1X3L16-M32/M32	0144668/00
ES-KAKE7E-PH3X3L16-PE1X3L16-M32/M32	0144669/00
ES-KAKE1SKID-PH7X2L6-PE2X2L6-M25/M25	0144697/00
ES-KAKE7S-PH3X3L16-PE2X3L16-M32	0144701/00

Designation	Ident-No.
ES-AKE1-PH5X3L6-PE2X3L6-M25	0144702/00
ES-AKE1H-PH4X2L6-PE1X2L6-M25/M32	0144703/00
ES-KAKE3E-PH4XVK10-PE1X2L35-M40	0144719/00
ES-AKE1R2PH7X3L6-PE2X3L6-M32/M32	0144729/00
ES-KAKE1E-PH4X2L2,5-PE2X2L2,5-SV/M25	0144731/00
ES-KAKE1E2-PH4X2L2,5-PE2X2L2,5-SV/M25	0144732/00
ES-KAKD1E-PH4X2L6-PE2X2L6-SV/M25	0144733/00
ES-KAKE1E-PH3X2L2,5-PE2X2L2,5-SV/M25	0144734/00
ES-KAKE3E-PH3XVK10-PE1X2L35-M40/2XSV	0144744/00
ES-KAKE1EVL-PH7X3L6-PE2X3L6-M32/M40/M32	0144763/00
ES-AKW1EVL-PH7X3L6-PE2X3L6-M32/M32/M32	0144764/00
ES-KAKE1EVL-PH7X3L6-PE2X3L6-M32/M32/M32	0144765/00
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ES-KAKE1EVL2-PH7X3L6-PE2X3L6-M32/M40/M32	0144767/00
ES-AKW1EVL2-PH7X3L6-PE2X3L6-M32/M32/M32	0144768/00
ES-KAKE1EVL2-PH7X3L6-PE2X3L6-M32/M32/M32	0144769/00
ES-AKE1EVL4-PH7X3L6-PE2X3L6-M32/M32/M32	0144770/00
ES-KAKD1EVL2-PH7X3L6-PE2X3L6-M32/M32/M32	0144773/00
ES-KAKD1EVL3-PH7X3L6-PE2X3L6-M32/M32/M32	0144779/00
ES-AKE1-PH7X3L6-PE2X3L6-M32/M32	0144809/00
ES-AKE1E-PH4X2L6-PE2X2L6-M25M16	0144815/00
ES-AKE2-PH3X3L16-PE1X3L16-2XM25/M16	0144819/00
ES-KAKE1E5-PH7X3L6-PE2X3L6-SV/M32	0144846/00
ES-KAKE1E-PH7X3L6-PE2X3L6-SV/M32	0144847/00
ES-KAKE1E2-PH7X3L6-PE2X3L6-SV/M32	0144848/00
ES-KAKE7E-PH3X3L16-PE1X3L16-M32/2XSV	0144849/00
ES-KAKE1E3-PH7X3L6-PE2X3L6-SV/M32	0144850/00
ES-KAKE1E4-PH7X3L6-PE2X3L6-SV/M32	0144851/00
ES-AKW1E-PH7X3L6-PE2X3L6-M32/M32	0144852/00
ES-AKE1-PH4X2L6-PE2X2L6-M25	0148065/00
ES-AKE2R-PH6X3L6-PE2X3L6-M25/M25	0148066/00
ES-AKE1-PH3X2L16-PE2X2L16-M25	0157610/00
ES-AKE1-PH7X2L6-PE2X2L6-M25	0157619/00
ES-AKE1VD-PH9X2L6-M25	0166928/01
ES-AKE1-PH7X2L4-PE2X2L4-M25	0166935/02-0001
ES-AKE1-PH7X2L4-PE2X2L4-M25	0166935/03
ES-AKB1-PH4X2L4-PE2X2L4	0166936/03
ES-KAKE1S-PH7X2L4-PE2X2L4-M25	0166993/02
ES-KAKB1S-PH4X2L4-PE2X2L4	0166994/02
ES-AKE4EPH6X2L2,5-PE1X2L2,5-M20	0167396/01
ES-AKE5E-PH3X2L6-PE1X2L6-M20/M25	0167399/01

Designation	Ident-No.
ES-AKE1PR-PH3X2L10-PE1X2L10-M32/M20	0167636/01
ES-AKE1G-PH7X2L6-PE2X2L6-M25	0167877/01
ES-KAKE1S-PH7X2L6-PE2X2L6-M25	0169453/03
ES-AKE1-PH7X2L6-PE2X2L6-M25	0169462/03
ES-AKB1-PH4X2L6-PE2X2L6	0169481/03
ES-AKE1-PH7X2L6-PE2X2L6-M25	10000812
ES-AKE1E-PH3X2L6-PE1X2L6-M32/M25	10000831
ES-KAKE1ETB-PH3X2L6-PE1X2L6-M32/M25	10000855
ES-KAKE1EH-PH3X2L6-PE1X2L6-M32/M25	10001214
ES-AKE1E-PH3X2L6-PE1X2L6-M32/M25	10001226
ES-AKD1ETB-PH6X2L6-PE2X2L6-M25	10001672
ES-AKE2R-PH4X3L6-PE2X3L6-M25/M25	10001833
ES-AKE1-PH5X3L6-PE2X3L6-M25	10002647
ES-AKE1-PH4X2L6-PE2X2L6-M25	10002648
ES-AKE1-PH4X3L6-PE2X3L6-M25	10002649
ES-AKE1-PH6X3L2,5-PE3X3L2,5-M25	10002650
ES-AKE2-PH3X3L16-PE1X3L16-M50/M25	10003267
ES-KAKE1E-PH4X2L2,5-PE2X2L2,5-M25	10004228
ES-KAKD1EH-PH4X2L2,5-PE2X2L2,5-M25	10004229
ES-KAKE1E-PH3X2L16-PE1X3L16-M25	10004230
ES-KAKE1E-PH4X2L2,5-PE2X2L2,5-SV/M25	10004743
ES-AKE1-PH3X2L6-PE2X2L6-M25/M20	10006100
ES-AKE1-PH7X3L6-PE2X3L6-M25/M25	10006248
ES-AKE1A-PH7X2L6-PE2X2L6-M25	10006378
ES-KAKE1A-PH7X2L6-PE2X2L6-M25	10006379
ES-KAKE1A-M12X1,5	10006403
ES-AKE1-PH7X3L6-PE2X3L6-M32/M32	10006588
ES-AKE3-PH3XVK10-PE1X2L35-M40/M40	10006676
ES-AKE1EV-PH4X2L2,5-PE2X2L2,5-M25/M25	10006723
ES-AKE1EV-PH4X2L2,5-PE2X2L2,5-M25	10006724
ES-AKE1EV-PH4X2L2,5-PE2X2L2,5-M25	10006725
ES-AKE1-PH3X3L10-PE1X2L10-M25	10006961
ES-KAKE1SS-PH3X2L10-PE1X2L10-M25	10006966
ES-AKE1-PH3X2L6-PE2X2L6-M25/M20	10007909
ES-AKE3-PH4XVK10-PE1X2L35-M40	10021800
ES-AKE1-PH7X3L6-PE2X3L6-M32/M32	10025561
ES-AKE1-PH7X3L6-PE2X3L6-M32/M32	10025562
ES-AKE7E-PH3X3L16-PE1X3L16-M32/M32	10025581
ES-AKE1-PH7X2L6-PE2X2L6-M25	1009341/01
ES-KAKE1E-PH4X2L2,5-PE2X2L2,5-SV/M25	1010000254
ES-AKE1-PH7X3L4-PE2X3L4-M25	1027410/00

Designation	Ident-No.
ES-AKE7-PH3XVK10-PE2X2L16-M32/M32	2515930/00
ES-AKE1-PH3X2L16-PE1X2L16-M25/M32	2516165/00
ES-AKE3-PH3X2L35-PE2X2L35-M40	2519585/00
ES-AKE3-PH3XVK10-PE1X2L35-M40	2519775/00
ES-AKE3-PH3XVK10-PE1X2L35-M40	2519837/00
ES-AKE1EE-PH4X2L2,5-PE2X2L2,5-M25	2806631/00-E
ES-AKE1EV-PH4X2L2,5-PE2X2L2,5-M25/M25	2806631/00-V
ES-AKE1E-PH4X2L2,5-PE2X2L2,5-M25	2806631/00-VL
ES-AKE1EE-PH3X2L2,5-PE2X2L2,5-M25	2823107/00-E
ES-AKE1EV-PH3X2L2,5-PE2X2L2,5-M25M25	2823107/00-V

5.2.21 Brush wear indicator



Brush wear indicator		
Travel speed, max	[m/min]	70
Opening in in track profile Length, min. Height	 [mm] [mm]	 70 50
Rail length	[m]	1
PE-VPN position variable		

The brush wear indicator automatically checks the brush wear. The indicator triggers at a residual height of 3 mm. This value has been preset. A pulse is triggered when the carbon brush is worn out. It is advisable to install it in front of a maintenance bay for automatic operation of a switch. The KVT 10 brush wear indicator is supplied complete with a 1 m U10 conductor rail section. The conductor rail ends are already prepared for UEV 10 joint splice/feeds.

Brush wear indicator with inductive proximity switch

For brush wear indicators with an odd number of pins, the lower pin of the compact hanger is not connected.

Type | PE on no. 4	Number of poles	Weight [kg]	Ident-No.
VT-KVT10-4-14HS4B	4	2,828	166 957
VT-KVT10-5-14HS4B/6	5	3,302	167 440
VT-KVT10-6-14HS4B	6	3,686	166 895
VT-KVT10-7-14HS4B/8	7	4,094	167 441
VT-KVT10-8-14HS4B	8	4,478	166 896
VT-KVT10-9-14HS4B/10	9	4,884	167 442
VT-KVT10-10-14HS4B	10	5,274	166 897

Type | PE-VPN on no. 4	Number of poles	Weight [kg]	Ident-No.
VT-KVT10-4-14VPN4B	4	2,773	144 907
VT-KVT10-5-14VPN4B/6	5	3,247	144 908
VT-KVT10-6-14VPN4B	6	3,631	144 909
VT-KVT10-7-14VPN4B/8	7	4,039	144 910
VT-KVT10-8-14VPN4B	8	4,423	144 911
VT-KVT10-9-14VPN4B/10	9	2,534	144 912
VT-KVT10-10-14VPN4B	10	3,010	144 913

6 TRANSPORT AND STORAGE

6.1 Safety instructions for transport and storage



NOTICE!

Damage due to improper transport or storage. Improper transport or storage may cause significant property damage!

- ► Storage temperature: 0 °C to +45 °C
- ► Storage location: Indoors, dry, no exposure to chemicals.
- ► Do not expose to direct sunlight.
- ► Exercise caution and observe the symbols on the packaging while unloading the pieces at delivery or during transport on the facilities.



NOTICE!

Handling, transport and storage should take place in such a way that the parts are not damaged. The transport and protective packaging is primarily made out of reusable materials. All packaging materials have to be disposed of in accordance with the local provisions.

6.2 Transport inspection

Check the delivery for completeness and transport damage upon receipt!

If any external damage is found:

- Refuse delivery or accept delivery only conditionally.
- Note the scope of the damage in the transport documents or on the carrier's delivery note.



NOTICE!

The delivery may be damaged during transport!

Report all defects as soon as they are found. Claims for damages can only be made during the applicable period.

- ► Document and report the defects found.

6.3 Conductor system

NOTICE!

When transporting the conductor rail, i.e. from the removal from the delivery box to the installation site, observe the following:

- ► Bending/ sagging must be avoided, as this can lead to permanent deformation of the conductor rails.
- ► Avoid bending the conductor rails. Bent areas must not be installed and have to be separated out.

Conductor rail

- Transport and storage in wooden crates.
- Transport by truck

NOTICE!

Incorrect unpacking can lead to damage!

Improper unpacking may lead to property damage and personal injury.

- ► Only handle sections using lifting equipment which allows full-surface support or at least a three-point support, for example by using a lifting traverse.

6.4 Assemblies and individual parts

All units and individual parts are packaged in cardboard boxes for transport and storage.

7 COMMISSIONING

7.1 Safety instructions for commissioning



⚠ WARNING!

Risk of injury in case of improper operation!

Improper operation may result in serious injury or property damage.

- ► Observe the safety instructions from section “3 Safety instructions.”
- ► Are all acceptance reports available? (initial startup)
- ► Are there no people in the danger zones?
- ► Was the assembly performed completely according to instructions?
- ► Have excess materials, tools and auxiliary devices been cleared from the danger zones?
- ► Has the electrical system been powered up by an authorized electrically trained person (see section “3.3 General risks”)



⚠ WARNING!

Danger to unauthorized persons!

Unauthorized persons who do not meet the requirements described here do not know the dangers in the respective work area.

- ► Keep unauthorized persons away from the work area.
- ► If in doubt, speak to people and expel them from the work area.
- ► Interrupt the work as long as the unauthorized persons are in the work area.



⚠ WARNING!

Hazard in case of insufficient qualification of personnel!

Insufficiently qualified persons are unable to judge the risks when working on the system, which puts them and others at risk if severe or fatal injuries.

- ► All work must be performed by qualified personnel only
- ► Insufficiently qualified personnel must stay out of the work area



⚠ WARNING!

Risk of injury from falling parts!

In case of improper use (faulty assembly, misuse, failure to perform maintenance, etc.), there is a risk of parts falling down.

- ► Wear a helmet
- ► Perform regular maintenance



⚠ WARNING!

Perform a trial run after proper installation. The following points must be observed:

- Perform the first run at reduced speed.
- The current collectors must run in the conductor rail without vibration.
- The current collector must not be hindered in freely passing through by narrowing of the tracks on connectors, feeds, transfer guides and isolating sections. If necessary, push open constrictions using the MG-SW 10 mounting fork.
- Formation of sparks on the carbon brush must not occur (formation of sparks indicates a dirty or oxidized contact surface; clean the contact surface).
- In particular, ensure that the current collector smoothly enters and exits at the transfer guides.



NOTICE!

The conductor rail material is susceptible to corrosion.

Corrosion can occur when working on the conductor rail with tools.

- Only tools that have not previously been used for ferritic materials may be used.
- Use own tools for the different materials (aluminum, copper, stainless steel).
- Chip-forming work (grinding etc.) must not be performed in the vicinity of the material, or the material must be covered in such a way that no soiling or damage can occur.

7.2 Assembly prerequisites



TIPS AND RECOMMENDATIONS!

- Appropriate handling of materials, in particular non-metallic parts with regard to mechanical stress, contamination, etc.
- Clean and metallically bright surfaces on all contact points
- Smooth crossovers, free of burrs, at the ends of the conductor rail profiles, in order to avoid breakdowns and high carbon brush wear
- Firm tightening of all screws using the screw lock provided
- Exact alignment of the conductor rail to the guide system
- Damaged materials may not be installed
- Observe all regulations governing installation of the system
- Sufficient distance between conductor rail components and construction components, e.g., screw heads, connector plates, cable bushings, connecting cables etc. The above-mentioned components must not influence the correct installation of all conductor rail components.

