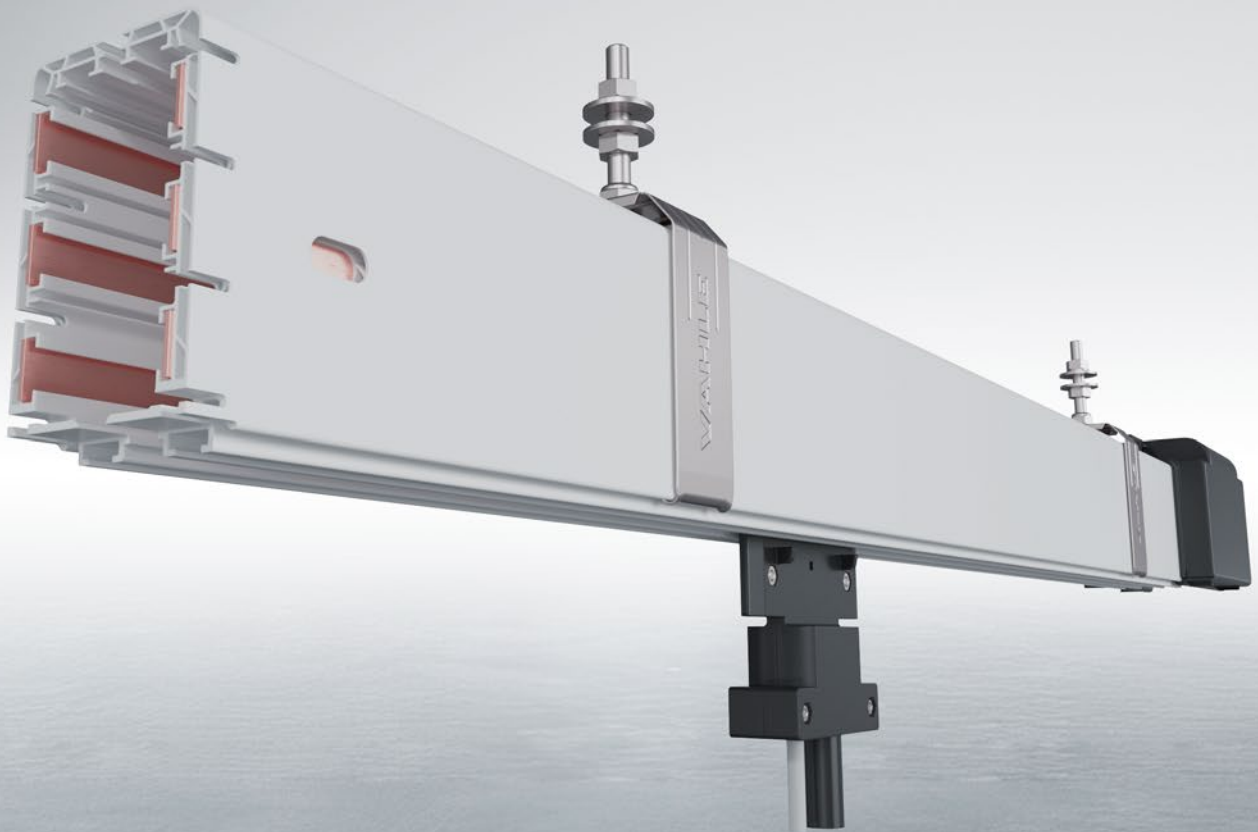


# MKH

## ENCLOSED CONDUCTOR SYSTEM



# ENCLOSED CONDUCTOR SYSTEM MKH

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## Description of the conductor system

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

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

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

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

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

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

Cross-sections other than those shown on pages 5 and 6 are possible. If the cross-section of the N-conductor is smaller than the cross-section

of the outer conductor, it is necessary to protect it against overcurrent and short circuit, design according to IEC60364-4-43 (HD 60364-4-43).

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

## Applications

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

## Approvals

UL-approved

## Housing

Color grey, plastic housing for 6 to 10 conductors.

Standard section 4 m. Other sections are available. The ground conductor is identified by international color code.

Phase reversing prevented by design of the collector and housing.

Higher number of conductors possible by combination of several conductor systems.

## Couplings

Through plastic joint caps.

# TECHNICAL DATA

## Feed sets

Through line feeds or end feeds.

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

## Continuity of the ground conductor

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

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

## End sections

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

## Hangers

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

The conductor rails are located in sliding and fixpoint hangers.

Max. support distance with the following ambient temperatures:

- Indoor systems and covered outdoor systems:  $\leq 35^{\circ}\text{C} = 2.00\text{ m}$
- Indoor and outdoor systems  
with and without heating:  $> 35^{\circ}\text{C} = 1.33\text{ m}$
- Cold and frozen storage warehouses:  $\leq 0^{\circ}\text{C} = 1.33\text{ m}$

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

## Expansion during temperature fluctuation

Housing-expansion section without electrical isolation for MKHD.

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

## Anti-condensation sections

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

## Contact sections, turntables, switches

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

## Sectionalizing

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

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

## Collectors

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

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

## With following system requirements double collectors have to be used

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

## PLEASE NOTE

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

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

## TECHNICAL DATA

### Conductor system values: electrical data

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

### Conductor system values: mechanical data

| Flexible strength          | Tensile strength           | Ambient temperature | Flammability                                        | Resistance to chemicals (at 45 °C)                                                                                                  |
|----------------------------|----------------------------|---------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 75 N/mm <sup>2</sup> ±10 % | 40 N/mm <sup>2</sup> ±10 % | –30 °C up to +60 °C | flame retardant,<br>self extinguishing,<br>UL 94 V0 | Gasoline, mineral oil, grease, acid sulfur<br>up to 50 %, caustic soda up to 25 % and<br>hydrochloric acid up to 50 %, concentrated |

### Correction factor $f_T$

| Ambient temperature °C                        | 35 °C | 40 °C | 45 °C | 50 °C | 55 °C | 60 °C |
|-----------------------------------------------|-------|-------|-------|-------|-------|-------|
| Correction factor $f_T$<br>Standard shrouding | 1     | 0.95  | 0.89  | 0.84  | 0.77  | 0.71  |

### Voltage drop for the conductor

|                         |                                                 |                                                   |
|-------------------------|-------------------------------------------------|---------------------------------------------------|
| For three-phase current | $\Delta U = \sqrt{3} \cdot I \cdot I_A \cdot Z$ | $Z$ = impedance [ $\Omega/\text{km}$ ]            |
| For alternating current | $\Delta U = 2 \cdot I \cdot I_A \cdot Z$        | $R$ = resistance [ $\Omega/\text{km}$ ]           |
| For direct current      | $\Delta U = 2 \cdot I \cdot I_A \cdot R$        | $I$ = feed length [km]                            |
|                         |                                                 | $I_A$ = inrush current of installation in amperes |

### Permissible continuous current of the conductor

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

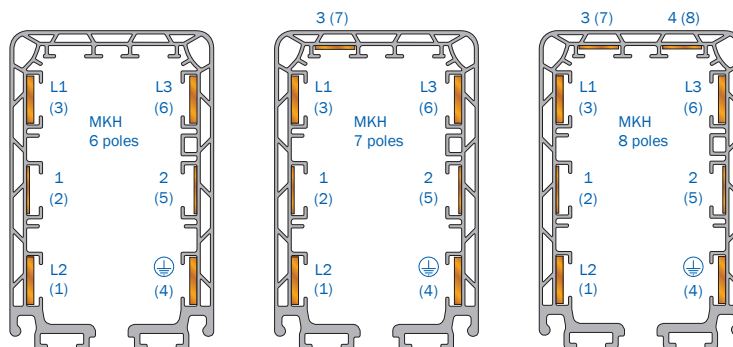
$I_{Dzul,UT}$  = permissible continuous current at ambient temperature  
 $I_{zul}$  = permissible continuous current at 35 °C (catalogue value)[A]  
 $f_T$  = temperature correction factor

