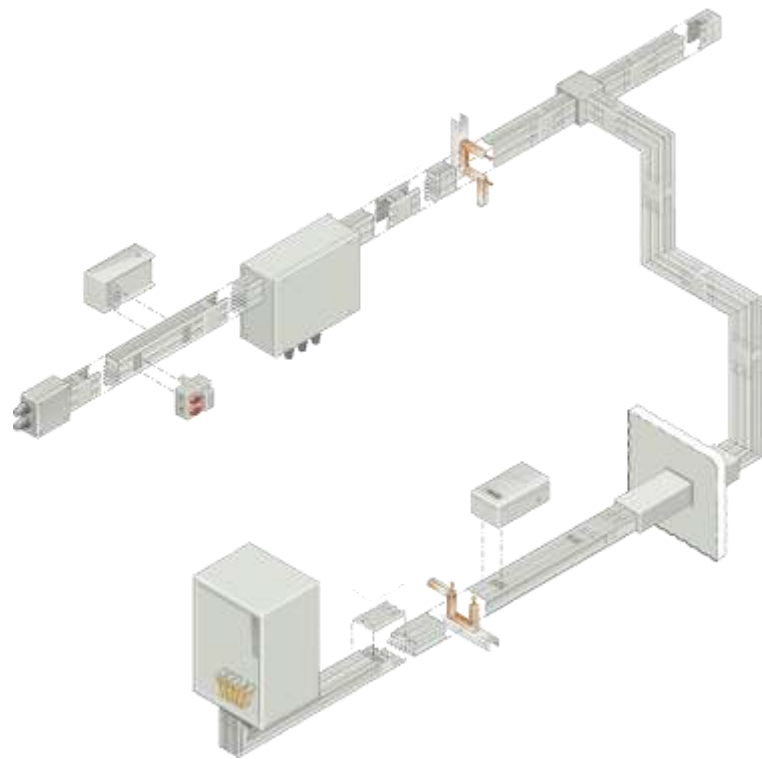


System Manual

# Busbar Trunking System unibar M 160 A to 1000 A



**:hager**



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# About this System Manual

This System Manual describes the unibar M Busbar Trunking System.

## **NOTE**

This system will be referred to as the "unibar M system" for short in this manual.

- Carefully read through this manual before performing work on the unibar M system.
- Read and observe the Safety section in particular.
- The safety measures in the other sections must also be observed.



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## 01.01 Subject of the System Manual

The System Manual contains information regarding the basic principles of the unibar M system, as well as guidance on the intended use, design, function, mounting, installation, and maintenance of a unibar M system.

### Target group

This System Manual is intended for users of Hager's unibar M Busbar Trunking System: Planners, manufacturers, operators and users of power switchgear and controlgear assemblies according to the DIN EN 61439-1/-2/-6 standard.

The System Manual also contains information regarding the basic principles of the unibar M system, as well as guidance on the intended use, design, function, mounting, installation, and maintenance of a unibar M system.

### Objective

The aim of this manual is to describe the system, function and application of Hager's unibar M Busbar Trunking System.

It conveys important information which is required for safe operation of, and carrying out work on the unibar M system.

The documents listed below are applicable to the relevant target group and must always be read in conjunction with this System Manual. The instructions and notices contained in these documents supplement this System Manual and must be observed.

### Operator

- Instructions and documentation for the unibar M system components.

### Planner

- Instructions and documentation for the unibar M system components.
- Hager catalogues for power distribution systems with technical information.
- Guidelines for the project planning and design of switchgear according to DIN EN 61439 (VDE 06600-600).

### Panel builder/electrically skilled personnel/plant manager

- Instructions and documentation for the unibar M system components.
- Guidelines for the project planning and design of switchgear according to DIN EN 61439 (VDE 0660-600).
- Record for piece verification (routine test report).
- Checklist for the conformity assessment procedure.

### Storing the documents

The operator is responsible for storing the documents safely.

- Carefully read through this System Manual before performing work on the unibar M system.
- Store the System Manual and instructions enclosed with the components within easy reach at the location where the unibar M system is installed. Authorised personnel must have access to this documentation at all times.

### Instructions on installation, maintenance, cleaning and disposal

- Observe the installation manual for the unibar M system components.
- Observe this System Manual as well as the instructions for components of the unibar M system for maintenance, cleaning and servicing, as well as for disposal.