7.3 Assembly tools

- Suitable means of transport for bringing the conductor rails to the installation site (full-area support of the conductor rails).
- Adjustable torque wrench for 1.4 Nm - 9.5 Nm
- ¼" and ½" reversible ratchets with extension and nut, size 7, 8, 10 and 13
- Allen wrench, size 2, 3, 5
- Phillips screwdriver PZ2
- 200 mm steel rule
- Steel tape measure
- Contact angle / 0875
- Soft-face hammer, head Ø approx. 50 mm
- Screwdriver set
- Deburring blade
- Assembly tool MK9/MK9HT

Bending device



Type		Weight [kg]	Ident-No.
MZ-BVU10-VP	Bending device	6,918	143 318
MZ-FU10-V(1)	Filler rod for PH/PE (4 m)	0,371	165 234
MU-FU10-H(2)	Filler rod for PH/PE (4 m)	0,354	144 416

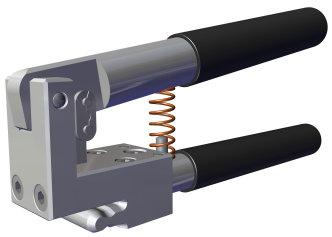
(1) For the production of EMS vertical curves
(2) For the production of EMS horizontal inside/outside curves

Circular saw

For cutting insulating and conductor rail profiles with length stop. Connection 230 V, 50 Hz

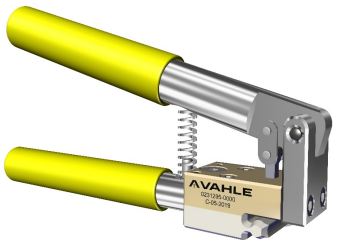
Type		Weight [kg]	Ident-No.
MZ-KS10	Circular saw, complete	8,059	165 276
MZ-SB	Spare blade	0,070	165 263

Hole punch for phase and standard PE



MZ-LZ10PH/PE	
Ident-No.	144 363
Weight [kg]	0,480

Hole punch for PE-VPN



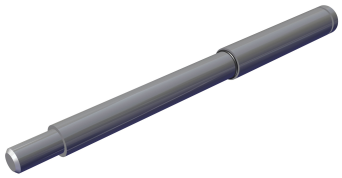
LZ10 PE-VPN	
Ident-No.	144 875
Weight [kg]	0,563

Deburring tools

Type	Use	Weight [kg]	Ident-No.
ROUND FILE RF-150 LONG/ CUT 3/ D=6MM	To deburr the inside of the phase conductor profile in the case of shorter lengths	0,085	143 330
SEMI CIRCULAR FILE HRF-150 LONG/ CUT 3	For deburring the outside of the conductor profile in case of shorter lengths.	0,085	165 264

Insertion gauge

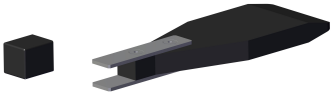
For setting the conductor rail and insulation profile in the case of shorter lengths.



MZ-ST10	
Ident-No.	165 091
Weight [kg]	0,150

Mounting fork

For pressing the conductor rail profile into the connector; if necessary, to widen the rail opening. For moving the connector cap



MG-SW10	
Ident-No.	165 093
Weight [kg]	0,125

Punch-in drift

For driving in the dowel pins when using the attachment for transfer guide (BFU made of aluminum)

MZ-ED10	
Ident-No.	165 277
Weight [kg]	0,010

Dismantling tool

For releasing the conductor rails from the compact holders.



MZ-DMW10	
Ident-No.	165 119
Weight [kg]	0,039

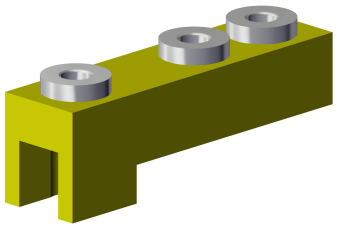
Twist drill bit

For making the bore-holes for the USK10A-VPN locating clamps at fixed points.

TWIST DRILL BIT Ø 6.6 MM, TYPE N	
Ident-No.	144 879
Weight [kg]	0,003

Drill template

For making the bore-holes for the USK10A-VPN locating clamps at fixed points.



DRILLING TEMPLATE BS 10 FOR PE-VPN	
Ident-No.	144 877
Weight [kg]	0,092

Assembly tools box

MZ-MWK-K	
Ident-No.	166 548
Weight [kg]	26,500

Assembly tools box can be locked and contains:

- 1x bending device BVU10-VP
- 1x filler rod FU10
- 1x circular saw KS10
- 1x spare blade SB
- 1x hole punch LZ10PE-VP
- 1x LZ10PH/PE, 1x round file RF
- 1x semi-circular file HRF
- 1x insertion gauge ST10
- 1x mounting fork MG-SW10
- 1x punch-in drift ED10
- 1x dismantling tool DMW10
- 1x drill template BS10A
- 1x twist drill bit ø 6.6

7.4 Installation

7.4.1 Assembly preparation

NOTICE!

Ensure that the following requirements are fulfilled before assembling the system:

- ► Protective measures have to be taken against unauthorized access and operation during the installation work.
- ► The installation site must be clean and free of all objects.
- ► There has to be adequate lighting over the entire installation site.
- ► Tools for proper assembly of the system have to be available (see 7.3 Assembly tools).
- ► The customer must provide the interface plan in advance.
- ► Mark the position of the isolating sections and feeds on the EMS profile according to the interface plan.
- ► Check the mechanical alignment of the EMS components at crossings (switches, jack, etc.).

7.4.2 Compact hanger

Hanger distances/compact holders

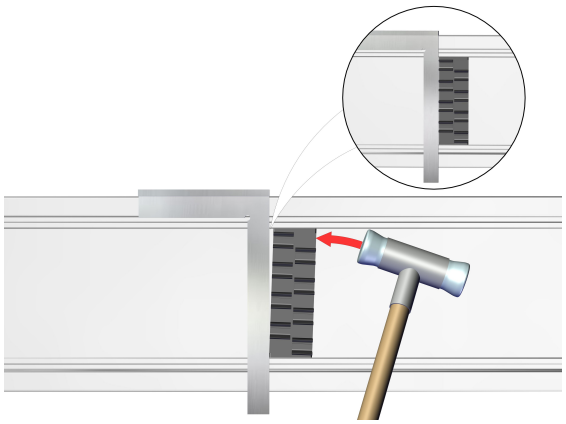
If the compact holders are used in a curve, the first compact holder must be installed in the straight section before and after the curve with a distance of 300 mm.

The installation should start at system ends (fixed points) (switches, jacks, etc.).

Observe the following installation distances:

System	Distance to straight sections, max. [m]	Distance in a curve, max. [m]
U10	0,6	0,3
U10 + SMGM	0,6	0,3
U10 + APOS Optic	0,6	0,3
U10 + SEW slotted hollow conductor	0,6	0,3
U10 + RCOAX (Siemens)	0,4	0,2

General



Prerequisites:

✓ All compact holders must be attached at exact right angles to the rail or the EMS profile.

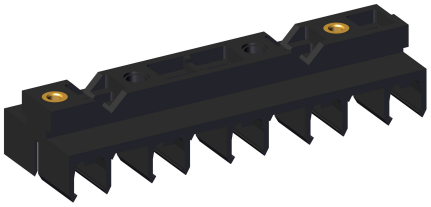
Required tools:

⚒ Contact angle

⚒ Soft-face hammer

If the holder is misaligned, this could lead to unintended fixed points with clamping effects between clamp and conductor rail.

Compact holder for screwing on (KA)



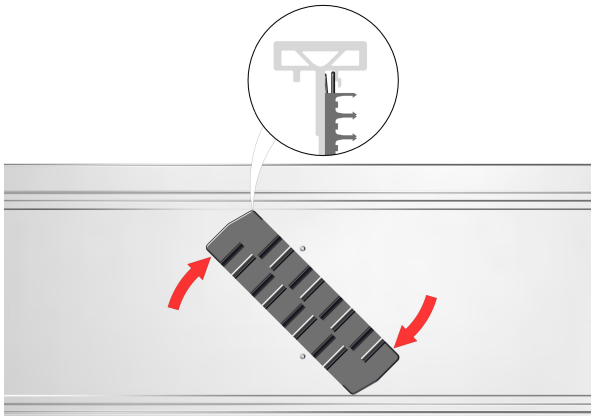
Required tools:

- ⚒ Drill template (not contained in scope of delivery)
- ⚒ M5 twist drill bit

Assembly instructions:

1. Drill through-holes in the profile using the drilling template.
2. Fasten the compact holder with the screw material to the through-holes on the profile.

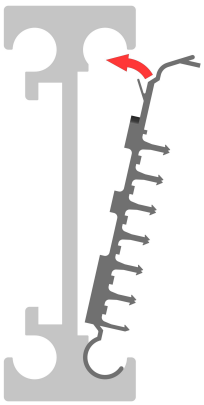
Compact holder for turning in (KD)

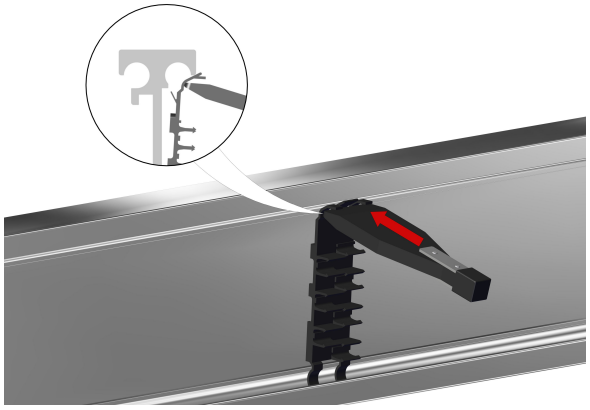


Assembly instructions:

1. Turn the compact holder clockwise into the profile.

Compact holder for clipping in (KK)





Required tools:

- ⚒ Mounting fork MG-SW10

Assembly instructions:

1. Clip the compact holder into the profile.
2. Press the latch with the mounting fork until the holder engages with an audible click.

Compact holder for inserting (KS)

Assembly instructions:

1. Place the compact holder in the profile until it clips into the existing holes, or secure it with additional clamps on the back.

Compact holder with additional adhesive protection

Prerequisites:

- ✓ The area of the profile must be dry and free of grease, oil and dust.
- ✓ Remove light soiling with a cleaning cloth.
- ✓ Remove more heavy soiling with Rivolta A.C.S 3.

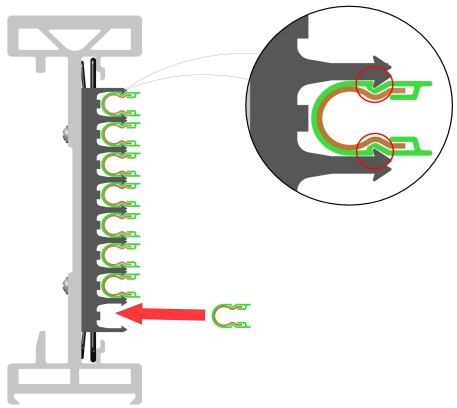
Assembly instructions:

1. Remove the foil of the adhesive strip and place the compact holder on the profile.

7.4.3 Conductor system

NOTICE!

- ► Always start the assembly at fixed points (switches, system ends, jacks).
- ► Firstly assemble standard lengths.
- ► For shorter lengths, see chapter Shorter lengths, connecting pieces and moving system components.
- ► For curves, see chapter Curved sections.



Assembly instructions:

1. Clip the conductor rail into the compact holder.
2. Make sure that the snap-in hooks of the compact holder snap into the designated places on the insulating profile.

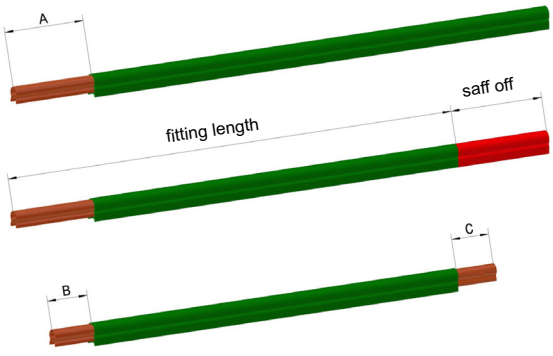
Shorter lengths, connecting pieces and moving system components



Step 1

Assembly instructions:

1. Push the conductor rail profile into the insulating profile until the desired conductor rail protrusion A is reached on the opposite (left) side (see Protrusions table). If necessary, use the insertion gauge ST10.



Step 2

Assembly tools:

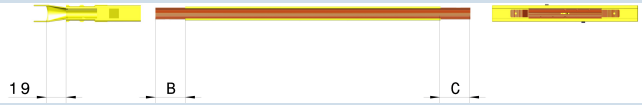
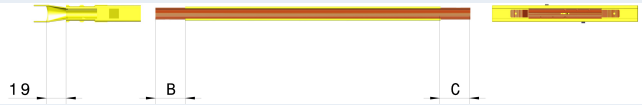
⚒ Circular saw ST10

Assembly instructions:

1. Mark the length of the required copper rail/fitting length starting (left) at the protruding copper rail profile.
2. Saw off the conductor rail at the marking.
3. Push the conductor rail profile from the left until the desired protrusions B and C are reached on both sides (see Protrusions table).
4. Perform end finishing, see Chapter End finishing.

Protrusions table

PH and PE standard	A [mm]	B [mm]	C [mm]	
Shorter length	70	35	35	
Shorter length Connection piece	70	35	35	
Shorter lengths for moving system parts	70	35	35	
Shorter length for Connector - expansion section	65	35	30	
Shorter length for expansion section - expansion section	60	30	30	

PE-VPN	A [mm]	B [mm]	C [mm]	
Shorter length	70	35	35	
Shorter length connection piece Feed at joint	60	25	35	
Shorter length connection piece Feed at transfer guide	60	41	35	
Shorter lengths for moving system parts	50	41	25	
Shorter length for joint - expansion section	65	35	30	
Shorter length for expansion section - expansion section	60	30	30	

Curved sections

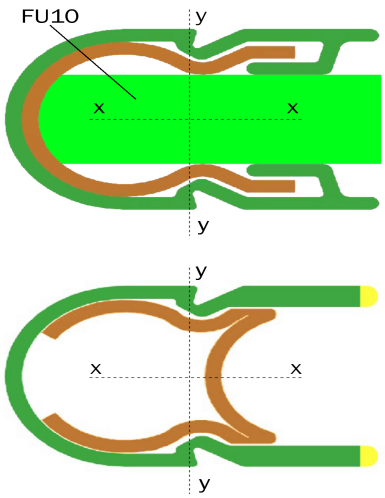
Curves must be made with the bending device BVU10 VP. With this bending device all U10 conductor rail types can be bent vertically and horizontally.

NOTICE!

Using the conductor rail U10/25 C PE-VP-G (slotted insulation jacket) is absolutely necessary for horizontal inner and outer curves.