# TECHNICAL DATA

## MKHD/MKHF/MKHS

### Cross sections<sup>(1)</sup>

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



| Type <sup>(2)</sup><br>(HS with PE /<br>SS without PE) | No.<br>of<br>pol-<br>es | Copper cross section mm <sup>2</sup> |    |              |      | Ampere rating<br>with 35 °C in A,<br>L1, L2, L3 <sup>(5)</sup> |            |             | Nom-<br>inal<br>volt-<br>age<br>V <sup>(4)</sup> | Impedance at<br>50 Hz 20 °C<br>Ω/1000 m |       | Resistance<br>at 20 °C<br>Ω/1000 m |       | Leak-<br>age dis-<br>tance<br>mm |
|--------------------------------------------------------|-------------------------|--------------------------------------|----|--------------|------|----------------------------------------------------------------|------------|-------------|--------------------------------------------------|-----------------------------------------|-------|------------------------------------|-------|----------------------------------|
|                                                        |                         | Phase<br>L1,<br>L2, L3               |    | Control line |      | 60 %<br>ED                                                     | 80 %<br>ED | 100 %<br>ED |                                                  | Phase<br>L1,<br>L2, L3                  |       | Phase<br>L1,<br>L2, L3             |       |                                  |
| MKH ... 6/63-HSC                                       | 6                       | 3x10                                 | 10 | 2x10         |      | 81                                                             | 70         | <b>63</b>   | 690                                              | 1.731                                   | 1.731 | 1.717                              | 1.717 | 30                               |
| MKH ... 6/63-SSD                                       | 6                       |                                      |    | 6x10         |      | 81                                                             | 70         | <b>63</b>   | 690                                              | 1.731                                   |       | 1.717                              |       | 30                               |
| MKH ... 6/80-HSC                                       | 6                       | 3x17                                 | 17 | 2x10         |      | 103                                                            | 89         | <b>80</b>   | 690                                              | 1.078                                   | 1.078 | 1.057                              | 1.057 | 30                               |
| MKH ... 6/100-HSC                                      | 6                       | 3x26                                 | 26 | 2x10         |      | 129                                                            | 112        | <b>100</b>  | 690                                              | 0.717                                   | 0.717 | 0.687                              | 0.687 | 30                               |
| MKH ... 6/140-HSC                                      | 6                       | 3x33                                 | 26 | 2x10         |      | 161                                                            | <b>140</b> | 125         | 690                                              | 0.586                                   | 0.717 | 0.549                              | 0.687 | 30                               |
| MKH ... 6/160-HSC                                      | 6                       | 3x42                                 | 26 | 2x10         |      | 184                                                            | <b>160</b> | 143         | 690                                              | 0.473                                   | 0.717 | 0.429                              | 0.687 | 30                               |
| MKH ... 6/200-HSC <sup>(3)</sup>                       | 6                       | 3x51                                 | 26 | 2x10         |      | 231                                                            | <b>200</b> | 179         | 690                                              | 0.393                                   | 0.717 | 0.344                              | 0.687 | 30                               |
| MKH ... 7/63-HSC                                       | 7                       | 3x10                                 | 10 | 2x10         | 1x11 | 81                                                             | 70         | <b>63</b>   | 690                                              | 1.731                                   | 1.731 | 1.717                              | 1.717 | 30                               |
| MKH ... 7/63-SSD                                       | 7                       |                                      |    | 6x10         | 1x11 | 81                                                             | 70         | <b>63</b>   | 690                                              | 1.731                                   |       | 1.717                              |       | 30                               |
| MKH ... 7/80-HSC                                       | 7                       | 3x17                                 | 17 | 2x10         | 1x11 | 103                                                            | 89         | <b>80</b>   | 690                                              | 1.078                                   | 1.078 | 1.057                              | 1.057 | 30                               |
| MKH ... 7/100-HSC                                      | 7                       | 3x26                                 | 26 | 2x10         | 1x11 | 129                                                            | 112        | <b>100</b>  | 690                                              | 0.717                                   | 0.717 | 0.687                              | 0.687 | 30                               |
| MKH ... 7/140-HSC                                      | 7                       | 3x33                                 | 26 | 2x10         | 1x11 | 161                                                            | <b>140</b> | 125         | 690                                              | 0.586                                   | 0.717 | 0.549                              | 0.687 | 30                               |
| MKH ... 7/160-HSC                                      | 7                       | 3x42                                 | 26 | 2x10         | 1x11 | 184                                                            | <b>160</b> | 143         | 690                                              | 0.473                                   | 0.717 | 0.429                              | 0.687 | 30                               |
| MKH ... 7/200-HSC <sup>(3)</sup>                       | 7                       | 3x51                                 | 26 | 2x10         | 1x11 | 231                                                            | <b>200</b> | 179         | 690                                              | 0.393                                   | 0.717 | 0.344                              | 0.687 | 30                               |
| MKH ... 8/63-HSC                                       | 8                       | 3x10                                 | 10 | 2x10         | 2x11 | 81                                                             | 70         | <b>63</b>   | 690                                              | 1.731                                   | 1.731 | 1.717                              | 1.717 | 30                               |
| MKH ... 8/63-SSD                                       | 8                       |                                      |    | 6x10         | 2x11 | 81                                                             | 70         | <b>63</b>   | 690                                              | 1.731                                   |       | 1.717                              |       | 30                               |
| MKH ... 8/80-HSC                                       | 8                       | 3x17                                 | 17 | 2x10         | 2x11 | 103                                                            | 89         | <b>80</b>   | 690                                              | 1.078                                   | 1.078 | 1.057                              | 1.057 | 30                               |
| MKH ... 8/100-HSC                                      | 8                       | 3x26                                 | 26 | 2x10         | 2x11 | 129                                                            | 112        | <b>100</b>  | 690                                              | 0.717                                   | 0.717 | 0.687                              | 0.687 | 30                               |
| MKH ... 8/140-HSC                                      | 8                       | 3x33                                 | 26 | 2x10         | 2x11 | 161                                                            | <b>140</b> | 125         | 690                                              | 0.586                                   | 0.717 | 0.549                              | 0.687 | 30                               |
| MKH ... 8/160-HSC                                      | 8                       | 3x42                                 | 26 | 2x10         | 2x11 | 184                                                            | <b>160</b> | 143         | 690                                              | 0.473                                   | 0.717 | 0.429                              | 0.687 | 30                               |
| MKH ... 8/200-HSC <sup>(3)</sup>                       | 8                       | 3x51                                 | 26 | 2x10         | 2x11 | 231                                                            | <b>200</b> | 179         | 690                                              | 0.393                                   | 0.717 | 0.344                              | 0.687 | 30                               |

(1) Numbers in paranthesis apply to control line

(2) Complete types e.g. MKH ... 7/63HSC for 7 poles with bolted joints

(3) only for MKHS

(4) Nominal voltage UL = 600 V

(5) Power consumption UL on request

# TECHNICAL DATA AND STANDARD SECTIONS

## MKHD/MKHF/MKHS

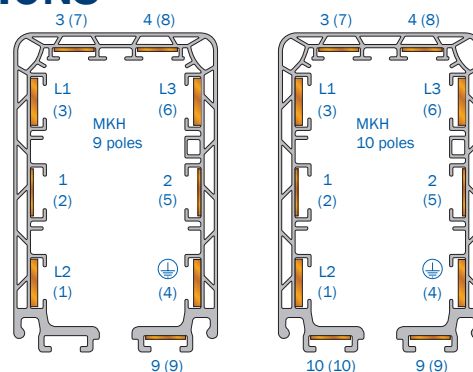
### Cross sections<sup>(1)</sup>

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

Layout of the system on request.

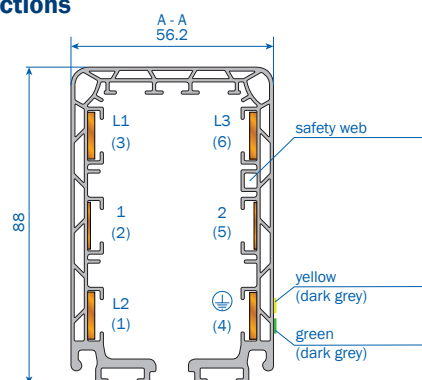
Pole 9 and 10 for max. 24 V

AC or 60 V DC.