## 01.02 Imprint

### Revisions

unibar M Busbar Trunking System Manual

Revision number	Date	Name	Document no.
V1.0	4/2023	A. Yebra Dominguez M. de Man J. Berg	6LE089568A

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## 01.03 Symbols and warning signs used

### Warning messages

	<b>Signal word</b> Type and source of the hazard Consequences if the hazard is ignored ● Measures for averting the hazard.
--	---

Warning messages include a specific hazard symbol in the left column.  
The right column contains the warning text consisting of:

1. Signal word
2. Description of the hazard
3. Consequences if instruction is not observed
4. Instruction(s) on how to avoid the hazard

### Danger levels in warning messages

Signal word	Consequences of non-compliance
Danger	Leads to serious injury or death
WARNING	Can lead to serious injury or death
CAUTION	Can lead to minor injuries
Attention	Can lead to device damage
NOTE	Can lead to material damage

### Important notes

	<b>Information</b> Informational text
--	--

Informational notes include a specific symbol in the left column.  
The right column contains the information text.

### Procedural instructions with a fixed order

- Precondition (optional)
  - ① Instruction(s)/Step 1
  - ② Instruction(s)/Step 2  
Intermediate result (optional)
  - ③ Instruction(s)/Step 3
  - ④ Instruction(s)/Step 4  
End result (optional)



# Safety

## Read carefully

- Observe the safety information in this System Manual.
- Observe the safety information in the assembly and installation instructions of the components used.
- The information about intended use as provided in this section should also be taken into account.

The safety-related information is provided to help you identify and avoid risks in good time. This information is essential for safe assembly and use of the unibar M system.



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## 02.01 Intended use

### **Busbar Trunking System with type test according to EN 61439-6**

The unibar M Busbar Trunking System is designed for setting up fixed, encapsulated busbar trunking systems BTS (**B**usbar **T**runking **S**ystems) according to EN 61439-6.

#### **Design versions**

Busbar elements with different geometric shapes are available.

The Busbar Trunking System can be routed as follows:

- Horizontal installation
  - Housing in flat position, conductor upright position or
  - Housing in upright position, conductor flat position
- Vertical installation

Basic features of unibar M Busbar Trunking System with protection type IP55

- System for transporting electrical energy (currents from 160 A to 1000 A) to supply medium-sized consumers in buildings and all sectors of industry.
- Can be fitted with tap-off boxes at predefined tap-off points to withdraw electrical energy.
- Can be fitted with cable feeders.

#### **Complies with EN 61439-1/-6**

unibar M Busbar Trunking Systems are manufactured according to EN 61439-1/-6. Intended use includes observing the technical data.

The unibar M system is used to install a busbar trunking system based on the specific project:

Hager is responsible for planning the individual busbar trunking system according to the specifications provided by the user. The busbar elements are installed by Hager or panel builders licensed by Hager. An electrically skilled person with appropriate testing experience must commission the system for the first time at the user's premises. Installation, extensions and commissioning by ordinary persons are not permitted.

The unibar M system is designed for fixed indoor installation.

#### **Restrictions on operation by ordinary persons**

The unibar M system with tap-off boxes may only be operated by non-professional electrical personnel to a limited extent.

- In the case of tap-off boxes with miniature circuit breakers, residual current circuit breakers and fuse links up to 63 A, ordinary persons are permitted to restart the system.
- Only the following persons may carry out operating procedures on tap-off boxes with NH fuse elements and moulded case circuit breakers:
  - Electrically skilled personnel/electrotechnical specialist personnel or
  - Electrically instructed persons.

Prevent access and switching operations by unauthorised personnel and secure all separators and actuator devices against reconnection by means of prohibition signs and one or more of the following methods:

- by effective barriers
- with padlocks
- with blocking elements.

**Intended use also includes**

- Reading and observing the System Manual.
- Reading and observing this manual along with any instructions provided with the system components (where available).
- Complying with the safety regulations.

**02.02 Foreseeable misuse**



**DANGER!**

Danger due to electric shock or arc faults

Misuse can result in high voltages and high currents, which can lead to dangerous situations. This may result in serious injuries and even death.

- Only use the product in areas for which the product is designed.
- Never operate the product outside the specifications provided in the Technical Data.
- Observe the instructions for extension and the project planning rules.
- Always observe the requirements for personnel qualifications.

Any use other than or beyond that specified, as well as modifications to the components and busbar elements that are not designated in the system proposal are considered to be misuse. Hager does not assume any liability for damages resulting from misuse.

Examples of misuse of the unibar M Busbar Trunking System:

- Misuse as a walkway, working platform, shelf.
- Misuse of unibar M elements to fasten other trunking, frames or other objects.
- Unauthorised drilling or welding on busbar elements or energy distribution elements.
- Removal of flanges/covers and their screw connections or the removal of components necessary for safe operation.

**02.03 Observe the installation manual**



**Danger**

Risk of life-threatening injuries and even death if installation manual is not observed.

- Carefully read and observe the installation manual for the unibar M Busbar Trunking System according to EN 61439-6.
- In the installation manual, you will find safety-related information on transport, storage, assembly, operation, inspection and finally the disposal of system components.
- Observe the safety information in the installation manual. This information is essential for safe assembly and use of the Busbar Trunking System.