For the production of vertical and horizontal inner and outer curves of the conductor rails PH, PE-Standard and PE-VPN, the rolls shown in the table must be used. The required radii are achieved by feeding the upper roll. In order to avoid unwanted cross-sectional changes during bending, the corresponding filler rods must be used according to the following table:

Curve	Radius	Curve type	Conductor rail		Infeed in revolutions	Filler rod	Track
Horizontal Curve	750	Inner	PH/PE	(y-y)	3 ¾	FU10-H	2
			PE-VPN	(y-y)	3 ¾	-	4
		Outer	PH/PE	(y-y)	3 ½	FU10-H	2
			PE-VPN	(y-y)	4	-	3
	1000	Inner	PH/PE	(y-y)	3	FU10-H	2
			PE-VPN	(y-y)	3	-	4
		Outer	PH/PE	(y-y)	2 ¾	FU10-H	2
			PE-VPN	(y-y)	3 ½	-	3
	1500	Inner	PH/PE	(y-y)	2 ½	FU10-H	2
			PE-VPN	(y-y)	2 ½	-	4
		Outer	PH/PE	(y-y)	2 ¼	FU10-H	2
			PE-VPN	(y-y)	3	-	3
	2000	Inner	PH/PE	(y-y)	2 ¼	FU10-H	2
			PE-VPN	(y-y)	2 ¼	-	4
		Outer	PH/PE	(y-y)	2	FU10-H	2
			PE-VPN	(y-y)	2 ¾	-	3
Vertical curves			PH/PE	(x-x)		FU10-V	1
			PE-VPN	(y-y)		-	1





Bending the conductor rail

Required tools:

⚒ BVU10 VP

1. Determine the zero point of the bending device
   a) Lay PH rail with filler rod in the bending device (track 2 for inner and outer curve, track 1 for vertical curve)
   b) Feed in upper roller to conductor rail (without gap)
2. Mark the curve dimension (determine stretched length) and mark on the conductor rail.
3. Make the shorter lengths according to curve measurement + approx. 200 mm bending allowance on both sides. See illustration and chapter Curved sections.

NOTICE!

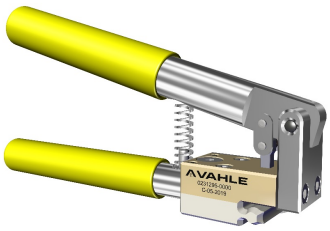
► No end finishing may take place yet.

4. Insert the corresponding filler rod in the conductor rail.
5. Turn the adjusting roller of the BVU10 VP with the hand crank until the zero point, see ruler of the bending device.
6. Guide the conductor rail with filler rod into the corresponding track. The markings must be on the right and left next to the BVU 10.
7. Turn down the adjustment roller according to the radius and push it back and forth several times. It is necessary to move the conductor rail during the infeed to avoid kinking.
8. Guide the conductor rail through the bending unit up to the curve markings. The markings must be centered under the adjustment roller.
9. A correction of the curve is possible by feeding in again.
10. Remove the filler rod.

NOTICE!

► If there are short lengths, cut the conductor rail to the curve length and finish the ends according to Chapter 5.4.3.7. A straight section of at least 100 mm should remain on both sides.

► To check the slot width (5.5 mm) of the curved section, pass through the curved section with the back of the mounting fork MG-SW10.



NOTICE!

End finishing of the PE-VPN profiles may only be carried out with the PE-VPN conductor punch tool (7.3 Assembly tools). Due to the different geometry of the profile it is not possible to use other conductor punch tools.

End finishing

NOTICE!

► When chamfering the inner contour, the contact surface must be deburred particularly carefully.
To ensure a perfect current transfer, make sure that the ends of the conductor rails are metallically bright and clean.

Deburring

Required tools:

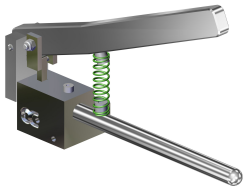
⚒ Semi-circular file HRF

⚒ Circular file RF

Assembly steps:

1. Slightly chamfer the outer contour with semi-circular file HRF.
2. Slightly chamfer the inner contour with circular file RF.

Perforation



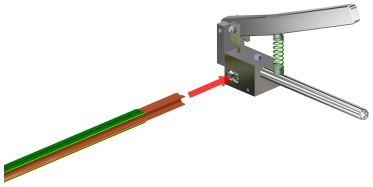
Required tools:

⚒ Hole punch LZ10 / LZ10 PE-VPN

NOTICE!

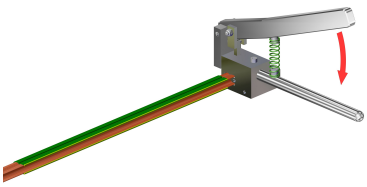
► Make sure that the conductor rail profile is pushed in as far as it can go and then perforated. Otherwise an incorrect hole pattern will result.

► The hole punch LZ10 PE-VPN may only be used for the end finishing of the conductor rail U10 PE-VPN.



Assembly steps:

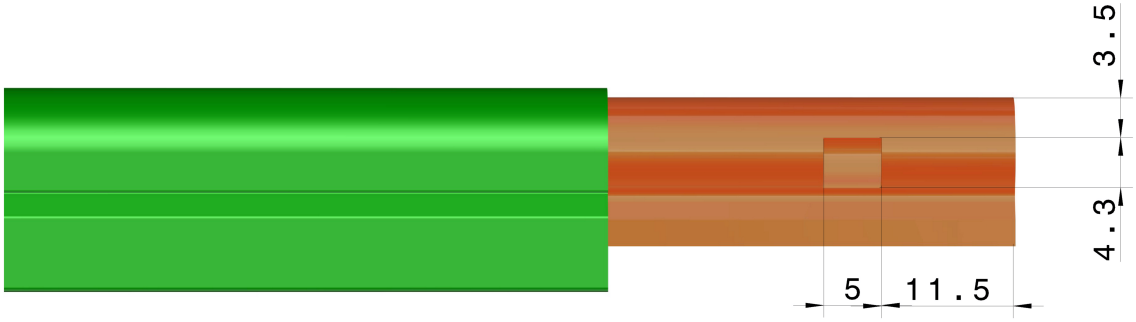
1. Slide the conductor rail as far as it will go into the hole punch.
2. Perforate the conductor rail.



NOTICE!

► If the perforations are faulty, do not punch again. The perforation created in this way will lead to incorrect extension in the joints and incorrect positioning of the transfer guide gaps and isolating sections.
Faulty punched conductor rail ends must be sawn off and used for shorter under-lengths or scrapped.

Hole pattern dimensions:



Transfer guide US 10 and
Isolating section LT 10

✓ The end finishing and perforation were performed as described.

✓ The following additional end finishing is necessary for transfer guides and isolating sections:

Required tools:

⚒ Semi-circular file HRF

Assembly steps:

1. Chamfer the conductor rail up to half the material thickness of the CU profile, at a flat angle of approx. 15°.

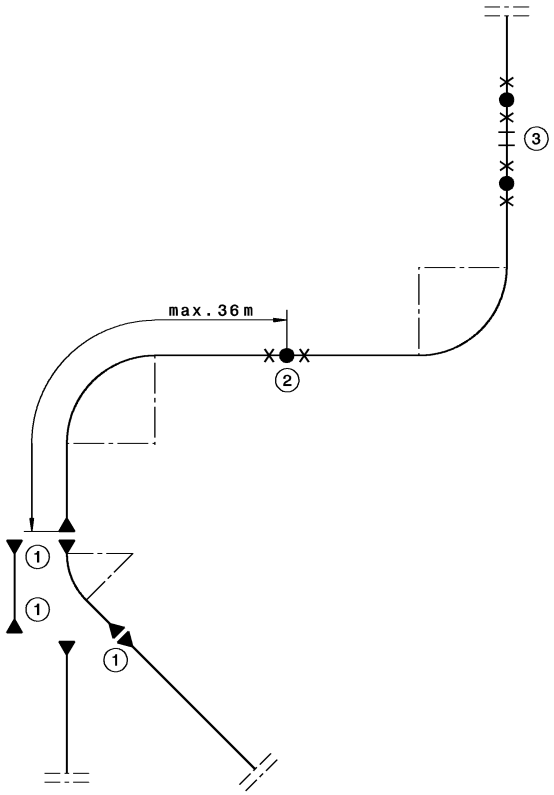
NOTICE!

► The position of this chamfer is in longitudinal direction to the conductor rail, at the height of the rectangular perforation and must have at least its width

7.4.4 Fixed point

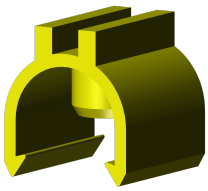
The conductor rails must be secured at regular intervals against longitudinal displacement.

No.	Position	consisting of
1	switches and lifting stations	transfer guide and BFU, see 7.4.10 Transfer guide
2	on the line	Fixed point compact holder and locating clamps on both sides USK 10/USK 10A
3	Before and behind expansion sections at expansion joints	



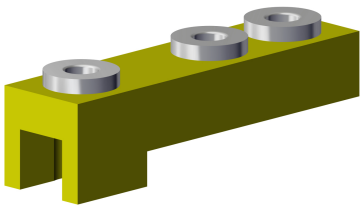
Distances between fixed points

Key	Temperature range	t min. [° C]	t max. [° C]	Δ t [° C]	Rail length [m]	Fixed point distance [m]
1	Normal	0	40	40	6	36
2	Normal 1	5	35	30	6	48
3	Normal 2	10	30	20	6	72
4	Cold storage	-8	20	28	5	50
5	Deep-freeze storage	-30	20	50	3	27



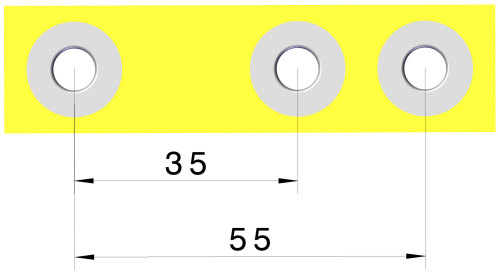
NOTICE!

- Only the PE-VPN locating clamps (Locating clamp PE-VPN) may be used for PE-VPN.
- It is not permitted to use other locating clamps.



NOTICE!

- Only the PE-VPN drilling jig (7.3 Assembly tools) may be used for PE-VPN.
- It is not permitted to use other drilling jigs.

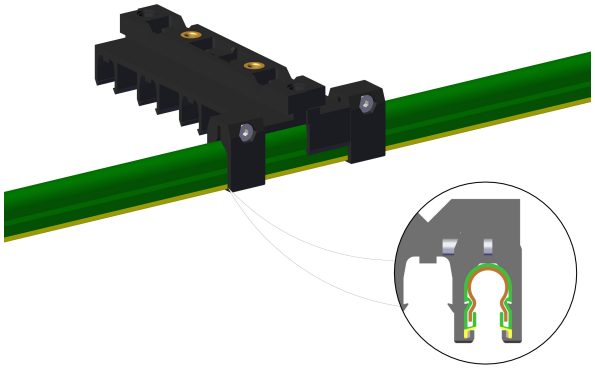


NOTICE!

- Borehole A with 35 mm hole spacing: for 20 mm wide compact hangers
- Borehole B with 55 mm hole spacing: for 40 mm wide compact hangers

Fixed point with locating clamp USK 10 and USK 10A

Arrange the locating clamps on the right and left of the fixed point compact holder. There must not be any air gap between locating clamps and compact holder



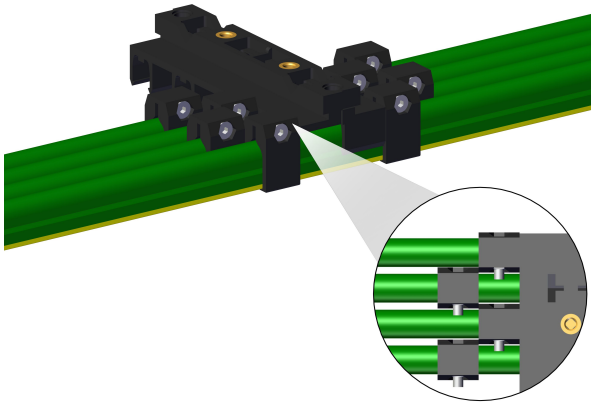
Assembly USK 10 for PH- and PE-standard

Required tools:

⚒ Tool: Allen wrench, size 2.5

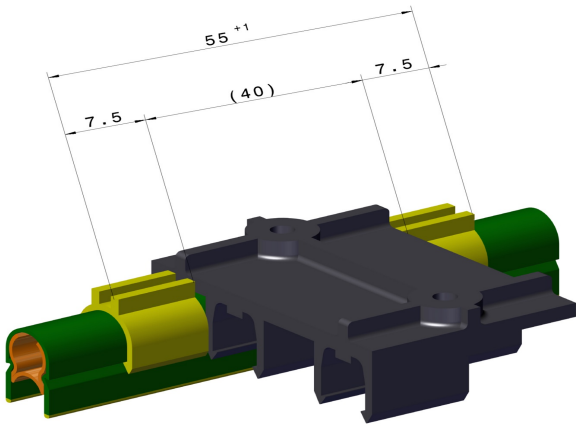
Assembly steps:

1. Mount the conductor rails and, before pressing them into the fixed point compact holder, mark the position of the locating clamps.
2. Screw the locating clamps on the conductor rails, offset by hand (not by machine)on the left and right of the compact holder (torque 1.4 Nm).
3. Press the conductor rail into the fixed point compact holder.



NOTICE!

► For multi-pole conductor rail systems, arrange the locating clamps offset.



Assembly USK10A-VPN for PE-VP

Required tools:

⚒ Drilling template BS 10 for VPN

⚒ Drill Ø 6.6 mm

Assembly steps:

1. Create a fixed point compact holder on the EMS profile.
2. Mount conductor rails and, before pressing them into the fixed point compact holder, mark the position of the locating clamps.
3. Use the drilling template to drill two holes in the back of the conductor rail.
4. Press a USK10A-VPN locating clamp into each of the holes.
5. Press the conductor rail into the fixed point compact holder.

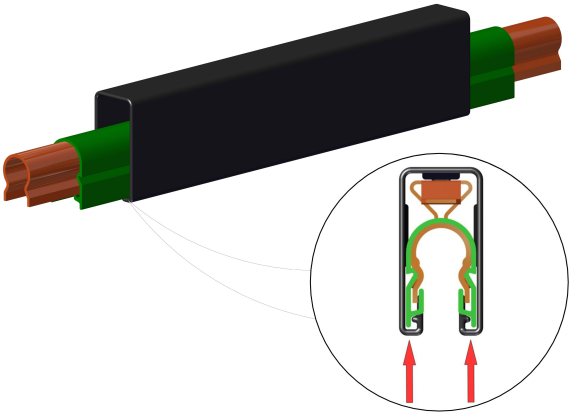
Fixed point with transfer guide US and BFU

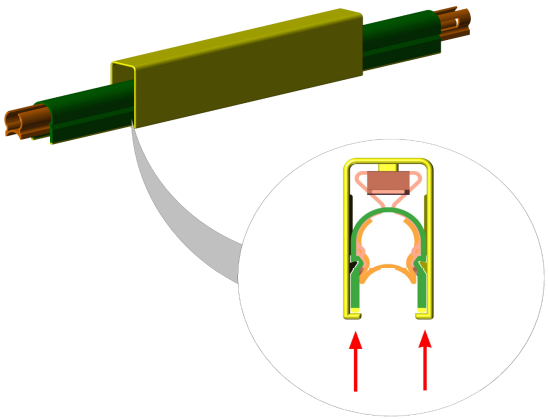
Fasteners for transfer guides are screwed to the EMS profile and in combination with the transfer guides are a system fixed point.