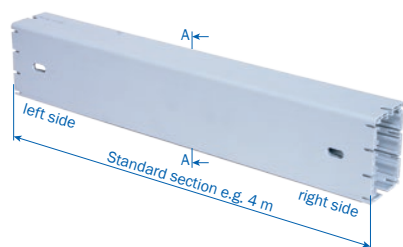


| Type                | No. of poles | Copper cross section mm <sup>2</sup> |    |              |      | Ampere rating with 35 °C in A, L1, L2, L3 <sup>(3)</sup> |            |            | Nominal voltage V | Impedance at 50 Hz 20 °C Ω/1000 m |       | Resistance at 20 °C Ω/1000 m |       | Leakage distance mm |
|---------------------|--------------|--------------------------------------|----|--------------|------|----------------------------------------------------------|------------|------------|-------------------|-----------------------------------|-------|------------------------------|-------|---------------------|
|                     |              | Phase L1, L2, L3                     | ⊥  | Control line |      | 60 % ED                                                  | 80 % ED    | 100 % ED   |                   | Phase L1, L2, L3                  | ⊥     | Phase L1, L2, L3             | ⊥     |                     |
| MKHD ... 9/63-HSC   | 9            | 3x10                                 | 10 | 2x10         | 3x11 | 81                                                       | 70         | <b>63</b>  | 690               | 1.731                             | 1.731 | 1.717                        | 1.717 | 30                  |
| MKHD ... 9/63-SSD   | 9            |                                      |    | 6x10         | 3x11 | 81                                                       | 70         | <b>63</b>  | 690               | 1.731                             |       | 1.717                        |       | 30                  |
| MKHD ... 9/80-HSC   | 9            | 3x17                                 | 17 | 2x10         | 3x11 | 103                                                      | 89         | <b>80</b>  | 690               | 1.078                             | 1.078 | 1.057                        | 1.057 | 30                  |
| MKHD ... 9/100-HSC  | 9            | 3x26                                 | 26 | 2x10         | 3x11 | 129                                                      | 112        | <b>100</b> | 690               | 0.717                             | 0.717 | 0.687                        | 0.687 | 30                  |
| MKHD ... 9/140-HSC  | 9            | 3x33                                 | 26 | 2x10         | 3x11 | 161                                                      | <b>140</b> | 125        | 690               | 0.586                             | 0.717 | 0.549                        | 0.687 | 30                  |
| MKHD ... 9/160-HSC  | 9            | 3x42                                 | 26 | 2x10         | 3x11 | 184                                                      | <b>160</b> | 143        | 690               | 0.473                             | 0.717 | 0.429                        | 0.687 | 30                  |
| MKHD ... 10/63-HSC  | 10           | 3x10                                 | 10 | 2x10         | 4x11 | 81                                                       | 70         | <b>63</b>  | 690               | 1.731                             | 1.731 | 1.717                        | 1.717 | 30                  |
| MKHD ... 10/63-SSD  | 10           |                                      |    | 6x10         | 4x11 | 81                                                       | 70         | <b>63</b>  | 690               | 1.731                             |       | 1.717                        |       | 30                  |
| MKHD ... 10/63-HSC  | 10           | 3x17                                 | 17 | 2x10         | 4x11 | 103                                                      | 89         | <b>80</b>  | 690               | 1.078                             | 1.078 | 1.057                        | 1.057 | 30                  |
| MKHD ... 10/100-HSC | 10           | 3x26                                 | 26 | 2x10         | 4x11 | 129                                                      | 112        | <b>100</b> | 690               | 0.717                             | 0.717 | 0.687                        | 0.687 | 30                  |
| MKHD ... 10/140-HSC | 10           | 3x33                                 | 26 | 2x10         | 4x11 | 161                                                      | <b>140</b> | 125        | 690               | 0.586                             | 0.717 | 0.549                        | 0.687 | 30                  |
| MKHD ... 10/160-HSC | 10           | 3x42                                 | 26 | 2x10         | 4x11 | 184                                                      | <b>160</b> | 143        | 690               | 0.473                             | 0.717 | 0.429                        | 0.687 | 30                  |

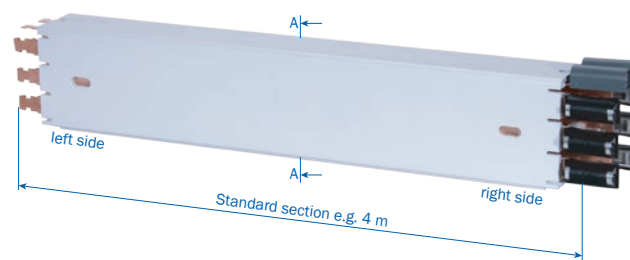
### Standard sections



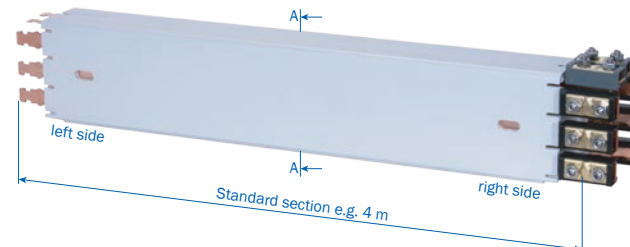
### Type MKHD for continuous copper strips



### Type MKHF with plug-in joints, factory assembled



### Type MKHS with bolted joints, factory assembled



(1) Numbers in paranthesis apply to control line

(2) Nominal voltage UL = 600 V

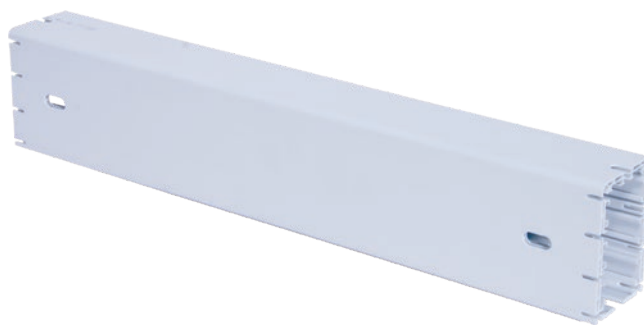
(3) Power consumption UL on request

# TYPES AND ORDER NUMBERS

## MKHD/MKHF

### Type MKHD

with continuous copper strips  
(to be drawn in during installation)



| Type <sup>(1)</sup> | Weight kg/m | Order No. |
|---------------------|-------------|-----------|
| MKHD-...HSC         | 1.052       | 26250•    |
| MKHD-...SSD         | 1.052       | 26251•    |

### Type MKHF

with factory assembled copper strips  
and plug-in joints (63 – 100 A)



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

(1) Complete types e.g. MKHD-**4000**HSC for 4 m with PE Order No. 262504

MKHF8/63-**4000**HSC for 4 m with PE Order No. 263264

The 4-digit number (in bold) in the type indicates the length of the section in mm.

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

# TYPES AND ORDER NUMBERS

## MKHS

### Type MKHS

with factory assembled copper strips and bolted joints  
(63 – 200 A)



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

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

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



# SECTIONS AND SEALING STRIPS

## MKHD/MKHF/MKHS

### Curves

Min. bending radius, horizontal = 1000 mm

max. length L = 3600 mm

max.  $\Delta$  120°

Smallest vertical radius: on request

HR for SI = Horizontal radius – Safety web inside

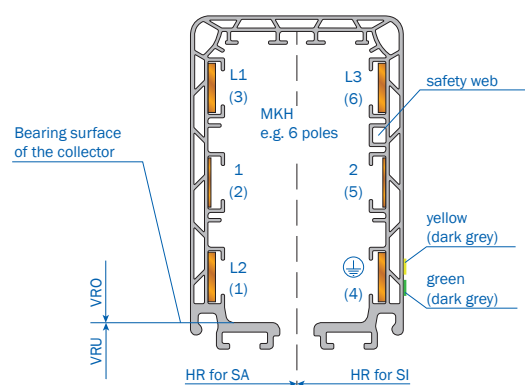
HR for SA = Horizontal radius – Safety web outside

VRO = Vertical radius upwards

VRU = Vertical radius downwards

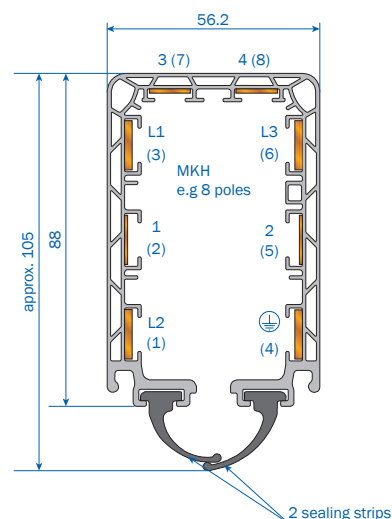
Safety web will be mounted in direction of track.

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



### Sealing strip including accessories

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

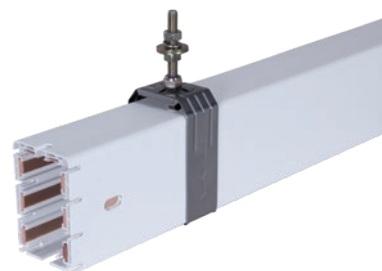


| Type                                  | Description                                        | Order No. |
|---------------------------------------|----------------------------------------------------|-----------|
| DL-D-KBH-MKH-MKL-TDV10 <sup>(1)</sup> | Sealing strip 10 m long                     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

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

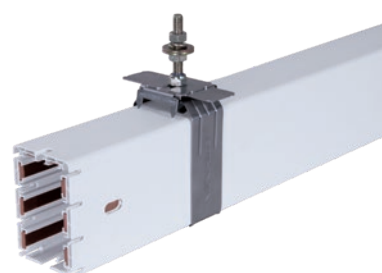
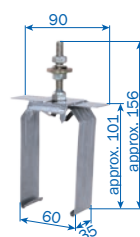
# HANGERS AND END SECTIONS

## MKHD/MKHF/MKHS



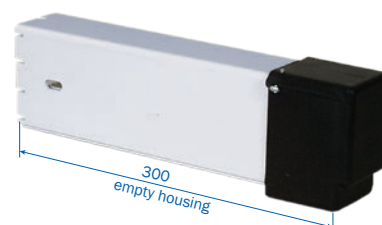
### Sliding hanger

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



### Fixpoint hanger

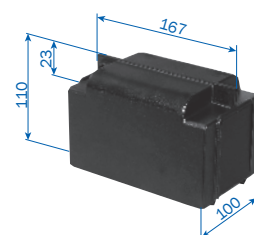
| Type                    | Weight kg | Order No. |
|-------------------------|-----------|-----------|
| AH-MFH                  | 0.182     | 262001    |
| AH-MFH/K <sup>(1)</sup> | 0.182     | 262002    |