## 02.04 General safety instructions

### Electrical hazards - 5 safety rules before starting work



#### Danger

Electric shock from contact with live parts!

Electric shock can result in death!

- ① Disconnect completely (all poles and all sides).
- ② Secure against reconnection.
- ③ Verify the absence of voltage.
- ④ First earth and then short-circuit.<sup>[1]</sup>
- ⑤ Cover or shield any adjacent live parts.

<sup>[1]</sup> When working on low-voltage systems, the step for earthing and short-circuiting the system may only be omitted if there is no danger of voltage transmission or backfeed.

#### **Minimum qualifications of specialist personnel: qualified electrician/electrically skilled person with appropriate testing experience**

Only electrically skilled personnel may assemble, install, test, maintain, dismantle, and dispose of components of the unibar M Busbar Trunking System.

#### **Observe residual energies and static discharge**

Prior to starting activities during installation work, disconnect the system and make sure it is statically discharged before touching the devices. Static voltages can result in personal injuries.

#### **Observe the tolerance of the mains voltage**

Observe the specified mains voltage tolerance. Mains voltage fluctuations or deviations from the nominal value may not exceed the tolerance limits specified in the technical data. If the tolerance limits are exceeded, functional failures and hazardous conditions cannot be excluded.





# Why use a Busbar Trunking System?

This section provides background information on Busbar Trunking Systems.

An energy distribution system must not only be flexible and cost-efficient, but also space-saving, safe and offer a long service life. unibar M Busbar Trunking Systems from Hager are just that: efficient and reliable. Using this system, energy can be transported, distributed and switched precisely.



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## 03.01 Purpose of a Busbar Trunking System

### Easy to plan

Easy to plan, quick to install and flexible in use: the unibar M carries energy economically into every building and industrial environment with a power requirement of 160 A to 1000 A.

- Energy distribution can be planned with precision based on the total connected load and the type and number of consumers.
- The modular design with frequently placed tap-off possibilities gives you a flexible infrastructure.
- Standardized sizes ensure that all applications can be implemented quickly and in a way that saves space.

### Time-saving and economical assembly

Advantages of installation:

- Two-person installation of the Busbar Trunking System saves time and money compared with complex and expensive conventional cable installation.
- Installation errors are virtually eliminated thanks to the safe and reliable, user-guided connection technology.
- No special tools are required.
- Easy and thus quick assembly with large distance between mounting points (up to 4 m compared to 1.5 m for cable installation).
- Elements to compensate the expansion are not needed.

Hager's unibar M Busbar Trunking System therefore offers a cost-effective alternative to cable installation.

### Safe: High level of short-circuit resistance and minimum fire load

A step ahead in terms of safety - both in relation to short-circuit resistance and fire load.

- The Busbar Trunking System has a high short-circuit resistance and a very low fire load.  
Example: The unibar M straight length elements for a rated current of 250 A have a fire load of just 1.32 kWh/m. Comparable cables (NYY 4 × 95/50 mm<sup>2</sup>) have a fire load of 5.19 kWh/m by comparison.
- The busbar systems are halogen-free.
- In addition, short-circuit protection close to the load facilitates troubleshooting

The busbars comply with Standards EN 61439-1 and EN 61439-6.

### Flexibility

If energy distribution needs to be adapted to new requirements, a Busbar Trunking System can facilitate this quickly.

- For example, new tap-off boxes can be easily mounted at the tap-off points.
- The system can be easily expanded and modified.
- Tap-off boxes and system components increase flexibility. Cost-intensive downtimes are either reduced or eliminated.
- The Busbar Trunking System ensures fault-free operation, along with a high level of user friendliness and safety.