7.4.5 Joint splice/feed

NOTICE!

- A maximum of two cable connections through 6.3 x 0.8 mm flat plug connection (both sides) is possible.
- Maximum cable cross section 6 mm².
- Mounting the UEV 10 VP is done similarly to the UEV 10. Please observe that the yellow joint cap is used.





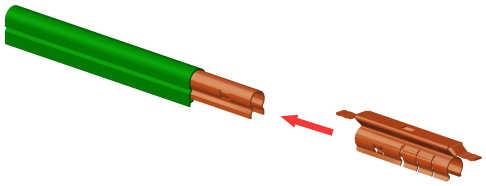
NOTICE!

- 2 x 40 A can be fed in at maximum.
- Only mount at rail section.
- Do not mount in curves with radii smaller than 1000 mm.
- Feed connectors are used to electrically and mechanically connect the conductor rail sections.
- Every joint is protected against contact with a corresponding joint cap.
- The change in length of the conductor rail due to changes in the ambient temperature is compensated by the feed connector.
- The adjustment of the air gap depends on the mounting temperature.
- To determine the air gaps to be set, use the diagram Air gap page 104 .

Connecting cap

Assembly steps:

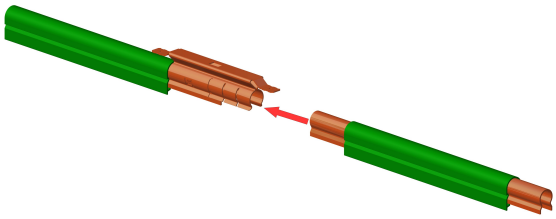
1. Slide the connector cap from the left over the end of the new conductor rail to be mounted until the connection point is free again.
2. The connector cap must cover both legs of the conductor rail.



Attaching feed connectors

Assembly steps:

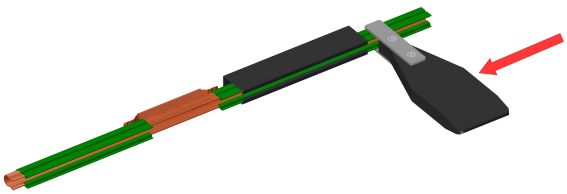
1. Clip the metal clip of the feed connector onto the right end of the already mounted conductor rail.



Connecting conductor rail

Assembly steps:

1. Clip the conductor rail into the compact holders and press the left end into the already mounted connector.



Connecting cap

Required tools:

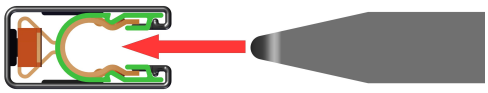
⚒ MG-SW 10 mounting fork

Assembly steps:

1. Slide the connecting cap with the metal side of the mounting fork over the joint (lightly tap perhaps).

After mounting the connector cap, check the correct fit of the flat plug sleeve of the connecting cable on the connection lug of the feed connector.

Expanding



Expanding connectors - not for PE-VP

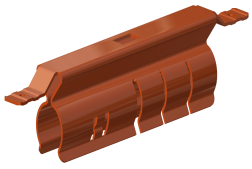
Required tools:

⚒ MG-SW 10 mounting fork

Assembly steps:

1. Expand the connector with mounting fork, pressing the plastic side into the conductor rail up to the track. The conductor rail has to correspond to the measurements from the side 19 5.2.1 Conductor system again.

Installation PE-VPN



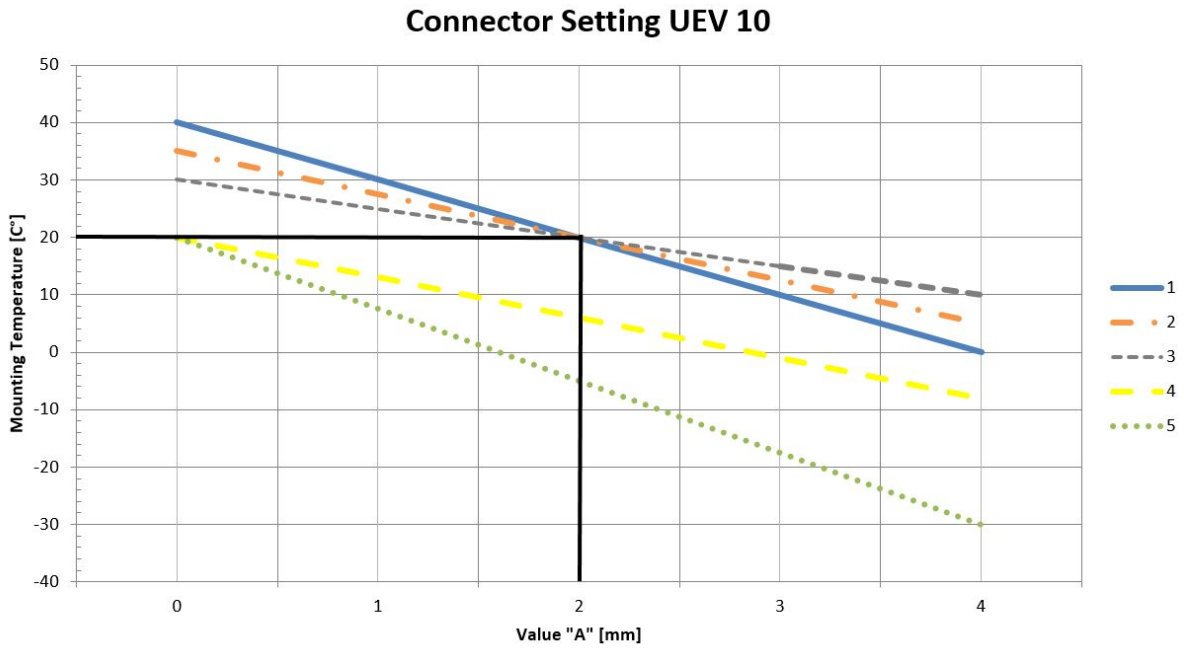
NOTICE!

► The U10 standard joint splice is compatible with PE-VPN.

Air gap

- The air gap between the conductor rail profiles depends on the temperature range during normal operation, the mounting temperature, and the conductor rail length.
- A simplified setting of the air gap is only possible for the "Normal" temperature range, fixed point distance of 36 m, and mounting temperature of 20°C. Here a connector is alternately mounted completely closed and completely open.
- Any other air gap to be adjusted is shown in the following diagram.
- Project the mounting temperature horizontally onto the corresponding straight line of the desired temperature range. Project the intersection point vertically onto the adjustment dimension A. Set this value at every conductor rail joint.

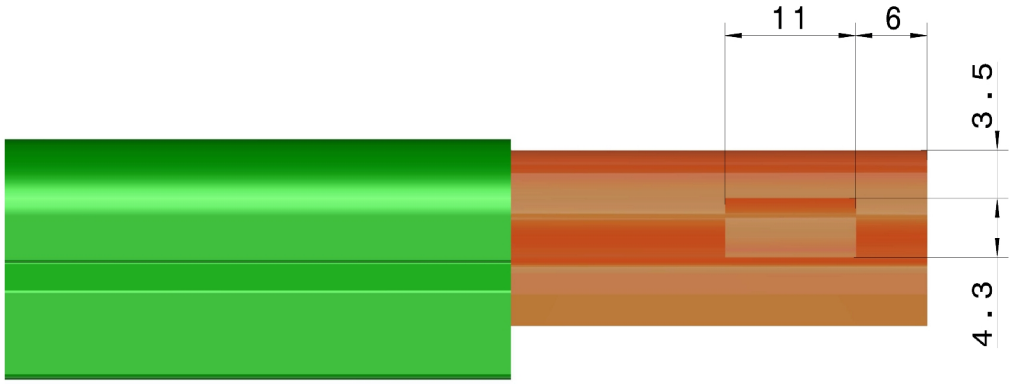
Key	Temperature range	t min. [° C]	t max. [° C]	Δ t [° C]	Conductor rail length [m]	Fixed point distance [m]
1	Normal	0	40	40	6	36
2	Normal 1	5	35	30	6	48
3	Normal 2	10	30	20	6	72
4	Cold storage	-8	20	28	5	50
5	Deep-freeze storage	-30	20	50	3	27



7.4.6 Expansion section

UDV 10 and UDV 10 VP

- Expansion sections are used to compensate the change in length between EMS profile (aluminum) and conductor rail (copper) depending on the ambient temperature.
- Expansion sections are used where the EMS profile has an expansion joint.
- The number of expansion sections in the area of the EMS expansion joint is calculated from the maximum possible expansion movement of the EMS expansion joint.
- Expansion sections consist of a feed connector and double perforations on both sides of the incoming conductor rail ends.
- An expansion movement of 0 to 15 mm can be compensated per expansion section.
- In case of expansions, the rail section must be mounted between two expansion sections with at least two compact holders.



Expansion section creation on site

Required tools:

- ⚒ Semi-circular file HRF
- ⚒ Circular file RF
- ⚒ Hole punch LZ10/LZ 10 PE-VP
- ⚒ MG-SW 10 mounting fork

Assembly steps:

1. Chamfer the conductor rail up to half the material thickness of the CU profile, at a flat angle of approx. 15°.
2. Punch the incoming conductor rail ends several times (see figure above).
3. Snap both conductor rail ends into feed connectors.
4. Set the required opening on the expansion section.
5. Press the conductor rails into the compact holder or fixed point compact holder.
6. Expand the connectors with the mounting fork, pressing the plastic side into the conductor rail up to the track. Does not apply for PE-VP!

NOTICE!

- ► Additional compact holders must be mounted on the right and left side of the UDV at a maximum distance of 150 mm.
- ► Do attach any feed in the area of the expansion sections.

Location of the fixed points

The fixed points must be made to the left and right of the EHB expansion joint on the outermost compact supports. Establishing the fixed points see chapter 7.4.4 Fixed point.

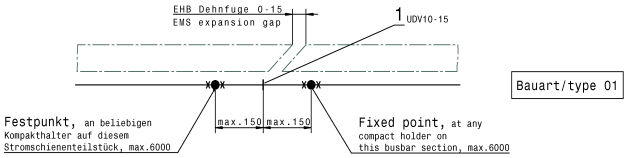


Fig. 7-1 UDV 10/C-15 max. 15 mm expansion movement

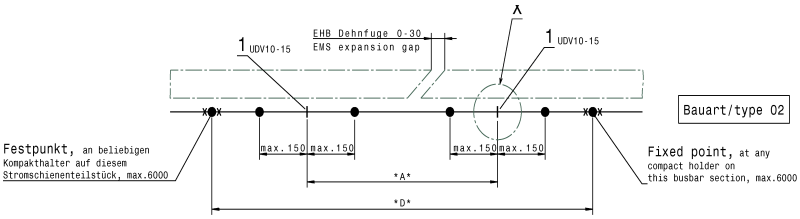


Fig. 7-2 UDV 10/C-30 max. 30 mm expansion movement

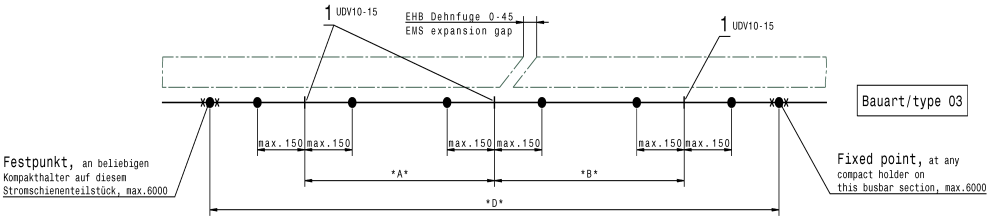


Fig. 7-3 UDV 10/C-45 max. 45 mm expansion movement

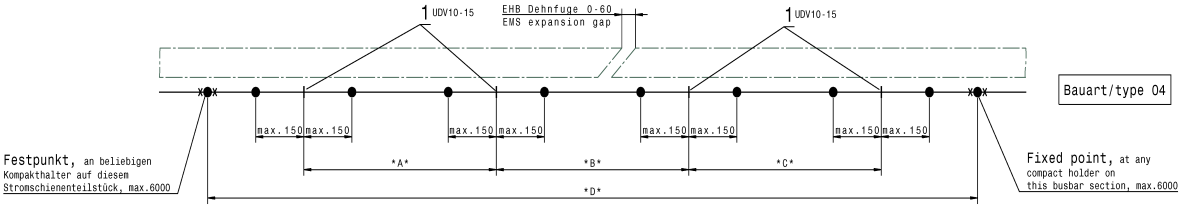


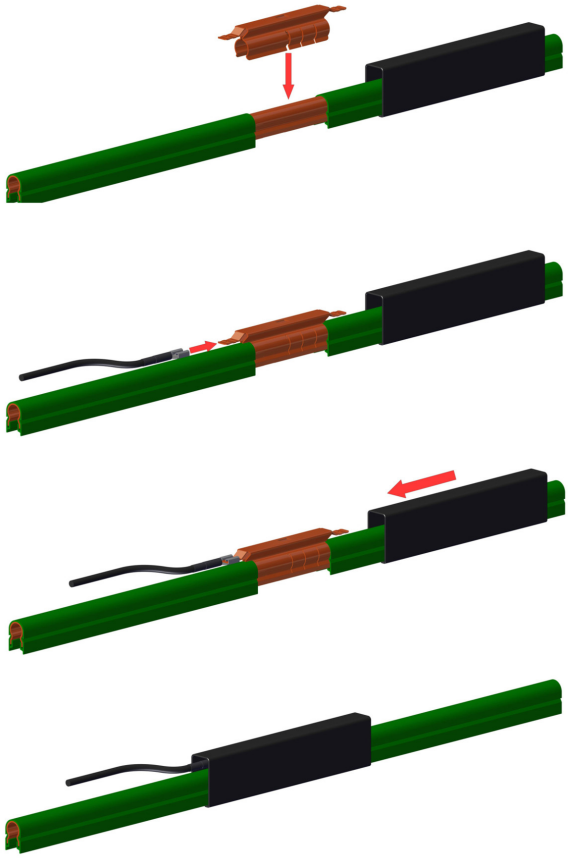
Fig. 7-4 UDV 10/C-60 max. 60 mm expansion movement

	UDV10-30		UDV10-45		UDV10-60		Number of compact holders	
	Length [mm]						up to 900 mm	up to 1500 mm
	min.	max.	min.	max.	min.	max.		
Segment A	450	1500	450	1500	450	1500	2	3
Segment B	-	-	450	1500	450	1500	2	3
Segment C	-	-	-	-	450	1500	2	3
Distance fixed points D	750	8000	1200	8000	1650	8000	-	-

7.4.7 Feed terminal

- Feeds must be installed near the customer's supply line.
- Do not mount in curves with radii smaller than 1000 mm.
- Do not mount in the areas of the expansion section.
- Attach strain relief for feed cable.
- Feed cable must not hinder the freedom of movement of the current collectors and the linear expansion of the conductor rail caused by temperature change.

Line feed UES 10 and UES 10 VP



Prerequisites:

✓ The mounting of the line feed takes place before the conductor rail is mounted in the compact holder.

✓ Do not mount on the rail section, only on the conductor rail.

Assembly steps:

1. Completely remove the insulating profile over a length of 70 mm.
2. Press on the metal clip in this area and mount the cables.
3. Slide over the connector cap.