### End section (MKHD)

with 0.3 m section

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



### End cap (MKHF / MKHS)

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

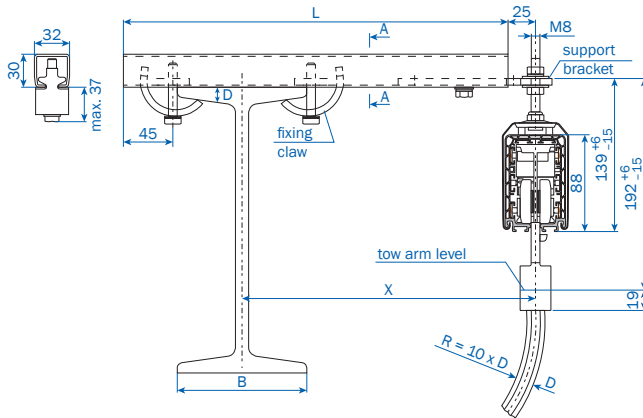
(1) stainless steel

# BRACKETS

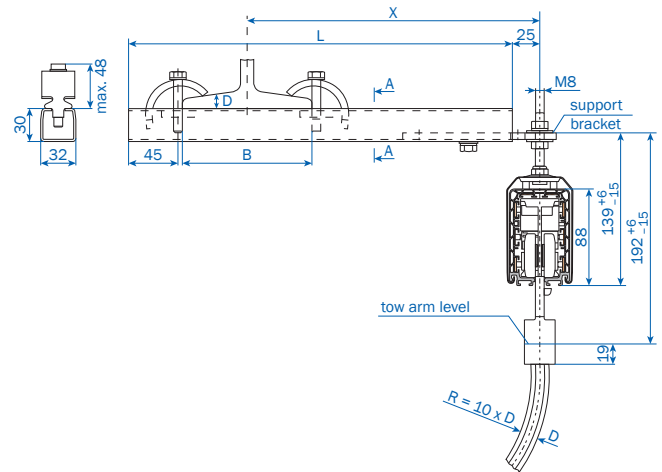
MKHD/MKHF/MKHS

View without I-beam

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



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

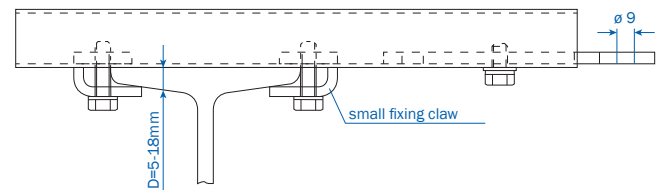


## Arrangement EHK with small fixing claw

Attention! Make sure that hoist wheels have enough clearance!

Use small claw if necessary!

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



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

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

## JOINTING MATERIAL AND END FEEDS

### MKHD/MKHF/MKHS



#### Joint cap, self locking (MKHD)

| Type    | Weight kg | Order No. |
|---------|-----------|-----------|
| VM-MVMD | 0.160     | 234678    |



#### Joint cap, self locking (MKHF / MKHS)

| Type    | Weight kg | Order No. |
|---------|-----------|-----------|
| VM-MVMS | 0.274     | 234585    |

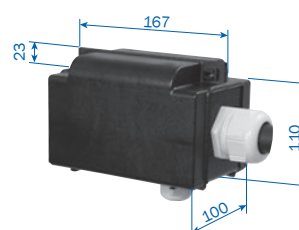
### End feed (MKHD)

End feed comes loose without standard section.

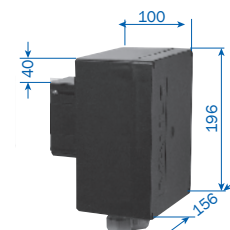
It can be mounted at the left or right hand side.

Electrical connection with customer supplied cable shoes

to M6 terminals



6- to 8-poles



9- to 10-poles

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

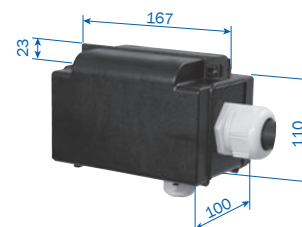
### End feed (MKHF / MKHS)

End feed comes loose without standard section.

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

Electrical connection with customer supplied cable shoes

to M6 terminals

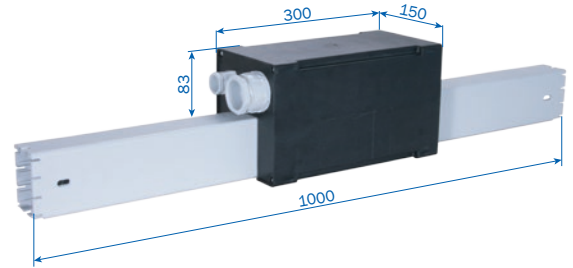


| Type               | Weight kg | Cable gland<br>(dimensions see page 33) | Order No. |
|--------------------|-----------|-----------------------------------------|-----------|
| ES-MKES6-8/63-80HS | 0.492     | M 25 and M 40                           | 235230    |
| ES-MKES6-8/63SS    | 0.446     |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

## LINE FEEDS

### MKHD

Electrical connection with customer supplied  
cable shoes to M8 terminals



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

## LINE FEEDS

### MKHF/MKHS

Electrical connection with customer supplied cable shoes to M8 terminals

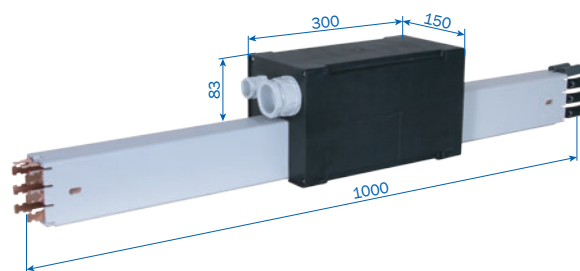


Photo shows MHGF

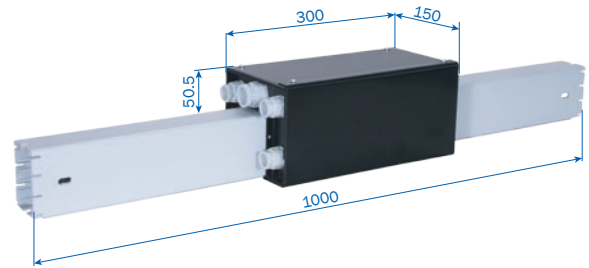
| Type                 | Weight kg | M-Cable gland<br>(dimensions see page 33) | Order No. |
|----------------------|-----------|-------------------------------------------|-----------|
| ES-MHGF6/63HSC-1000  | 3.056     | M 50 and M 25                             | 263205    |
| ES-MHGF7/63HSC-1000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

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

## LINE FEEDS

### MKHD

Electrical connection with customer supplied  
cable shoes to M8 terminals



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

## LINE FEEDS

### MKHF/MKHS

Electrical connection with customer supplied  
cable shoes to M8 terminals

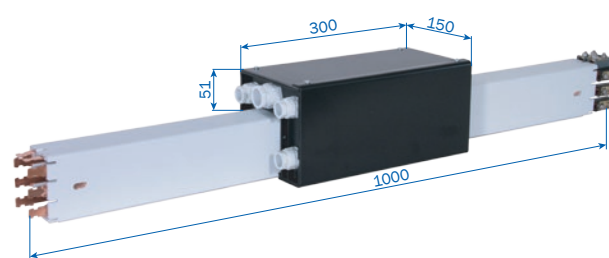


Photo shows MHLS

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

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



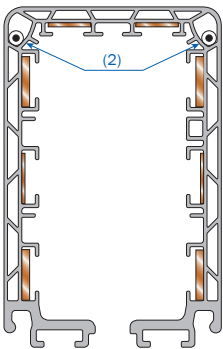
# HEATING

## MKHD/MKHF/MKHS

### Heating cable

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

<sup>(1)</sup> Divergences ±2.5 %



<sup>(2)</sup> Arrangement of heating cable

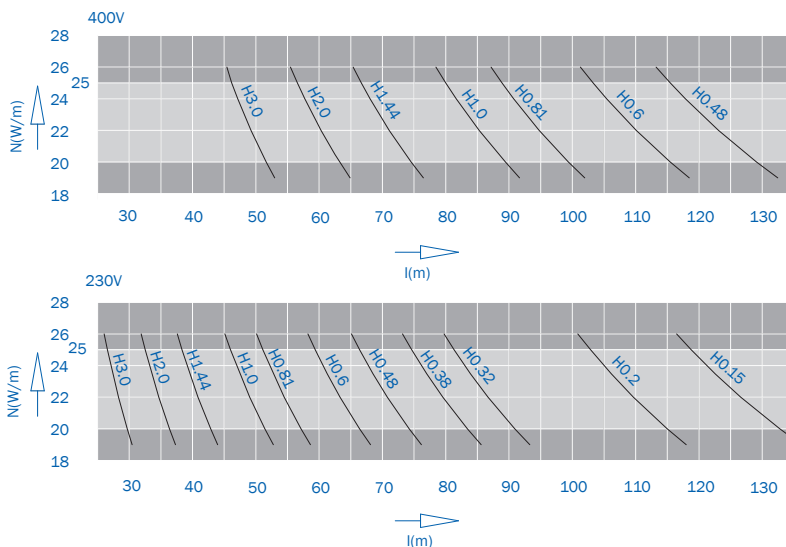
We recommend a heating system for outdoor installations and installations in humid plants. The heating consists of arrangement two heating cables as per drawing.