### 03.02 Comparison of Busbar Trunking System and cable installation

Feature	Busbar Trunking System	Cable installation
Operational safety	Type test according to IEC EN 61439-6 (VDE 0660-600-6).	Depends on the quality of the design.
Mechanical reliability	High	Low
Fire load	Low	High
Temperature behaviour	Ambient temperature – min. - 5 °C – max. +40 °C – +35 °C in 24-hour average	Cable loads are specified as +30 °C according to DIN 57298 Part 4/VDE 0298 Part 4/2.88.
Network construction	Clear layout based on linear network construction with conductor outputs arranged serially via tap-off boxes.	Very large accumulation of cables at feeding point due to star-shaped supply of consumers from central energy distribution.
Safety devices for consumers	In tap-off box. Ensures direct, immediately traceable allocation to the consumer on site.	Centralised in distribution board. Allocation to the consumer cannot therefore be verified directly. It is important that the labelling of the cable and consumer are correct and must always be checked.
Space requirement	Low as a result of compact design due to high current-carrying capacity and standard elements.	High as large distribution units are required. The installation criteria (accumulation, type of installation, current-carrying capacity, etc.) must be observed.
Upgradeability if conductor outputs are changed	High level of flexibility thanks to tap-off points in the straight length elements and a large number of different tap-off boxes	Only possible with substantial effort. Additional cables must be installed from central distribution unit to consumer.
Planning and project management	Easy and quick using computerised planning tools	High level of project planning effort/complexity (distribution unit and cable layout, cable plans, etc.)
Sizing (current, voltage drop, nulling conditions)	Low effort	High effort
Troubleshooting effort	Low	High
Fire barrier unit	Type tested, factory ready	Depends on quality of design at the installation site.
Functional integrity	Tested functional integrity according to DIN 4102-12.	Depends on quality of design at the installation site
Electromagnetic interference	Low due to sheet steel enclosure and conductor configuration.	Relatively high for standard cables
Assembly	Minimum level of assembly material and aids, short assembly times.	High level of assembly material and extensive aids, long assembly times.
Weight	Weight reduction of a half, or even a third, compared with cabling.	Up to 3 times heavier than a comparable busbar trunking system.
Halogen-free, PVC-free	Busbar elements are basically halogen and PVC-free	Standard cables are not halogen and PVC-free. Halogen-free cables are more expensive than standard cables.

# Design and characteristics

This section describes the design and characteristics of the Busbar Trunking System.



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#### 04.01 Characteristics of the unibar M Busbar Trunking System

- Type tested according to international standards DIN EN IEC 61439-1 and 61439-6; CE marking.
- Aluminium busbars with a rated current of 160 A to 1000 A (160 A, 250 A, 400 A, 630 A, 800 A, 1000 A).
- Voltages up to 690 V AC, frequency 50 Hz.
- Busbar elements with protection type IP55.
- 5-conductor system.
- Housing made of galvanised steel and painted sheet steel in light grey RAL 7035. Exception: Size 1 tap-off boxes have a plastic housing made of insulating material.
- The inner conductors of the busbar elements are made of nickel-plated and tin-plated aluminium.
- Installation can be either horizontal or vertical.
- Ambient temperature: min. -5 °C, max. 40 °C, 24-hour average 35 °C.
- All system components are silicone-free and halogen-free.

##### Flexibility and expandability

- The main components are: straight length elements, change of direction elements in various geometric shapes (L, Z, T, flexible), cable feeders and tap-off boxes. Additional equipment is available, for example, end flanges, joint blocks and fastening elements.
- Straight length elements with or without tap-off points are available in standard lengths 1.25 m, 2.25 m and 3.25 m (IP55).
- In addition, straight length elements can be ordered in lengths of 0.5 m to 3.24 m (IP55).
- Fire barrier can be supplied with fire resistance rating EI90 and EI120 according to DIN 4102, Sheet 2 to 4 and EN 1366
- Changes of direction elements:
  - L-Elements with a standard angle of 90°, or in 5° increments from 85° to 175° (IP55) can be ordered,
  - Z-Elements (2 x 90° angled) (IP55),
  - T-Elements (IP52),
  - Flexible change of direction elements (IP52).
- Cable feeders:
  - Cable end feeders (IP54),
  - Centre feeds (IP54),
  - Distribution board feeding units (IP00).
- Additional equipment: End flanges, brackets, joint blocks.

##### Tap-off boxes and tap-off points

- Tap-off boxes are available in 5 sizes for rated currents of 25 A to 630 A.
- Tap-off boxes have IP54 protection and can be upgraded to IP55 by means of sealing kits (except for models with transparent flap).
- Tap-off boxes and tap-off points can be sealed.
- tap-off points in the straight length elements are staggered every 0.25 m or 0.5 m on both sides.