NOTICE!

► 2 x 50 A can be fed in at maximum.

► A maximum of two cable connections through 6.3 x 0.8 mm flat plug connection (both sides) is possible.

► Maximum cable cross section 6 mm².

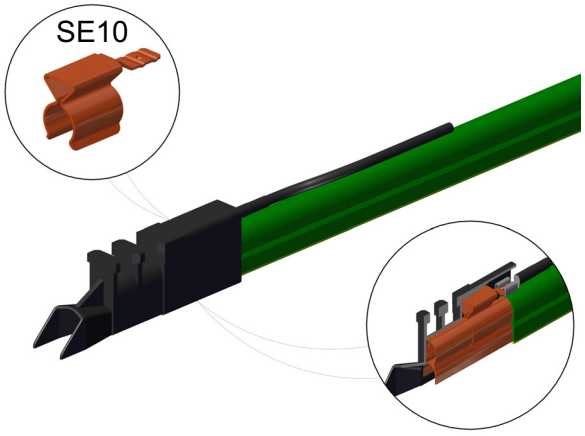
► Mounting the UES 10 VP is done similarly to the UES 10. Please observe that the yellow joint cap is used.

End feed terminal UEES 10

- Connecting cable pre-assembled on rail section at the factory.
- Assembly at system end.
- Connection of the feed rail to the other conductor rails by means of UEV 10 feed connectors.
- A maximum of one cable connection is possible.
- Maximum cable cross section 25 mm^2.

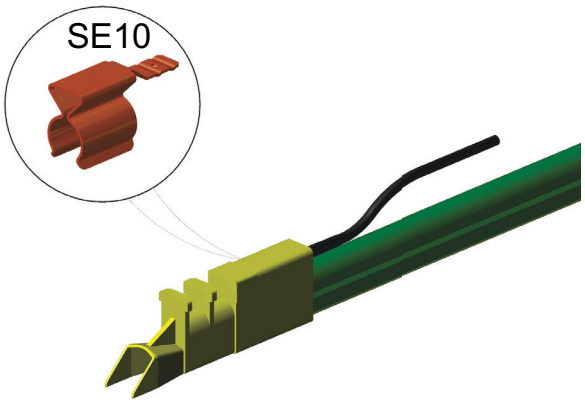


Feed at transfer guide USE10 and USE10 VP

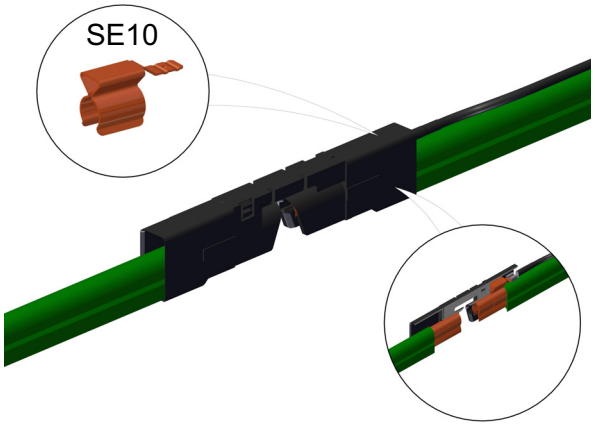


NOTICE!

- Assemble at the end of the conductor rail, e.g., at switches, lifting stations, removable rail sections and system ends.
- Assemble by clipping onto the copper profile.
- Maximum 1 x 40 A at SE 10 possible.
- A maximum of one cable connection is possible through 6.3 x 0.8 mm flat plug connection.
- Maximum cable cross section 6 mm^2.
- Preparation of conductor rails, see Chapter 7.4.3 Conductor system.
- For further information, see Chapter 7.4.10 Transfer guide.



Feed at isolating section LTE 10



NOTICE!

- For each SE 10 feed clamp, a max. of 40 A is possible.
- A maximum of one cable connection is possible through 6.3 x 0.8 mm flat plug connection.
- Maximum cable cross section 6 mm^2.
- For further information, see Chapter 7.4.11 Isolating section.

7.4.8 Connecting cable

Laying and connection

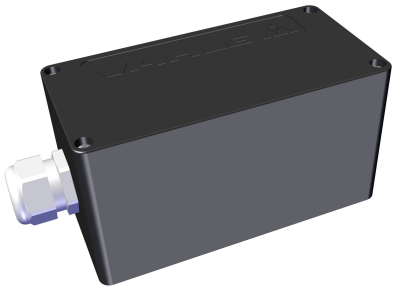
NOTICE!

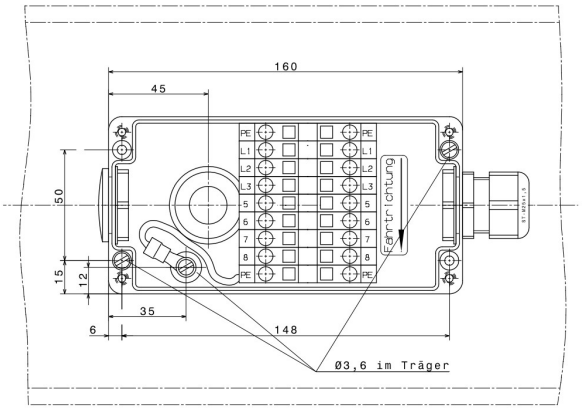
If there is a distance of more than 300 mm between the cable bushing in the EMS profile and the flat plug connection on the conductor rail, an additional 1-pin compact holder must be mounted centrally.

- ► Always use the compact holder that matches the EMS profile.
- ► Create the 1-pin compact holder on site using existing compact holders.
- ► After mounting the covers (e.g. connector caps, transfer guides, etc.), check the correct fit of the flat plug sleeve of the connecting cable on the connection lug.

7.4.9 Terminal box

Terminal boxes are used to feed power and data signals. Delivery is complete with fastening material and feed-through grommet.





Mounting of terminal box

1. Determine the position of the AKE terminal box in the system.

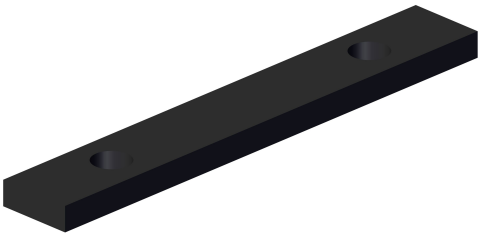
Drill holes

1. Determine the position of the following points and insert them as shown in the drawing.
   a) Attachment of the AKE
   b) Ground conductor connection (earthing connection)
   c) Cable bushing in EMS profile

NOTICE!

For marking the drill holes, the AKE housing can be used as a template

- ► 3x drill holes Ø 3.6 mm for attachment and earthing
- ► 1x drill hole Ø 25 mm for cable bushing



NOTICE!

If the terminal box is mounted on the outside of a curve, it must be underlaid with additional spacers (see illustration). Use 4 screws for attachment.

- 5x drill holes Ø 3.6 mm for attachment and earthing
- 1x drill hole Ø 25 mm for cable bushing



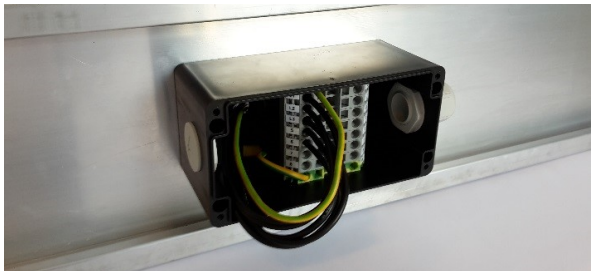
Feed-through grommet

1. Insert the feed-through grommet.



Terminal box and earthing cable

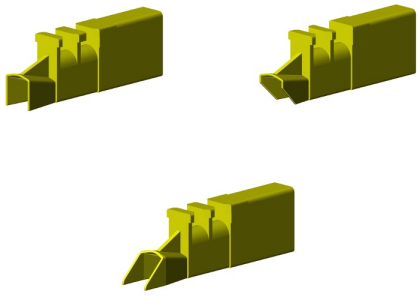
1. Fasten the terminal box with self-cutting screws.
2. Fasten the earthing line with self-cutting screws (see illustration).



NOTICE!

- Due to the expansion of the conductor rails, the connecting cable must be laid in the box with a loop of at least 100 mm, see illustration.

7.4.10 Transfer guide

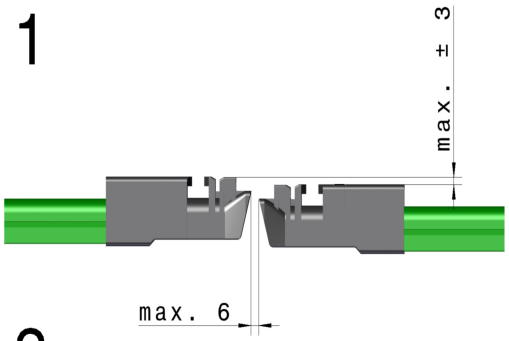


NOTICE!

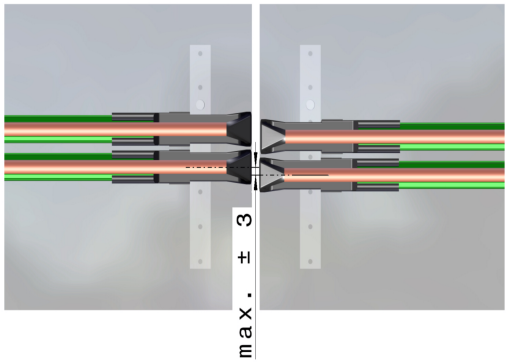
- Only the PE-VPN transfer guides (Transfer guide PE-VPN) may be used for PE-VPN.
- It is not permitted to use other transfer guides.

US 10 transfer guide and fastening for the BFU 10 transfer guide

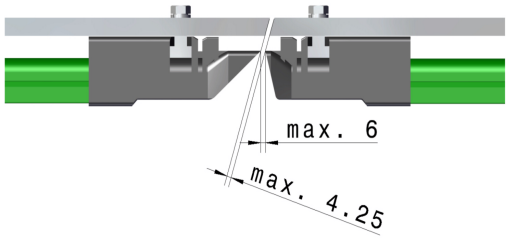
1



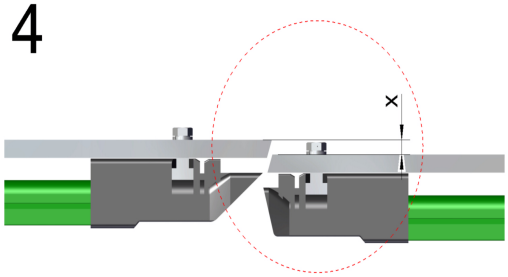
2



3

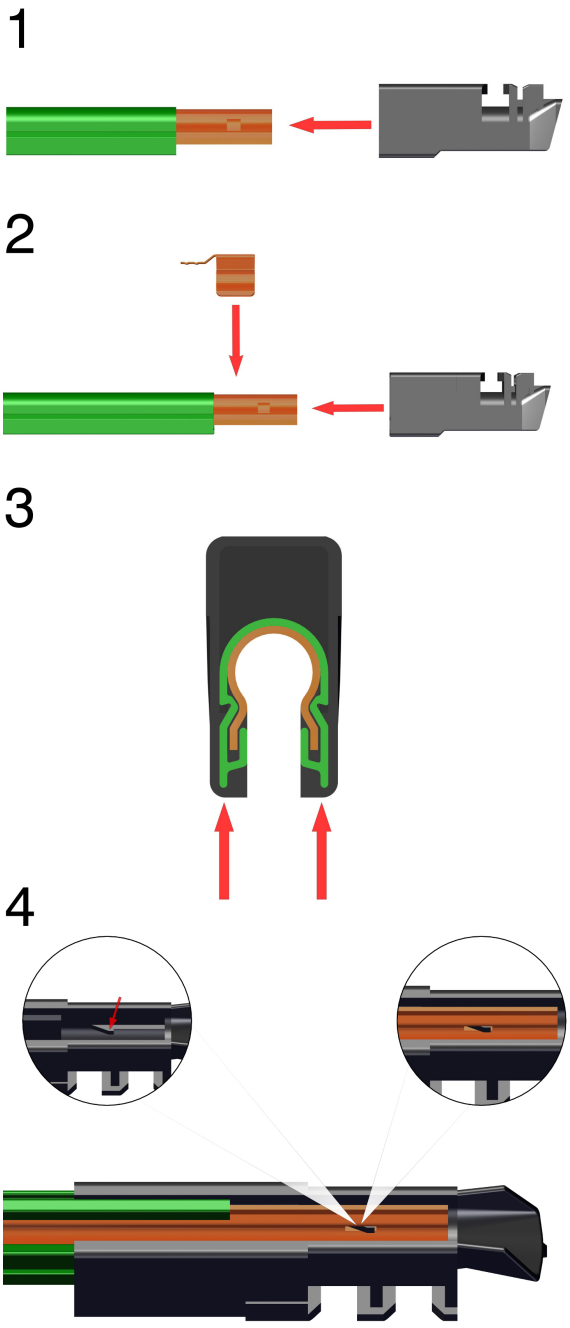


4



NOTICE!

- Transfer guides are used to safely pass over the carbon brushes at mechanical track separations such as switches, lifting stations, removable rail sections and system ends.
- When mounting transfer guides, please note that opposite rail ends must be exactly aligned in order to avoid disturbances when passing over the current collectors.
- Transfer guides must not protrude over the reference edge.
- Figure 1+2: Maximum height and side offset of opposite rail ends
  ± 3 mm to one another.
- Figure 1+3: Maximum air gap between the transfer guides is 6 mm.
- Figure 4: Make sure that the head of the fastening screw does not protrude into the cut of the track profile in the case of a diagonal cut.
- Transfer guides are single-use parts and cannot be used again after dismantling.



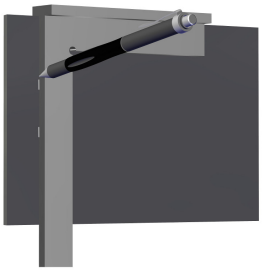
Transfer guide assembly

Prerequisites:

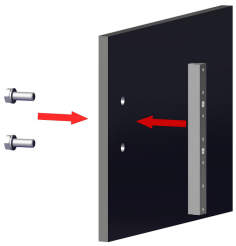
- ✓ EMS rail sections (switches/lifting station) must be aligned before conductor rail assembly.
- ✓ The section is created as in Chapter Shorter lengths, connecting pieces and moving system components page 93 .
- ✓ No multiple perforation.

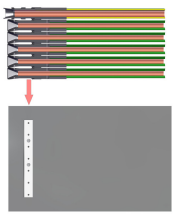
Assembly steps:

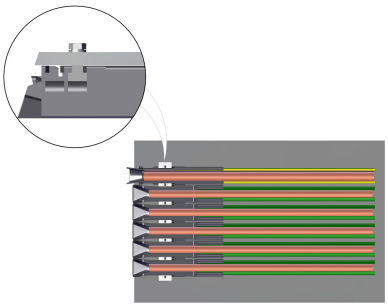
1. With feed terminal: Clamp the feed clamp to the conductor rail profile (Figure 2). Do not cover the perforation with the feed clamp.
2. Slide the transfer guide along the conductor rail until the cam latches in securely (Figure 4). The transfer guide must cover both legs of the conductor rail (Figure 3).
3. Expand the transfer guide as in Chapter Expanding page 103 .