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

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

For longer heating distances the total length has to be divided into several heating sections.

For short heating distances to feed with lower secondary voltage via transformer.



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

U = Supply voltage (Volt)

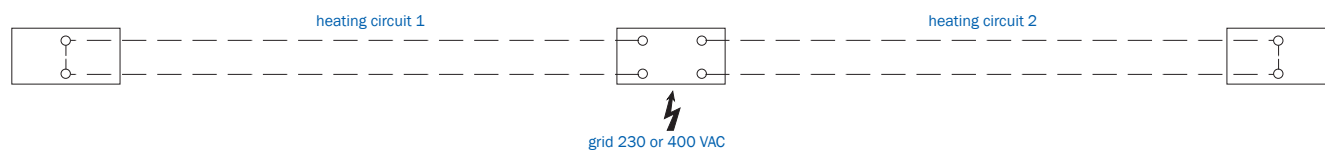
R = Resistance of heating cable (Ohm/m)

L = Length of heating section (m)

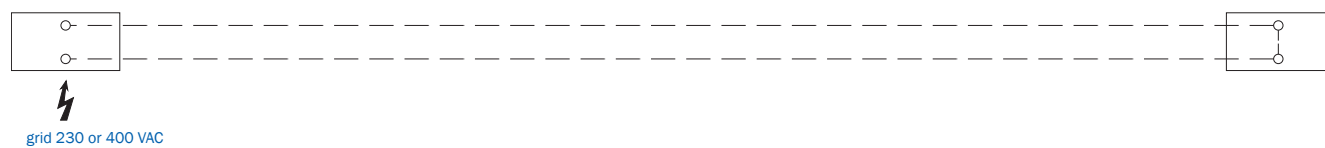
# HEATING

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

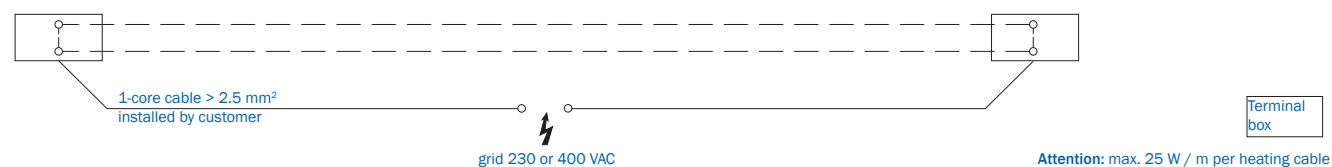
a) 2 heating circuits



b) 1 heating circuit



c) 2 heating circuits



## Connecting boxes for heating

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

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

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

Order for 60m conductor system example c)

1) 122m heating cable type H 2.0 (2x60m and 2x1m additional)

Voltage 400 V, two heating circuits in parallel

heating capacity as per above mentioned diagramm 2 x 22 W/m

at 60m 2 x 22 W/m ~ 2640 W = 2.64 kW.

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

3) 4x sets of material for connection ends.

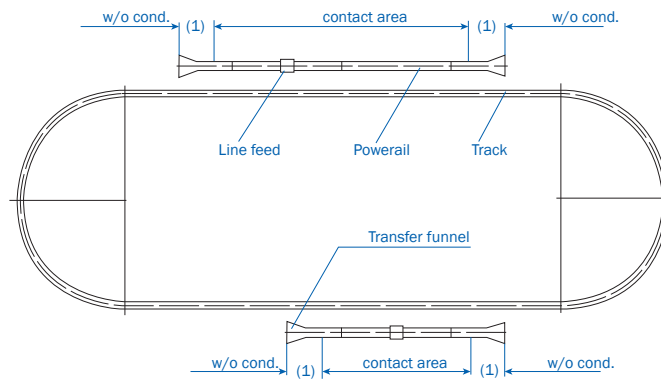
Switch gear assembly and temperature control unit as per customer's inquiry.

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

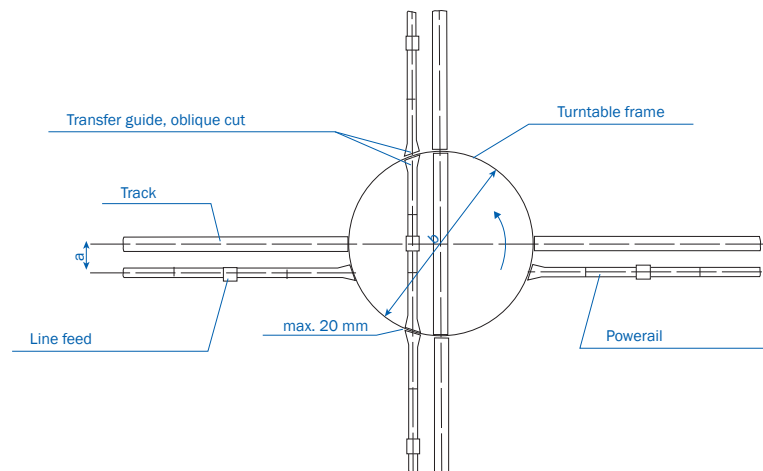
# CONTACT SECTIONS, TURNTABLES AND SWITCHES

## MKHD/MKHF/MKHS

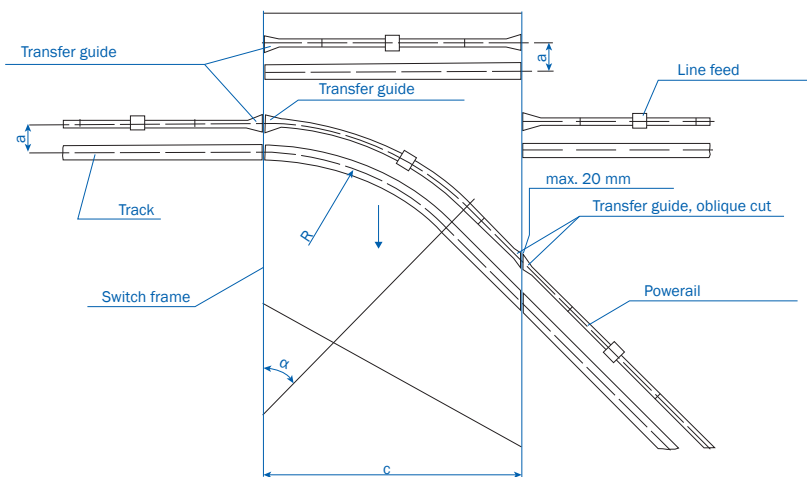
### Contact section<sup>(1)</sup>



### Turntable



### Sliding switch



Specify dimensions a, b, c,

R and angle  $\alpha$ .

$\alpha = 50^\circ$  max.

Max. 20 mm air gap between transfer guides.

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

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

# ENTRY FUNNEL

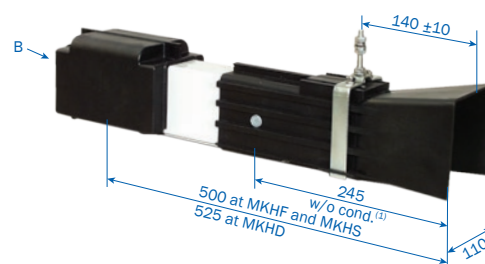
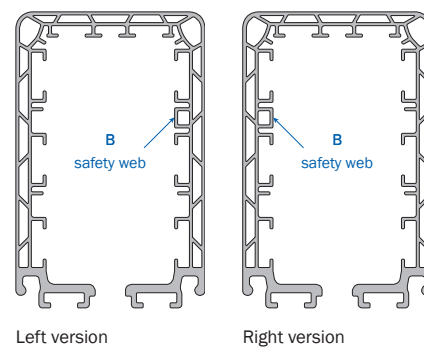
## MKHD/MKHF/MKHS

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

Offset of the funnel/guide to the collector:

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

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



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

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

# TRANSFER GUIDES

## MKHD/MKHF/MKHS

### Transfer guides, straight

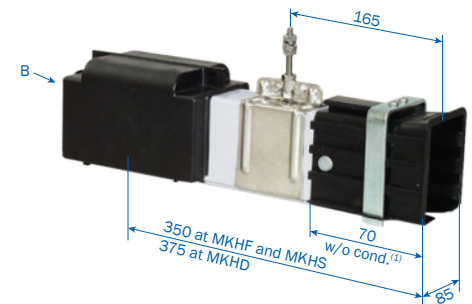
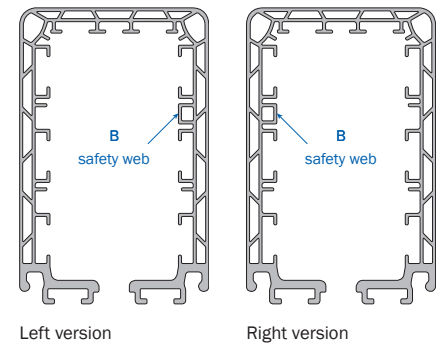
Necessary with all types of double collectors or

2 single collectors.