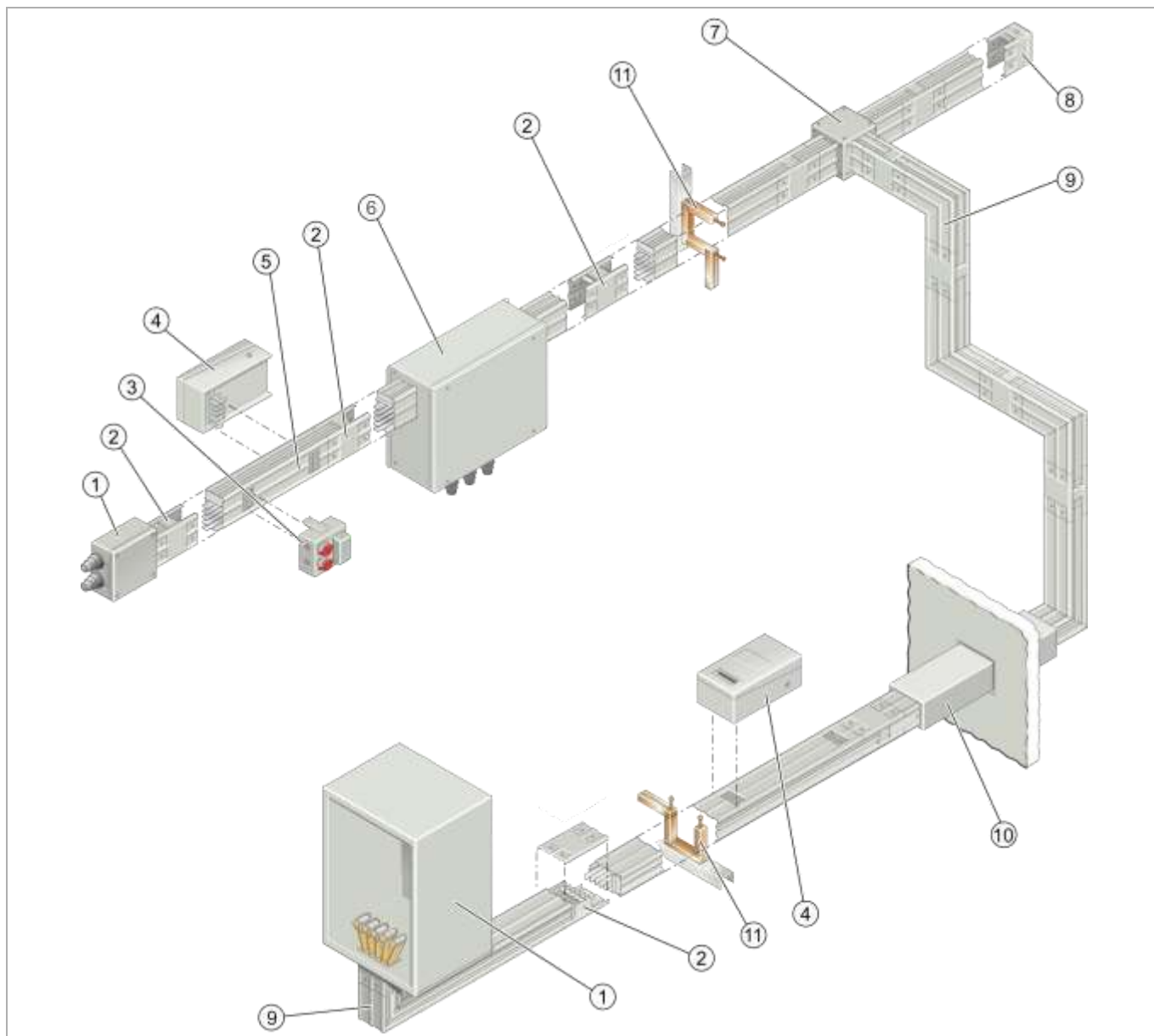
#### Advantages

- Straight length elements, L-Elements and Z-Elements with protection type IP55.
- T-Elements and flexible change of direction elements with protection type IP52.
- Cable feeders with protection type IP54.
- Tap-off boxes with protection type IP54, with additional equipment IP55 (versions without transparent flap).
- Easy and quick to plan.
- Time-saving and economical assembly, ready for operation quickly as a result.
- Reliable and safe in operation.
- Flexible building block system with easy solutions for every application.
- Facilitates early planning of energy distribution even before knowing the exact location of consumers.
- Innovative design, e.g. there are no compensating boxes for expansion compensation.
- Can be sealed throughout.

#### unibar M performance data

Rated current	160 to 1000 A
Rated operating voltage	690 V AC
Frequency	50 Hz
Number of active conductors	5
Protection type	Up to IP55
Ambient temperature, min./max.	-5/+40 °C
Busbar run installation position (routing direction)	Vertical, horizontal
Installation position of elements (orientation of housing)	Flat position, upright position
Length	0.5 to 3.25 m
Tap-off points	Without or on both sides staggered every 0.25 or 0.5 m
Tap-off boxes	Up to 630 A
Material	Al bars, painted sheet steel housing
Fire load	0.6 to 0.67 kWh/m (without tap-off points)
Can be combined with communication-enabled tap-off boxes for ...	Light control, remote switching and reporting as well as consumption recording

## 04.02 System components - Overview



- ① Cable end feeder
- ② Joint block
- ③ Tap-off box, size 1
- ④ Tap-off box, size 2 or higher
- ⑤ Straight length element
- ⑥ Intermediate cable feeder
- ⑦ Change of direction: T-Element
- ⑧ End flange
- ⑨ Change of direction: L-Element (90° horizontal or 90° vertical)
- ⑩ Fire barrier
- ⑪ Additional equipment for fastening