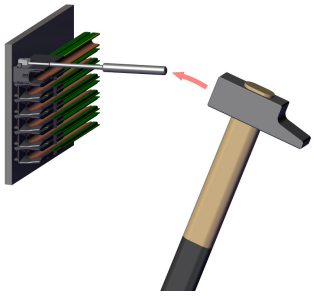












Assembly of fastening for transfer guide

Prerequisites
BFU types 10, 10A and 10B, fastening from the back:

✓ Mark and drill Ø 5.5 mm holes for BFU on mounting surface. For dimensions, see following pages.

Prerequisites
BFU types 10V, attaching from the front:

✓ Mark and drill M5 thread for BFU on mounting surface. For dimensions, see following pages.

Required tools:

⚒ Punch-in drift ED 10

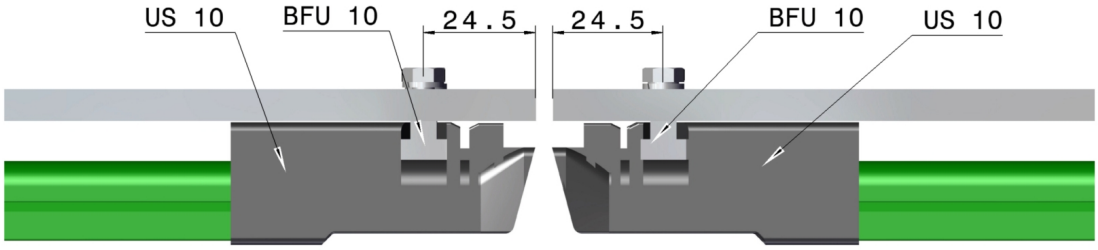
⚒ Hammer

Assembly steps:

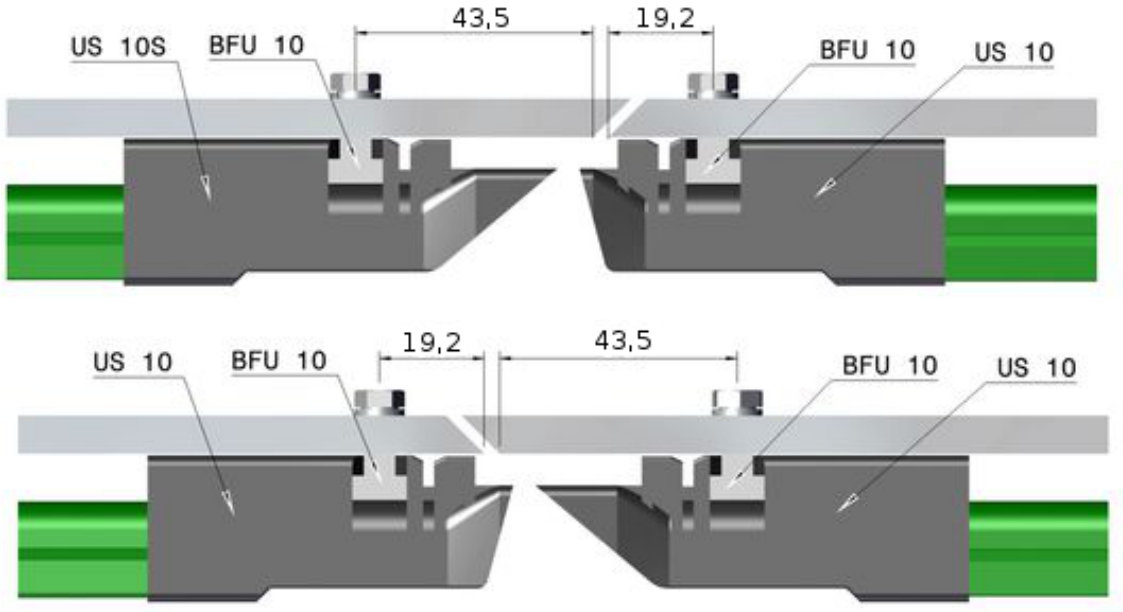
1. Slide the transfer guide onto the BFU.
2. Screw the BFU onto the fastening surface.
3. Pound in spring pins with the punch-in drift to fixate the transfer guides in place.

Hole dimensions and guide values. Always check during assembly. The EMS profile edge on the conductor rail side is the reference edge.

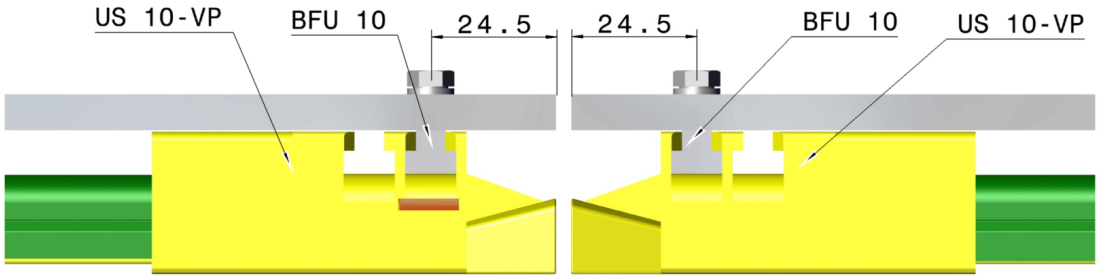
PH- and PE-Standard, straight, 10 mm



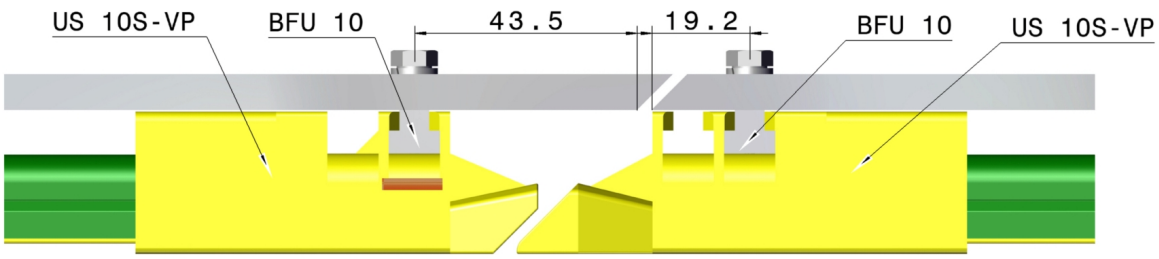
PH- and PE-Standard, 45° oblique, 10 mm

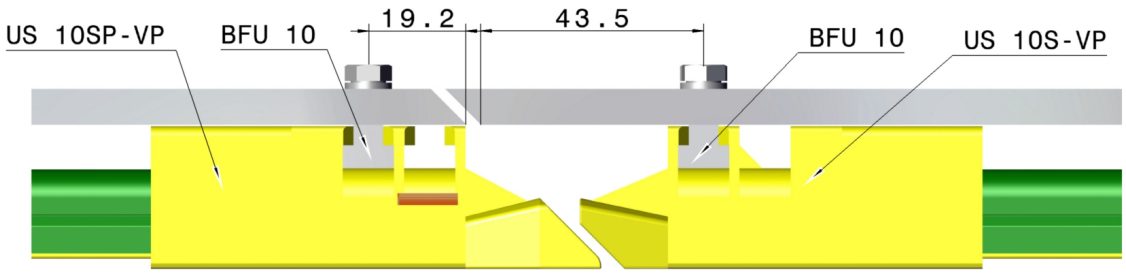


PE-VP, straight, 10 mm

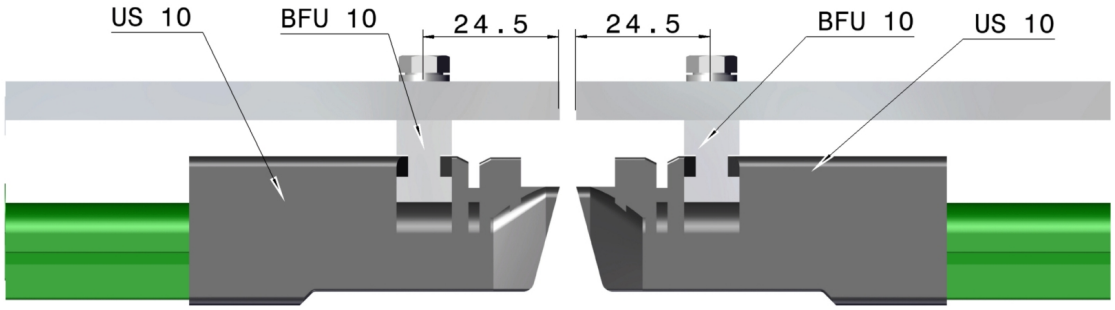


PE-VP, 45° oblique, 10 mm

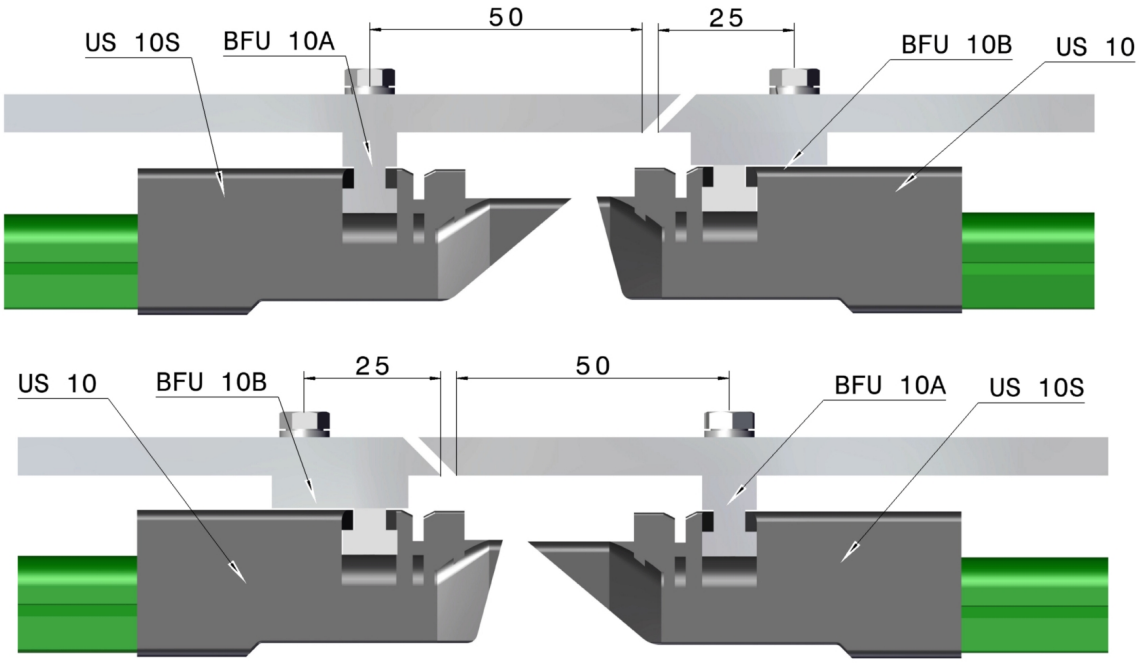




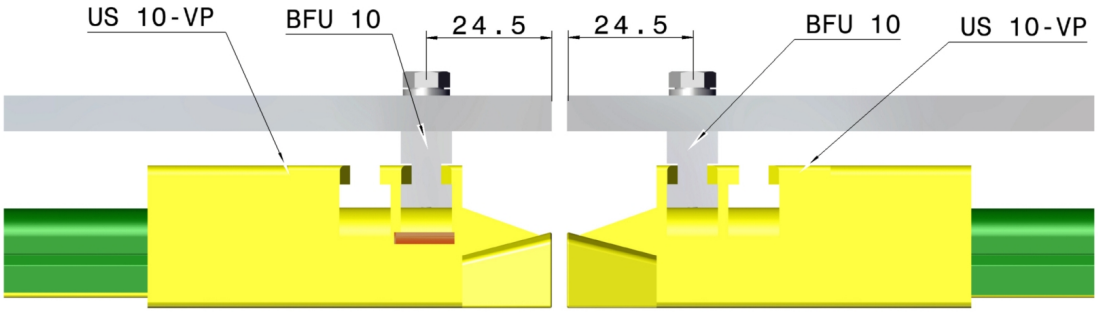
PH- and PE-Standard, straight, 16.5 mm



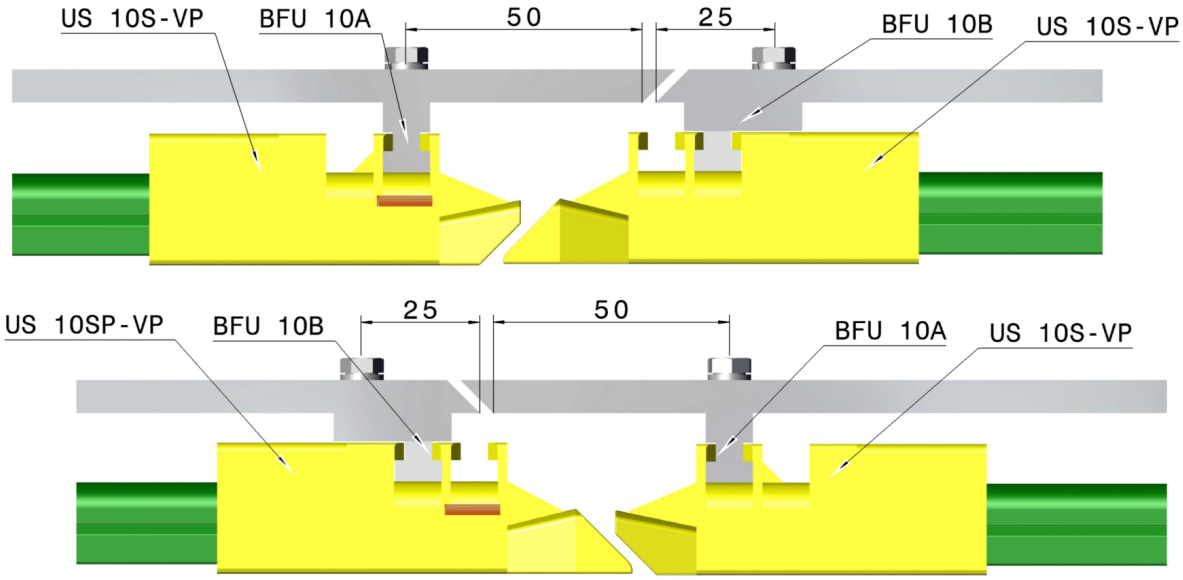
PH- and PE-Standard, 45° oblique, 16.5 mm



PE-VP, straight, 16.5 mm



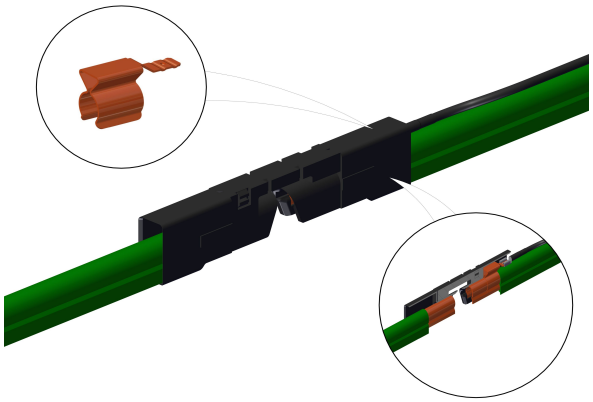
PE-VP, 45° oblique, 16.5 mm



7.4.11 Isolating section

NOTICE!