Staggered arrangement of the transfer guides to each other:

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

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



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

(1) corresponding to the center of collector

(2) Also suitable for former version with 40 A

# TRANSFER GUIDES, OBLIQUE<sup>(1)</sup>

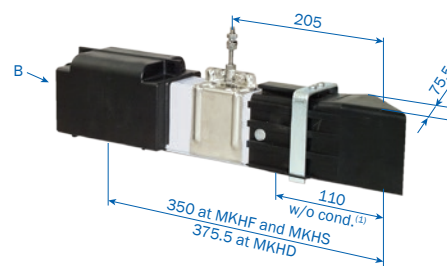
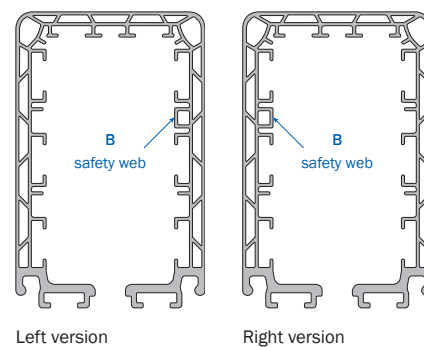
## MKHD/MKHF/MKHS

Necessary with all types are 2 single collectors.

Staggered arrangement of the transfer guides to each other:

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

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



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

(1) corresponding to the center of collector

(2) Also suitable for former version with 40 A

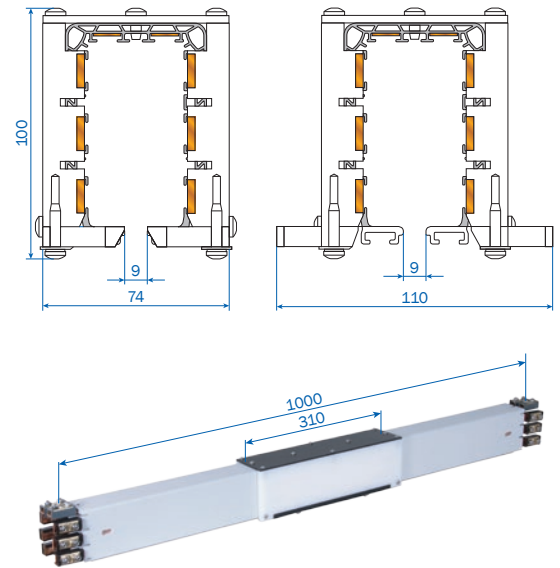
# REMOVAL SECTIONS

## MKHD/MKHF/MKHS

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

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

The removal section does not disconnect the powerail electrically.



## For single collectors

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

## For double collectors

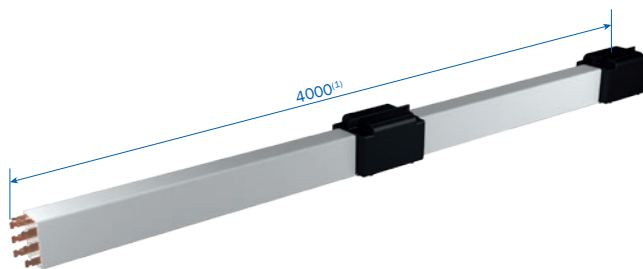
| Type                                    | Weight kg | Order No. |
|-----------------------------------------|-----------|-----------|
| AT-MATHD6/63-100HSC-1000 <sup>(1)</sup> | 5.108     | 262159    |
| AT-MATHD7/63-100HSC-1000 <sup>(1)</sup> | 5.284     | 262160    |
| AT-MATHD8/63-100HSC-1000 <sup>(1)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

(1) Also suitable for former version with 40 A

## MAINTENANCE SECTIONS

### MKHS

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



### For single collectors

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

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



# CONDUCTOR DEAD SECTIONS

## MKHD/MKHF/MKHS

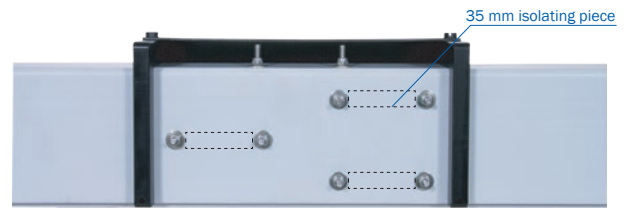


Photo shows isolating piece

## 5 mm air gap

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

## 35 mm isolating piece

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

Please advise us which conductors should be disconnected (see pages 24 and 25). The dead section comes factory assembled.

(1) Complete types e.g. ST-MHTI4HS-L1/L2/L3/2-MSWA for a 35 mm isolation piece with separation of conductors L1, L2, L3 und 2 for the current collector MSWA  
→ Order No.: 262589

## ANTI-CONDENSATION SECTIONS

### MKHD/MKHF/MKHS

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

### Use of the anti-condensation section

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

### Feeding

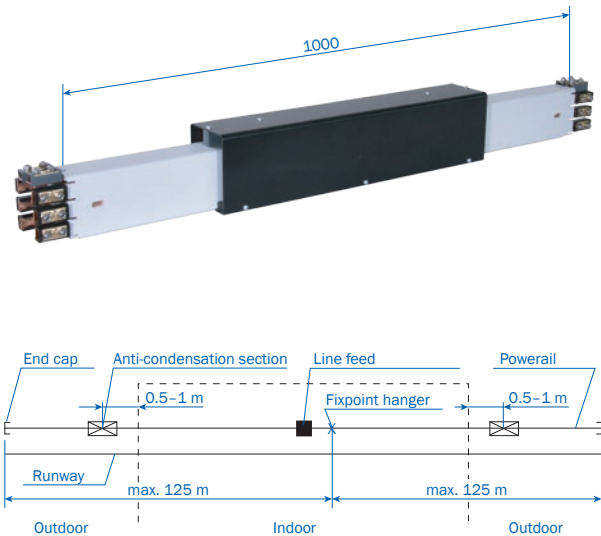
No extra feeds required as the Powerail is not interrupted.

### Collectors

No extra collectors required.

### Installation

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



### For MKHD

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

### For MKHF/S

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

(1) Also suitable for former version with 40A

## EXPANSION SECTIONS

### MKHD

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

Max. length during differences in temperature:

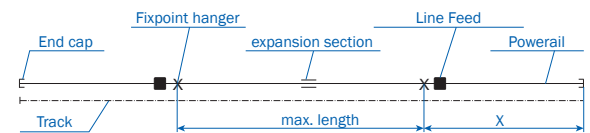
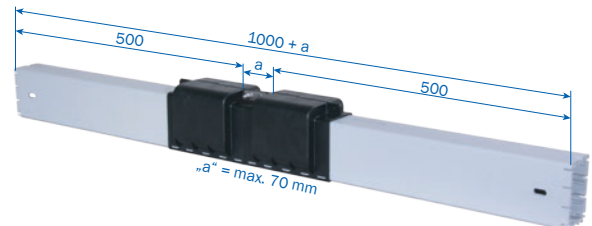
$\Delta t 20^{\circ}\text{C} = 70 \text{ m}$        $\Delta t 40^{\circ}\text{C} = 35 \text{ m}$        $\Delta t 80^{\circ}\text{C} = 17 \text{ m}$

$\Delta t 30^{\circ}\text{C} = 45 \text{ m}$        $\Delta t 60^{\circ}\text{C} = 23 \text{ m}$

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

X = max. 55 m for outdoor systems

X = max. 100 m for indoor systems



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

## EXPANSION SECTIONS

### MKHF/MKHS

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

Max. length during differences in temperature:

$\Delta t \ 90^\circ\text{C}$  ( $-30^\circ\text{C}$  bis  $+60^\circ\text{C}$ ) one expansion joint per 100 m.

An additional expansion joint every 100 m.

Arrangement of fixpoints according to sketches.

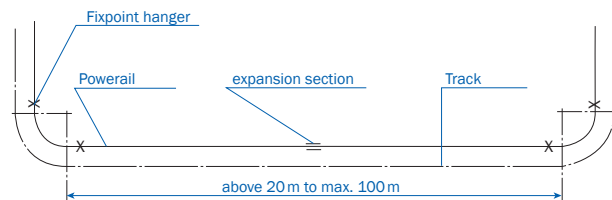
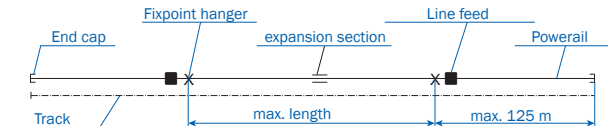
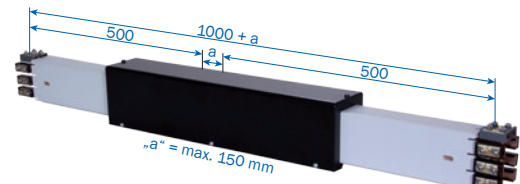
The remaining conductor sections have to be installed with sliding hangers.

Additional feeds or current collectors are not required as the expansion-sections do not interrupt electrical power.

### Assembly

The gap dimension „a“ is 75 mm during installation.