### 04.03 Basic principles of busbar elements

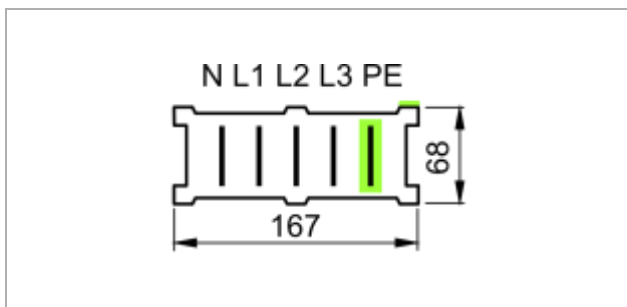
#### Busbars

Actual power transmission takes place within the busbar elements via 5 nickel-plated and tin-plated aluminium profiles, the busbars (N, L1, L2, L3 and PE).

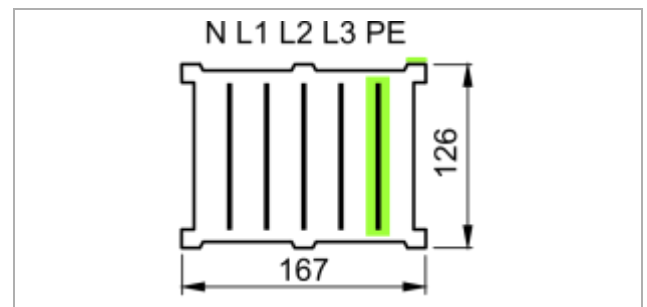
The low self-impedance and large surface of the busbars reduce heat development. This results in a low transmission loss and low voltage drop.

#### Housing

- The housings consist of galvanised steel with paint in the colour RAL 7035 (light grey).
- All straight length elements, L-Elements and Z-Elements have IP55 protection type as standard, cable feeders IP54.
- All tap-off boxes have IP54 protection type as standard, IP55 with additional equipment (versions without transparent flap).



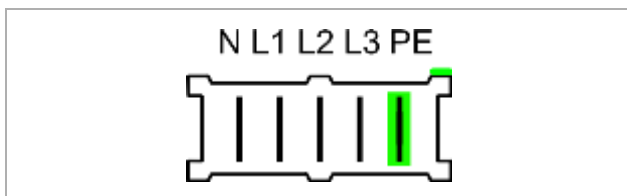
Housing cross-section with position of the busbars for 160 A to 400 A



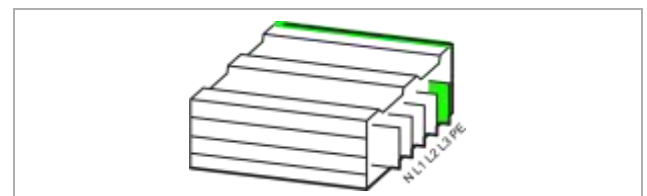
Housing cross-section with position of the busbars for 630 A to 1000 A

#### Position of the PE bar

- The reference point is the side with the open bar end, i.e. the side without the joint block.
- The PE bar is usually on the right.
- The side with the PE bar is marked in green in this document.



Cross-section through a busbar with marking for the PE side (right) with green line



Open end of bar with marking for the PE side (right) with green line

#### Dimensions of busbars

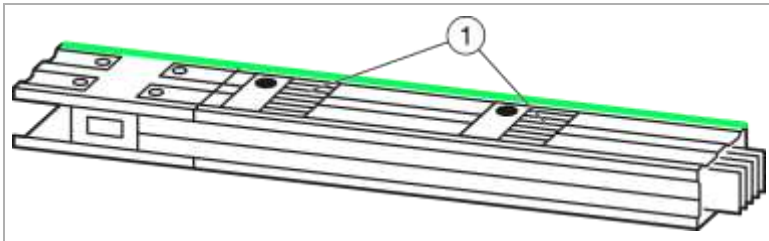
All busbars (N, L1, L2, L3 and PE) have the same cross-section.

Rated current In	Cross-section	Width	Height
160 A	63 mm <sup>2</sup>	167 mm	68 mm
250 A	108 mm <sup>2</sup>	167 mm	68 mm
400 A	205 mm <sup>2</sup>	167 mm	68 mm
630 A	381 mm <sup>2</sup>	167 mm	126 mm
800 A	446 mm <sup>2</sup>	167 mm	126 mm
1000 A	699 mm <sup>2</sup>	167 mm	126 mm

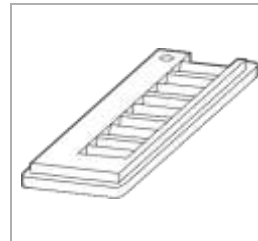
**Tap-off points**

The tap-off points are an integral component of the straight length elements.