- The isolating sections serve the electric isolation of the conductor rail, e.g., at switches, lifting stations, removable rail sections and system ends.
- When installing the isolating section with support on the rail bar, observe the overall height.
- For expanding isolating section, see Chapter Expanding.
- If the isolating section is still open after assembly, at least one additional compact holder is required. Arrange the compact holder at a distance of at least 50 mm, maximum 200 mm to the right or left of the isolating section.
- If the isolating section has no support, arrange the compact holder at a distance of at least 50 mm, maximum 150 mm to the right or left of the isolating section.
- In the case of isolating sections, the rail section must be mounted between two isolating sections with at least two compact holders.
- Isolating sections are single-use parts and cannot be used again after dismantling.



Assembly PH- and PE-standard

Prerequisites:

- ✓ The end machining has been performed as per Chapter End finishing .
- ✓ If required, the SE 10 is clipped on.

Assembly steps:

1. Isolating section halves are assembled like transfer guides. See 7.4.10 Transfer guide
2. Connect the halves after mounting on the conductor rails by pressing them together at the sides (press stud principle).

Combination possibilities	
	LT/LT- U 10 without feed
	LT/LTE- U 10 with feed, on one side
	LTE/LTE- U 10 with feed, on two sides

Assembly PE-VP

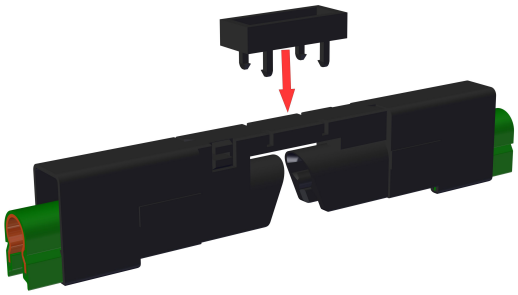
Prerequisites:

- ✓ The end machining has been performed as per Chapter End finishing .

Assembly steps:

1. Electrical isolators in the PE-VP rail are made by means of a transfer guide piece and corresponding BFU.

Spacer clamp, height



Assembly steps:

1. At a height of > 10.5mm, attach an additional spacer clamp.

7.4.12 Brush wear indicator



Creating a cut-out

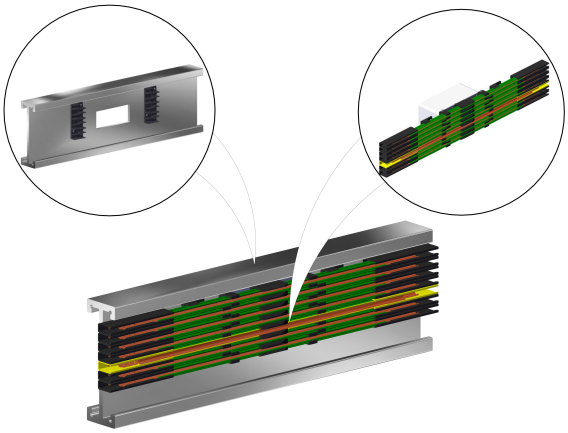
Assembly steps:

1. Determine the position of the brush wear indicator 10 in the system.
2. Determine the position of the cut-out for the proximity switch in the EMS profile (see illustration).
3. Create the cut-out of 50x70 mm.

Assembling KVT 10

Assembly steps:

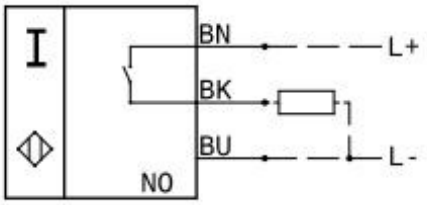
1. Assemble the KVT 10 like the U10. Observe the position of the PE.
2. Install a compact holder on both sides, at a distance of approx. 150 mm.



Assembling terminal box

Assembly steps:

1. Make two drill holes with Ø 3.6 mm in the EMS profile.
2. Fasten the terminal box with self-cutting screws.

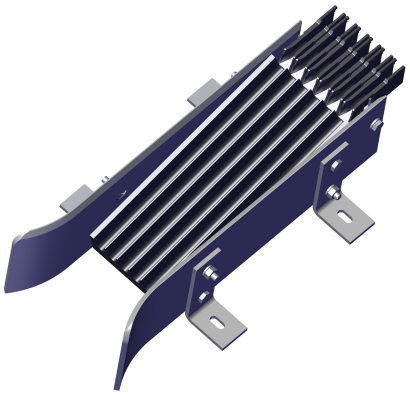


Assembly completion

Assembly steps:

1. Connect the micro switch to the signal source (see circuit diagram).
2. After completion of the work, run a worn carbon brush through the KVT 10 to test whether it is functioning properly.

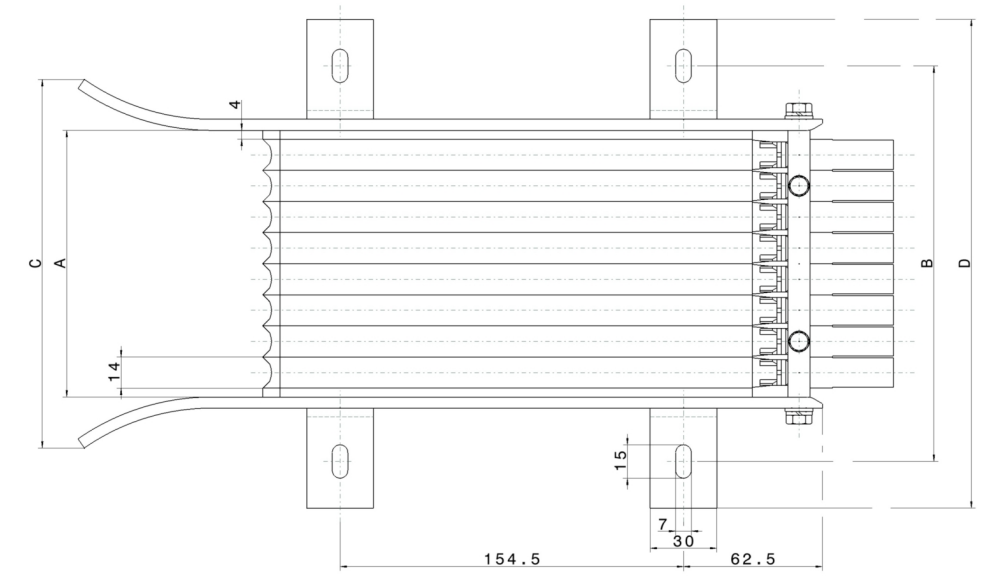
7.4.13 Transfer funnel

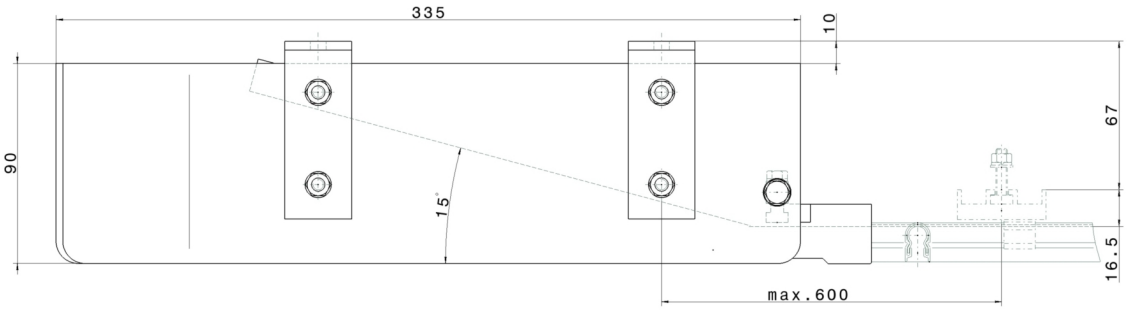


Assembly steps:

1. Attach the transfer funnel with M6 screws.
2. Align the height of the transfer funnel in the oblong holes of the attachment bracket.
3. Screw on the transfer funnel.
4. Mount the conductor rail correspondingly 7.4.3 Conductor system.
5. Carry out the fine adjustment of the BFU to avoid interfering edges (torque of the screws for BFU 9.5 Nm).

Type	Number of poles	A [mm]	B [mm]	C [mm]$^{+0,5}$	D [mm]	Weight [kg]	Ident-No.
MU-EFT10-2-KUFU	2	36	94	82	136	1,145	167 675
MU-EFT10-3-KUFU	3	50	108	96	150	1,230	167 676
MU-EFT10-4-KUFU	4	64	122	110	164	1,315	167 677
MU-EFT10-5-KUFU	5	78	136	124	178	1,400	167 678
MU-EFT10-6-KUFU	6	92	150	138	192	1,485	167 679
MU-EFT10-7-KUFU	7	106	164	152	206	1,570	167 680
MU-EFT10-8-KUFU	8	120	178	166	220	1,655	167 681
MU-EFT10-9-KUFU	9	134	192	180	234	1,740	167 682
MU-EFT10-10-KUFU	10	148	206	198	248	1,825	167 683
MU-EFT10-4L-VP-4-KS-TUR63	4	60	109	191,9	136	2,141	144 752
MU-EFT10-4R-VP-4-KSTUR63	4	60	109	191,9	136	2,141	144 753





7.4.14 Current collector

General



NOTICE!

- ▶ Select current collectors according to the system equipment and functionality.
- ▶ Connecting cables, highly-flexible.
- ▶ The laying of connecting cables must not impede full mobility.
- ▶ Loops must not touch the conductor rail.

Fastening level and alignment

NOTICE!

- ► Fastening level for current collectors must be aligned parallel to the EMS travel profile
- ► The Fastening level must be designed in such a way that the current collectors can be positioned at the pivot point of the boogie.
- ► Installation dimension is the horizontal distance between contact surface and fastening level on the vehicle.
- ► Align the current collector vertically centered to the conductor rail.

Standard applications

Current collector	Installation dimension Horizontal [mm]	Installation tolerance horizontal [mm]	Operating tolerance Horizontal [mm]	Installation tolerance vertical [mm]	Operating tolerance Vertical [mm]
KDS2/40	98	± 2	± 15	0 / + 1	± 15
KUFR2/40	98	± 2	± 15	0 / + 1	± 15
KUFU25	88	± 2	+ 15 / -10	0 / + 1	± 15
KESR32	88	± 2	± 15	0 / + 1	± 15
KSTUR63	124	± 2	± 30	0 / + 1	± 30

Funnel operation

Current collector	Retraction tolerance horizontal [mm]	Retraction tolerance vertical [mm]
KUFU25	± 10	± 10
KESR32	± 10	± 10
KSTUR63	± 30	± 30

7.5 Condition after the installation



DANGER!

Electrical hazard!

► After mounting the conductor rail, ensure proper grounding.



WARNING!

Incorrect installation!

The responsible assembly manager must check the following parts or situations after assembly:

► Damage
► Air gaps between all live parts
► Open spaces & interfering edges
► Random sample checking of tightening torques
► Line feed UEV/UES
► Current collector units
► Assembly of all required components

7.6 Operation/decommissioning

7.6.1 Operation

Operation is defined as trouble-free, normal operation. Check intervals as per the maintenance schedule, see Chapter 9 .

If defects occur, stop using the conductor rail immediately to prevent damage.

7.6.2 Decommissioning

Switch off the system and secure it against being switched back on.

8 MALFUNCTIONS

8.1 Safety information about malfunctions



WARNING!

Risk of injury in case of improper troubleshooting!

Improper troubleshooting may cause serious injuries or property damage.

- ► Ensure sufficient installation space before beginning any work.
- ► Switch off power supply, verify that the system is free of voltage, and secure against switching back on.

8.2 Procedure in the event of malfunction



DANGER!

Electrical hazard

- ► Before beginning troubleshooting, ensure that the system is free of voltage and remains so for the duration of the work. Observe the safety instructions!



WARNING!

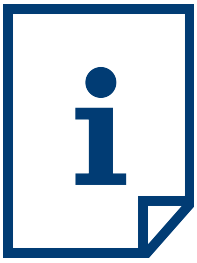
Improper troubleshooting

The inspection and maintenance tasks listed in this technical documentation must be performed regularly and documented (location, spare part, task performed, date, name of inspector).

- ► Troubleshooting on the system is only to be undertaken by trained, qualified persons assigned to the task.

General principle:

- In the event of malfunctions that pose an immediate hazard to persons or property, immediately activate the safety devices.
- Determine the cause of the fault.
- Notify the person in charge at the place of operation.



NOTICE!

The inspection and maintenance tasks listed in the technical documentation must be performed and documented regularly:

(location, spare part, task performed, date, name of inspector).

- ► Only persons with the required training, qualification and authorization may perform troubleshooting work on the system.

9 MAINTENANCE

The main aim of this section is to maintain the system's target condition and operational capability. By avoiding malfunctions and unplanned downtimes, regular maintenance can increase the utilization rate. Efficient planning of maintenance work and material is a prerequisite. In order to carry out safe maintenance by appropriately trained personnel, the following instructions must be observed:

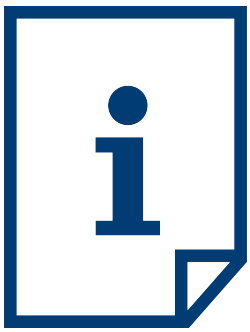


DANGER!

Danger of death due to electrical current!

Contact with live parts can result in life-threating injuries.

► Make sure that the relevant components are not live or under voltage, and that there is no unauthorized approximation.



NOTICE!

The inspection and maintenance work listed in the technical documentation must be performed and documented regularly

(Place, replacement part, performed work, date, name of the inspector)

► System fault elimination may only be carried out by trained, qualified and authorized persons.

Date	Name	Maintenance/servicing work	Instructions given by	Signature

9.1 Safety information about repairs



DANGER!

Before beginning any work, ensure that the system is free of voltage and remains so for the duration of the work. Observe the safety instructions in the section 3 Safety instructions!



WARNING!

Risk of injury due to improperly performed maintenance work!

Improper maintenance can result in serious personal injury or property damage.

- ► Ensure that there is sufficient clearance before starting work.
- ► Pay attention to order and cleanliness in the workplace!
- ► Follow the procedure according to3 Safety instructions before starting work.



WARNING!

Danger due to insufficiently qualified persons!

Insufficiently qualified persons cannot assess the risks involved in operating the system and expose themselves and others to the risk of serious or fatal injuries.

- ► Have all work performed only by persons qualified for the task.
- ► Inadequately qualified persons should be kept away from the work area.



CAUTION!

Tripping hazard due to protruding parts

There is a tripping hazard during the work.

- ► Watch out for steps and holes in the floor when walking inside the work area and the danger zone. There must be no loose objects in the work area.



CAUTION!