Valid for an ambient temperature of  $-10^\circ\text{C}$  to  $+35^\circ\text{C}$  during installation.



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

(1) Also suitable for former version with 40 A

# COLLECTORS

## MKHD/MKHF/MKHS

### Single collector MSA

upto max. 180 m/min.

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

### Connecting cables

for power line: cable 1 → 4 x 6 mm<sup>2</sup>  
cable 2 → ... x 1.5 mm<sup>2</sup>

for control line: cable 1 → ... x 2.5 mm<sup>2</sup>

(two cables for 8-pole and more)

Example of ordering double collectors with 2 m cable

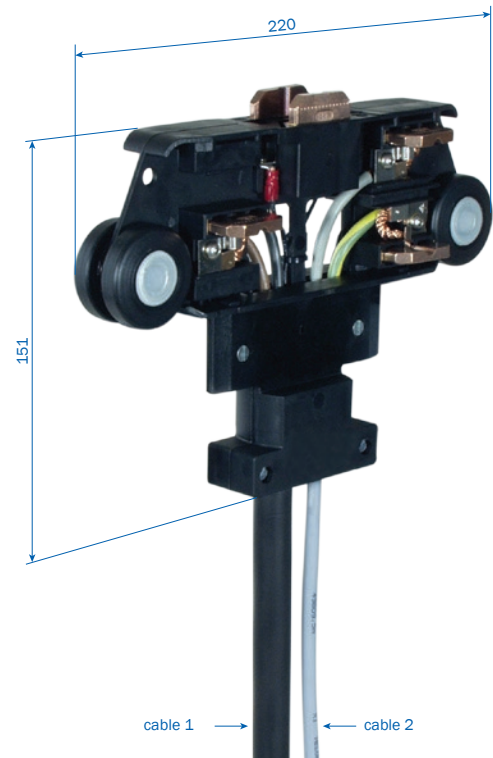
Order No. 236177-2

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

Cleaning trolleys on request

For curves use single collectors only.

Connecting cable 1 m, longer cable available.



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

# COLLECTORS

## MKHD/MKHF/MKHS

### Single collector MSWAS

upto max. 250 m/min.

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

### Connecting cables

for power line: cable 1 → 4 x 6 mm<sup>2</sup>  
 cable 2 → ... x 1.5 mm<sup>2</sup>  
 for control line: cable 1 → ... x 2.5 mm<sup>2</sup>  
 (two cables for 8-pole and more)

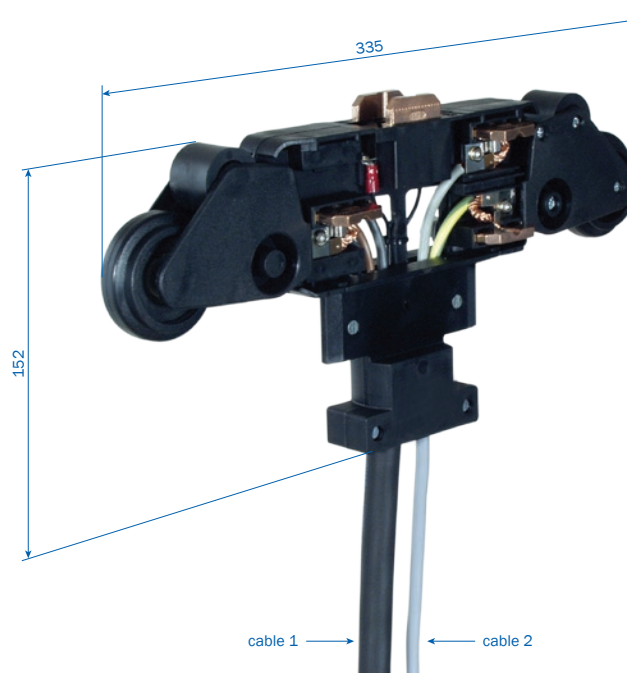
Example of ordering collector with 2 m cable

Order No. 236200-2

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

For curves use single collectors only.

Connecting cable 1 m, longer cable available.



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

# COLLECTORS

## MKHD/MKHF/MKHS

### Double collector DMSWA

upto max. 180 m/min.

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

### Connecting cables

for power line: cable 1 → 4 x 6 mm<sup>2</sup>  
cable 2 → ... x 1.5 mm<sup>2</sup>

for control line: cable 1 → ... x 2.5 mm<sup>2</sup>

(two cables for 8-pole and more)

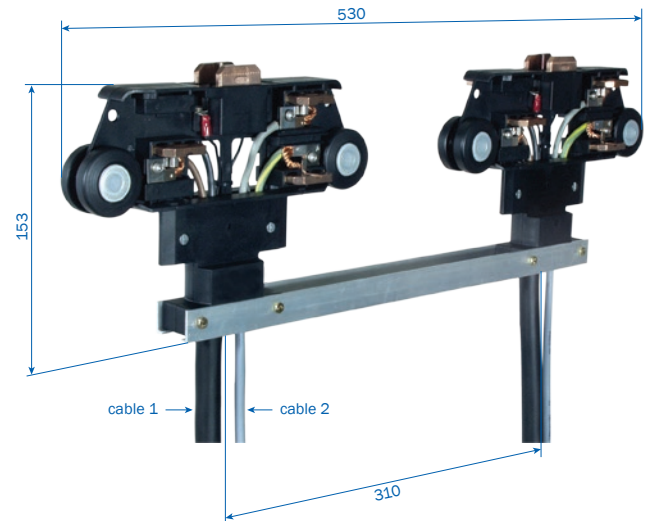
Example of ordering collector with 2 m cable

Order No. 236315-2

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

For curves use single collectors only.

Connecting cable 1 m, longer cable available.



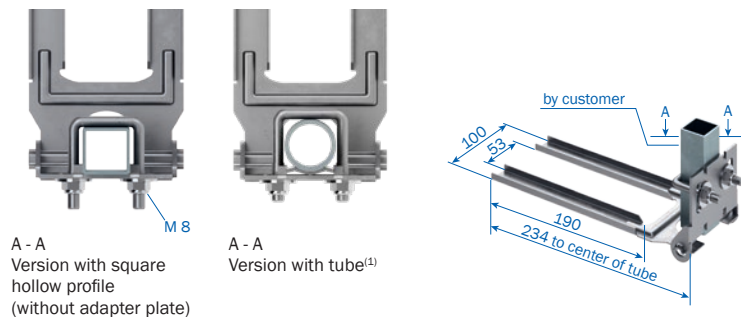
| Type                     | Weight kg | No of Poles | Power rating at 60 % ED in A | Ø of connecting-cables in mm |         | Order No. |
|--------------------------|-----------|-------------|------------------------------|------------------------------|---------|-----------|
|                     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

# TOW ARMS

## MKHD/MKHF/MKHS

### Tow arm

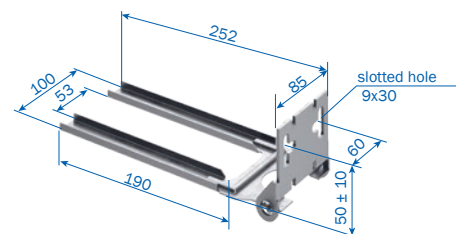
Installation options of 30 mm square-,  
hollow profile or tube with 30 – 34 mm



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

### Tow arm

for plane surface

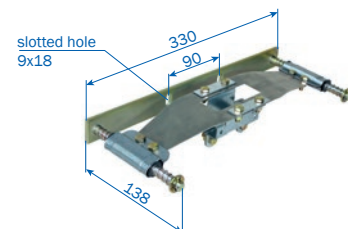


| Type                    | Weight kg | Order No. |
|-------------------------|-----------|-----------|
| MN-MGFN                 | 0.328     | 600888    |
| MN-MGF/K <sup>(2)</sup> | 0.442     | 600337    |

### Flexible tow arm

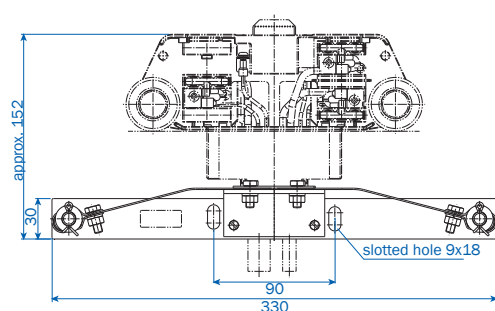
For single collectors  
for systems with transfer funnels MTH

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

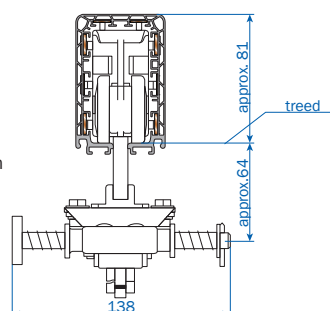


| Type    | Weight kg | Order No. |
|---------|-----------|-----------|
| MN-MFMN | 1.021     | 236460    |