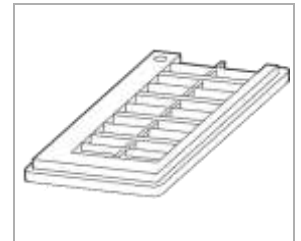
- The tap-off points are in a single row for 160 A to 400 A, and two rows for 630 A.
- The leading or lagging PE contact on the tap-off box ensures positive opening and closing of the tap-off point.
- Tap-off boxes (KEB7x) of sizes 1 to 04 can be plugged into all single-row and double-row tap-off points, tap-off boxes of size 05 (630 A) into the double-row tap-off points only.
- Tap-off points can be sealed.



Straight length element with tap-off points ①



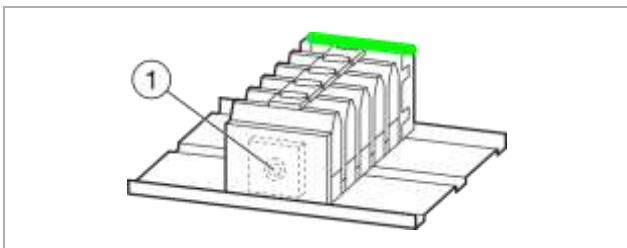
Single-row tap-off point (160 A to 400 A)



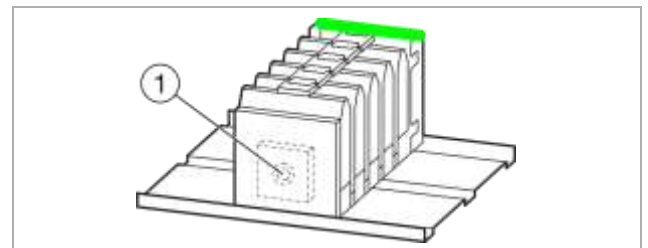
Double-row tap-off point (630 A)

**Joint blocks**

Joint blocks are used to connect the busbar elements quickly and safely.



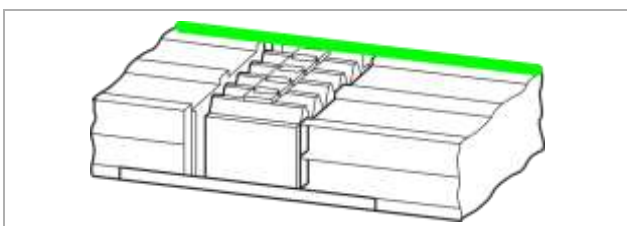
Joint block for 160 A to 400 A with single bolt clamp ① (behind cover)



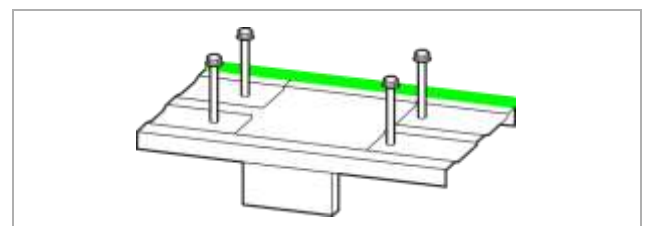
Joint block for 630 A to 1000 A with single bolt clamp ① (behind cover)

**Features:**

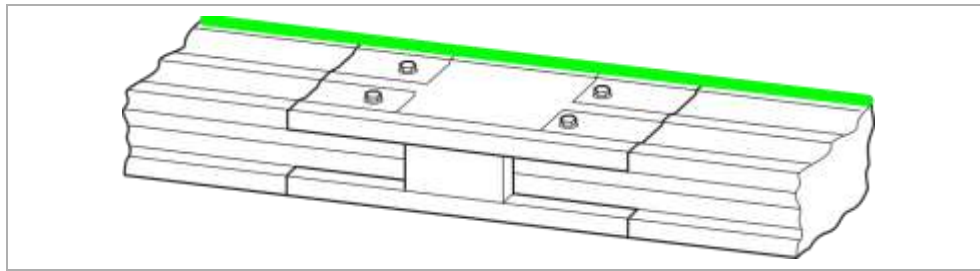
- The even pressing force of the joint blocks ensures that all five busbars are connected securely.
- Quick assembly using single bolt clamp.
- The installed expansion compensation compensates for the thermal expansion of the busbars.
- Joint blocks can be tightened with conventional tools.
- Four screws are used for mechanical connection of the joint block cover and joint block.
- Two sizes are available for the entire system: For 160 A to 400 A and for 630 A to 1000 A.
- One joint block is included in the scope of delivery for straight length elements, L-Elements, Z-Elements and T-Elements.