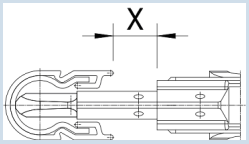
Health hazard due to carbon brush dust

Personal protective equipment must be worn when working on the system where carbon brush dust can escape into the ambient air:

- ► Respirator masks compliant with EN 149, protection level FFP3
- ► Use safety goggles with side protection.
- ► Gloves: Nitrile rubber, material thickness min. 0.11 mm
- ► Use skin care products with high fat content.
- ► No food, beverages or stimulants may be consumed in the work areas. Prior to breaks and when the work is complete, the skin has to be cleaned with soap and water. Work clothing and streetwear have to be stored separately.
- ► Put small quantities into collecting containers for toxic anorganic residues, as well as heavy-metal salts and their solutions.

9.2 Current collector

Maintenance schedule

Interval	Service/monitoring	Personnel
Daily	• Check safety equipment and operating behavior	Operator
Monthly	Mechanical checking: • Check mobility of joints, bearings, and hinge pins. Inspection for mechanical damage Electrical check: • Check for wear of carbon brush, firm seat of all contact screws and cable attachments. • Clean oxidized contact screws and cable ends and restore the protection of these locations. • Carbon brushes should be replaced in good time so that the mounts of the carbon brushes do not grind on the contact surface, or the outer edges touch the connecting caps. • Dimension X in the sketch shown below must not exceed 1.1 mm.  Check contact pressure • Load the current collector with a tension-compression spring balance depending on the installation situation. Force application point or area. For values of contact pressures, see Chapter 5.2.12 Compact current collector and following. Tightening torque • The tightening torque of the contact screw is 1.4 Nm.	Qualified persons Electrically qualified person

In the case of damage occurring to the current collector units, investigate associated components such as the conductor rails for damage.

After three carbon lives or carbon brush changes at the latest, the entire current collector has to be removed.



⚠ CAUTION!

For maintenance and cleaning work where carbon brush dust may get into the ambient air, respirator masks must be used:

► Wear respirator mask acc. to EN 149, min. protection level FFP3.
Vahle ID no.: 10017880

► Never blow out the mask with compressed air.

Current collector KSTUR63





NOTICE!

► After the second carbon brush change (3 carbon lives), the entire current collector must be replaced.

Replacing the carbon brush

1. Disconnect the cable at the carbon brush socket.
2. Pull the carbon brush socket away from the current collector arm.
3. Reconnect the carbon brush socket and the cable. Tightening torque of the cable fastening screw 1.2 Nm.

Current collector KDS2/40

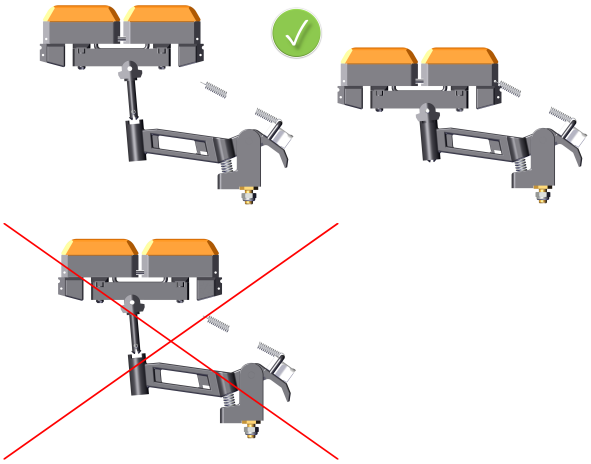


Replacing the carbon brush DSW 2/40

Work steps:

1. Pull out the connecting cable.
2. Pull the carbon brush out of the current collector arm.
3. Replace the carbon brush/spring/cam and observe the alignment of the carbon brush.
4. Install the connecting cable.

Current collector KUFR2/40

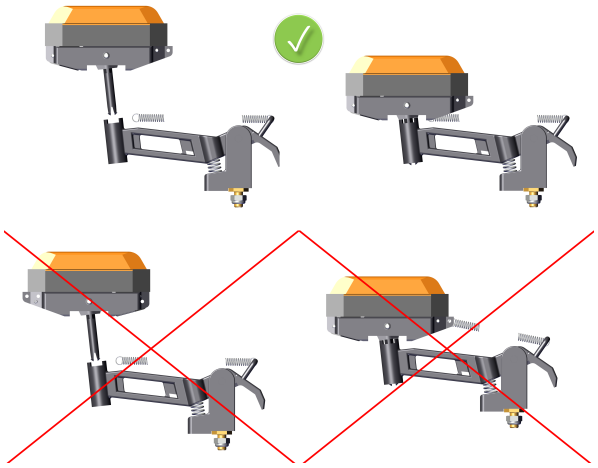


Replacing the carbon brush KMKF 2/40

Work steps:

1. Pull out the connecting cable.
2. Unhook the tension spring from the carbon brush.
3. Pull the carbon brush out of the current collector arm.
4. Replace the carbon brush and observe the alignment of the carbon brush.
5. Assemble the connecting cable and tension spring.

Current collector KUFU25

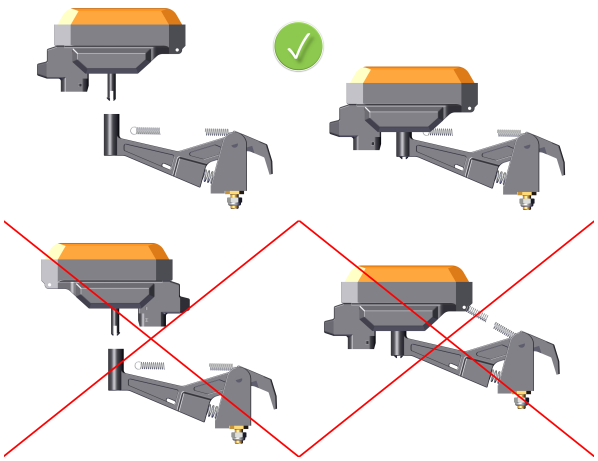


Replacing the carbon brush KMKU 25

Work steps:

1. Pull out the connecting cable.
2. Unhook the tension spring from the carbon brush.
3. Pull the carbon brush out of the current collector arm.
4. Replace the carbon brush and observe the alignment of the carbon brush.
5. Assemble the connecting cable and tension spring.

Current Collector KESR32-63



Replacing the carbon brush MK55 / MK63

Work steps:

1. Disassemble the connecting cable.
2. Unhook the tension spring from the carbon brush.
3. Pull the carbon brush out of the current collector arm.
4. Replace the carbon brush and observe the alignment of the carbon brush.
5. Assemble the connecting cable and tension spring.

9.3 Conductor system

NOTICE!

Wear of the conductor rail thickness

Occasionally, the conductor rail may show increased wear due to irregular maintenance, highly frequented installations, difficult environmental conditions or inaccurate installation.

- ► Installations that may be affected by increased wear must be inspected regularly. For example, in the case of increased deposition of abrasive particles, unevenness in the running surface, in the course of the track or unevenness of suspension points.
- ► The minimum contact rail thickness must not be less than:
  0.3 mm with a contact pressure per current collector <= 7 N
  0.4 mm for a contact pressure per current collector > 7 N <= 12 N
  0.5 mm for a contact pressure per current collector > 12 N <= 35 N
  0.8 mm with a contact pressure per current collector > 35 N
- ► The measurement of the current bar strength can be done by Vahle specialists. For this purpose, please contact Vahle Customer Service (2.5 Customer service).

Cleaning intervals

No general statement is possible since the intervals depend very strongly on the local circumstances or the conditions and frequency of use. We generally recommend thorough cleaning once a year.

If contact problems occur, the conductor rail has to be cleaned.

Individual assembly parts can get covered with carbon dust after longer periods of use and conduct voltage!

Automatic preventive cleaning with our RHG conductor cleaning device is only possible for loose dust deposits.

It is recommended to allow the device to run at intervals after commissioning of the system.

Maintenance schedule

Interval	Service/monitoring	Personnel
daily	• Check safety equipment and operating behavior.	Operator
monthly	• Visual inspection of general condition. Also check for expansion of the conductor rails and for traces of fire. In case of damage, burn marks and/or defects, replace the corresponding parts. • Check mechanical and electrical connections, especially at the feed terminals; re-tighten if necessary (observe the specified torques). • Remove carbon dust deposited especially at isolating sections and transfer guide (hand brush). • Remove small burns or discolorations on the contact surface by scouring with an abrasive pad. Do not use a powered brush. If removing the burns is not possible, then replace the relevant section of the conductor system.	Technician/electrically qualified person
quarterly	• Vacuum off any dust deposits (e.g. from graphite contacts) and other particles.	Qualified persons

In case of damage to the conductor system, the associated components such as current collectors must be inspected for damage.

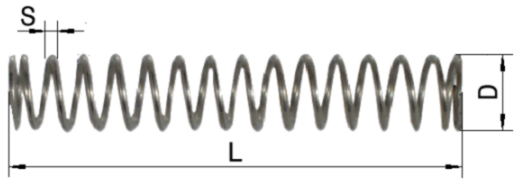
9.4 Spare parts

Carbon brushes

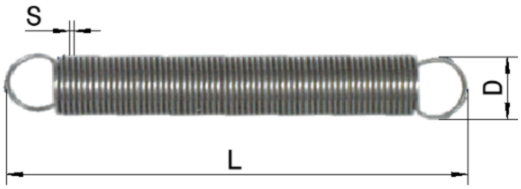
See Current collector KDS2/40.

Springs

Pressure spring DF



Tension spring ZF



Cams



Degree position spring GF



Type	for current collector	S [mm]	D [mm]	L [mm]	Ident-No.
DF3	KDS2/40	0,55	9,55	24,00	152 011
RF3	KUFU25, KUFR2/40	0,40	4,40	31,00	153 849
GF1	KDS2/40, KUFR2/40	-	2,00	21,50	153 850
Cams	KDS2/40	-	-	-	1011917

10 DISASSEMBLY AND DISPOSAL

10.1 Safety Instructions for removal/replacement

During disassembly, always observe the information in section 3.3.1 .



WARNING!

Risk of death from improper replacement or removal!

Errors during the removal or replacement of components may cause life-threatening situations or significant property damage

► Observe the safety instructions before beginning any removal work.



CAUTION!

All accessories must be checked for wear.

Only defect-free parts may be reused.

► Use only genuine VAHLE spare parts.

10.2 Preparation for disassembly

- Switch off the system and secure it against switching back on.
- Physically disconnect the entire power supply from the system.
- Loosen and remove all screws.



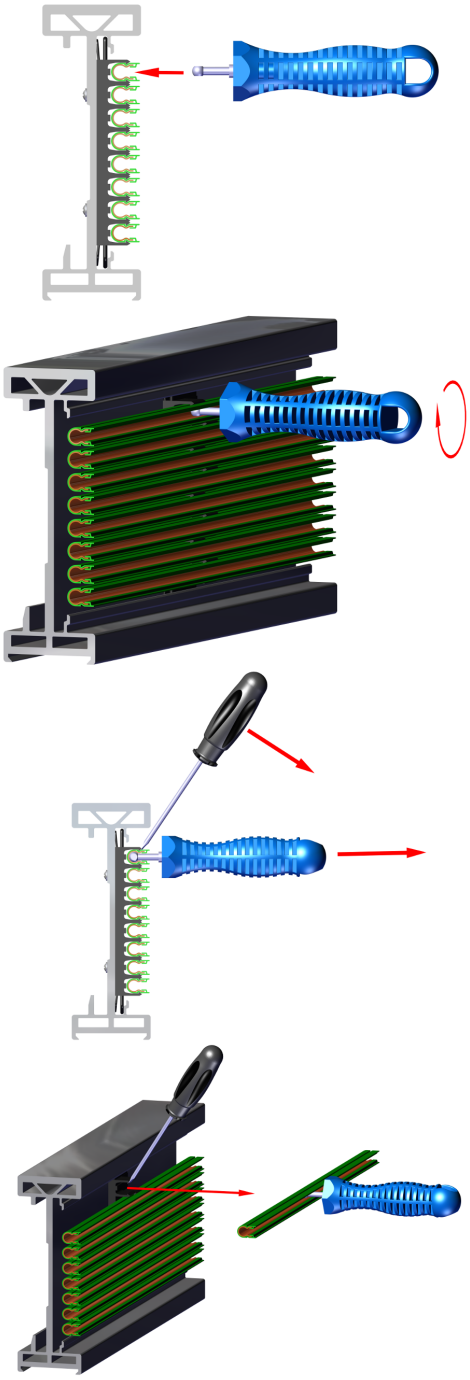
DANGER!

Danger of death due to electrical current!

Contact with live parts can result in life-threating injuries.

► Make sure that the relevant components are not live or under voltage, and that there is no unauthorized approximation.

10.3 Disassembly



Installation of component

Required tools:

- ⚒ Dismantling tool MW-DMW1L0
- ⚒ Slot-head screwdriver

Assembly steps:

1. Place the dismantling tool on the conductor rail and rotate it by 90°.
2. Press the sides of the compact holder apart with the slotted screwdriver.
3. Pull the conductor rail with dismantling tool.

10.4 Disposal

When the system reaches the end of its useful life, the system must be dismantled and disposed of in an environmentally sound manner in accordance with the valid local regulations and laws.



NOTICE!

Electronic scrap is hazardous waste. For its disposal, please observe the locally applicable regulations and relevant laws in the respective country.

11 PROTECTIVE MEASURES

11.1 EU conformity declaration

VAHLE

EU - Declaration of conformity

Paul Vahle GmbH & Co. KG, Westicker Str. 52, D-59174 Kamen (Germany)

We herewith declare that the products specified hereafter conform to the relevant EU regulations. This declaration will be void when amendments not approved by us will be made to the products.

Product Group	**42**
Product	**Unipole Insulated Conductor System**
Type	**U10** **incl. accessories**
Relevant EU Regulation	**2014 / 35 / EU** **(Low Voltage Directive)**
Placement of CE-marking	**96**

The following harmonized standards respectively other technical norms and Specifications have been applied:

EN 60204-1:	**2006/AC:2010**
EN 60204-32:	**2008**
EN 60529:	**1991 / AC:1993**

This declaration is not an assurance of properties.

The safety hints mentioned in the product documentation must be followed.

Kamen, 02.03.2018

i.V. Michael Heitmann

Michael Heitmann
Manager Testing & Services

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11.2 UKCA

VAHLE

UKCA - Declaration of conformity

Paul Vahle GmbH & Co. KG, Westicker Str. 52, D-59174 Kamen (Germany)

We herewith declare that the products specified hereafter conform to the relevant UK regulations. This declaration will be void when amendments not approved by us.

Product Group	**42**
Product	**Unipole Insulated Conductor System**
Type	**U10** **incl. accessories**
Relevant UK Regulation	**Electrical Equipment (Safety) Regulation 2016**
First CE / UKCA - marking	**1996 / 2022**

The following harmonized standards respectively other technical norms and Specifications have been applied:

EN 60204-1:	**2018**
EN 60204-32:	**2008**

This declaration is not an assurance of properties.

The safety hints mentioned in the product documentation must be followed.

Kamen, 21.10.2022

i.V. Michael Heitmann

Michael Heitmann
Director Quality Management

Paul Vahle GmbH & Co. KG · Postfach 1720 · D-59172 Kamen · Tel. 02307/704-0 · Fax 02307/704-444 · eMail: info@vahle.de

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Technical Documentation