### Flexible tow arm configuration



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



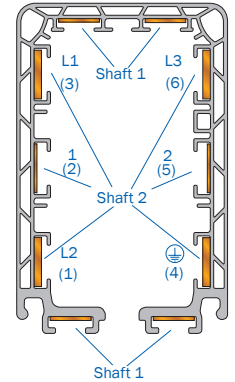
(1) For assembly use enclosed adapter plate (Prisma).  
(2) ... / K Stainless steel



# FLAT COPPER AND CABLE GLANDS

## MKHD/MKHF/MKHS

### Flat copper (MKHD)



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

| Type                 | Description                         | Weight<br>kg/m | Type of cassette |     |     | Order No.<br>(Cu) | Order No.<br>(Inox) |
|----------------------|-------------------------------------|----------------|------------------|-----|-----|-------------------|---------------------|
|                      |                                     |                | A                | B   | C   |                   |                     |
| SS-FLCU40A/11-11X1-E | 11 mm <sup>2</sup> 11 x 1 mm (40 A) | 0.10           | 90               | 260 | 300 | 234198            | -                   |
| SS-INOX40A/11-11X1-E | 11 mm <sup>2</sup> 11 x 1 mm        | 0.09           | 90               | 260 | 300 | -                 | 234384              |

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

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

### Cable glands

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

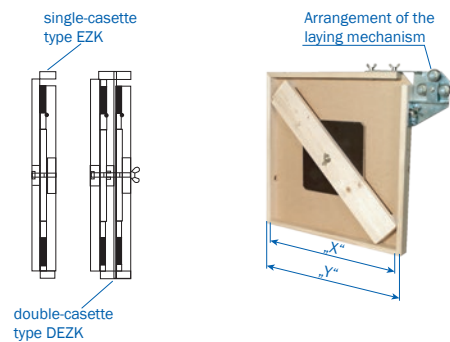
(1) Values for installation through VAHLE-engineers (with help device possible). Use bolted joints and possibly expansion sections for bigger lengths than shown in the table. In this case installation by VAHLE experts is recommended, especially for copper cross section of 42 mm<sup>2</sup>. Consult factory for proper layout.

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

## ASSEMBLING TOOLS

### MKHD/MKHF/MKHS

#### Copper cassettes



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

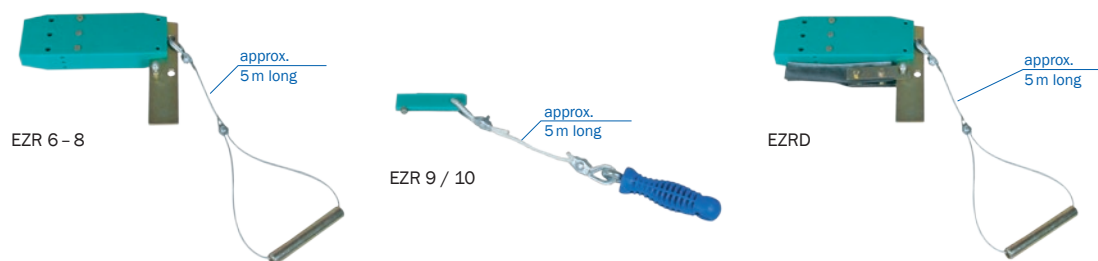
Type of copper cassette depends on copper cross section and system length (see page 33)

#### Straightening tool

required from strip sections 26 mm<sup>2</sup> Cu. upwards

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

#### Conductor threading tool



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

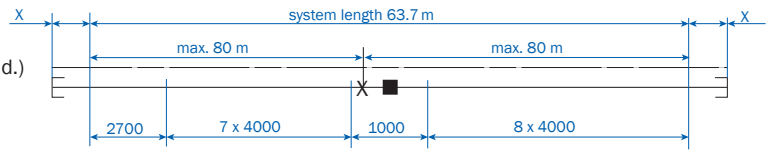
## EXAMPLE FOR ORDERING

### MKHD/MKHF/MKHS

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

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

Not for MKHF and MKHS.



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

## SPARE PARTS

### MKHD/MKHF/MKHS

#### For enclosed conductor system

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

#### For collector MSWA

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

#### Cleaning accessories on request

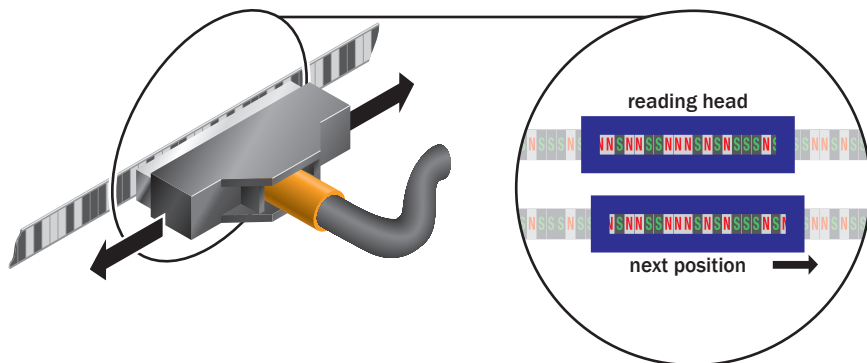
<sup>(1)</sup> Also suitable for former version with 40 A

## APOS POSITIONING SYSTEM

were developed for automated handling systems in material flow technology.

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

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



### Features

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



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

# QUESTIONNAIRE

Company: \_\_\_\_\_ Date: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 Email: \_\_\_\_\_ Website: \_\_\_\_\_

1. Number of wiper line systems: \_\_\_\_\_
2. Type of crane or device to be fed: \_\_\_\_\_
3. Operating voltage: \_\_\_\_\_ volt Phases: \_\_\_\_\_ frequency: \_\_\_\_\_ Hz  
☐ Three-phase voltage ☐ AC voltage ☐ DC voltage
4. Line length: \_\_\_\_\_
5. Number of phase rails: \_\_\_\_\_ N-rails: \_\_\_\_\_ Control rails: \_\_\_\_\_ Ground conductor: \_\_\_\_\_
6. Installation position of the wiper line:  
☐ Hanging wiper line / current collector cable downwards  
☐ Hanging wiper line / current collector cable lateral entry<sup>(1)</sup>  
☐ Hanging distance \_\_\_\_\_ m (max. 2 m) ☐ Other: \_\_\_\_\_
7. Number of cranes or devices in a wiper line system: \_\_\_\_\_
8. ☐ Indoor system ☐ Outdoor system
9. Special operating conditions (moisture, dust, chemical influences, etc) \_\_\_\_\_
10. Ambient temperature: \_\_\_\_\_ °C min. \_\_\_\_\_ °C max.
11. Hall expansion joints \_\_\_\_\_ pieces \_\_\_\_\_ expansion max.
12. Position and number of feeds<sup>(1)</sup>: \_\_\_\_\_
13. Position and number of disconnecting points (e.g. for repair zones)<sup>(1)</sup>: \_\_\_\_\_
14. Where is the wiper line to be positioned?<sup>(1)</sup>: \_\_\_\_\_
15. Screw consoles to be supplied: ☐ yes ☐ no Distance middle of carrier – middle of wiper line \_\_\_\_\_  
 Flange width of carrier: \_\_\_\_\_
16. Travel speed for longitudinal travel: \_\_\_\_\_ in bends: \_\_\_\_\_ at transfers: \_\_\_\_\_
17. Current consumption of the individual electricity consumers: \_\_\_\_\_  
 (Please use the table below.)
18. Max. voltage drop from conductor rail feed to the current collectors and considering the start-up currents:  
 3 % ☐ or \_\_\_\_\_ % in relation to nominal current.

| Motor data               | Crane/device 1 |                 |                    |        |                  |                    |                           | Crane/device 2 |                 |                    |        |                  |                    |                           |
|--------------------------|----------------|-----------------|--------------------|--------|------------------|--------------------|---------------------------|----------------|-----------------|--------------------|--------|------------------|--------------------|---------------------------|
|                          | Power kW       | Nominal current |                    |        | Start-up current |                    | Drive type <sup>(2)</sup> | Power kW       | Nominal current |                    |        | Start-up current |                    | Drive type <sup>(2)</sup> |
|                          |                | A               | cos φ <sub>N</sub> | % duty | A                | cos φ <sub>A</sub> |                           |                | A               | cos φ <sub>N</sub> | % duty | A                | cos φ <sub>A</sub> |                           |
| Lifting device           |                |                 |                    |        |                  |                    |                           |                |                 |                    |        |                  |                    |                           |
| Auxiliary lifting device |                |                 |                    |        |                  |                    |                           |                |                 |                    |        |                  |                    |                           |
| Carriage                 |                |                 |                    |        |                  |                    |                           |                |                 |                    |        |                  |                    |                           |
| Trolley traveling winch  |                |                 |                    |        |                  |                    |                           |                |                 |                    |        |                  |                    |                           |
|                          |                |                 |                    |        |                  |                    |                           |                |                 |                    |        |                  |                    |                           |

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

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

Further information: \_\_\_\_\_

Signature: \_\_\_\_\_

(1) Outline drawing required for offer preparation

(2) Enter drive type: K for squirrel-cage rotor, S for slip ring rotor, F for frequency-controlled motor

We reserve the right to make changes due to further technical development.

## NOTES



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