Joint block (installed)



Joint block cover



Joint block (installed) with mounted joint block cover

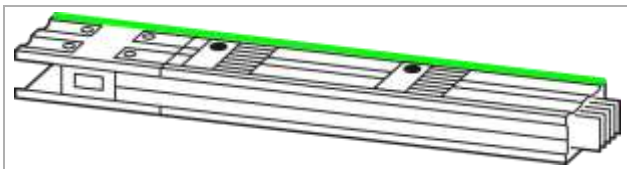
## 04.04 Busbar elements

### Straight length elements

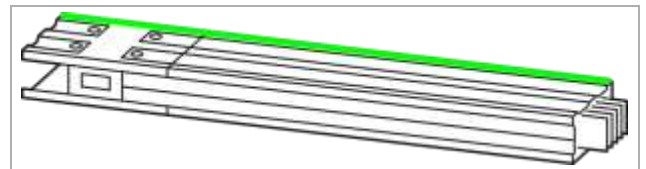
The foundation of the busbar system is the straight length elements to bridge distances.

Straight length elements are available in two versions:

- Without tap-off points.
- With tap-off points. They are located on both sides at a distance of 0.5 m and offset by 0.25 m from each other.



Straight length element with tap-off points



Straight length element without tap-off points

Available lengths:

- Standard lengths of 1.25 m, 2.25 m and 3.25 m.
- Lengths between 0.5 m and 3.24 m can be ordered. It may not be possible to fit tap-off points with tap-off boxes.
- Customizable adjustable length of 1.25 m, can be shortened to 0.5 m (full cross-section for N and PE, without tap-off points).

Number of tap-off points:

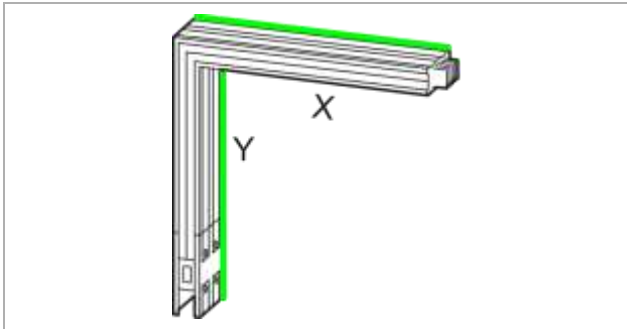
Length	Tap-off points both sides
1.25 m to 2.25 m	4 to 8
2.26 m to 3.25 m	8 to 12

One joint block is included in the scope of delivery.

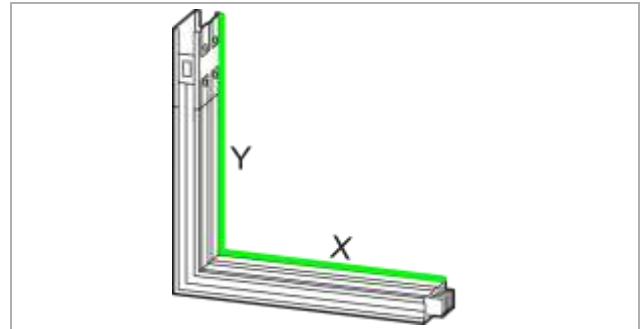
Busbar elements with a fire barrier can be configured as an additional ordering option (from a planning length of 0.86 m). See the section on fire protection.

**Changes of direction: L-Elements 90°**

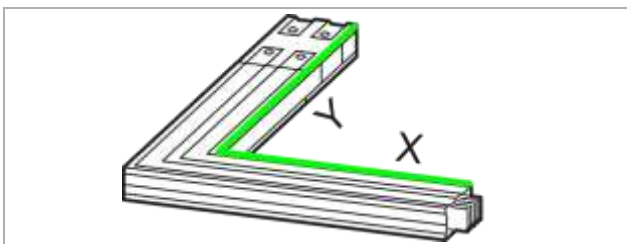
L-Elements are used to change direction by 90°. Four different versions are available.



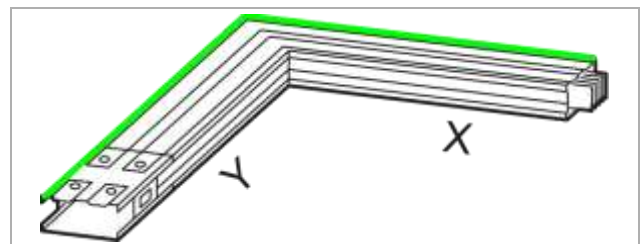
Vertical L-Element (angle), 90° downwards



Vertical L-Element (angle), 90° upwards



Horizontal L-Element (angle), 90° to the right (PE inside)



Horizontal L-Element (angle), 90° to the left (PE outside)

L-Elements can be supplied with the following leg lengths:

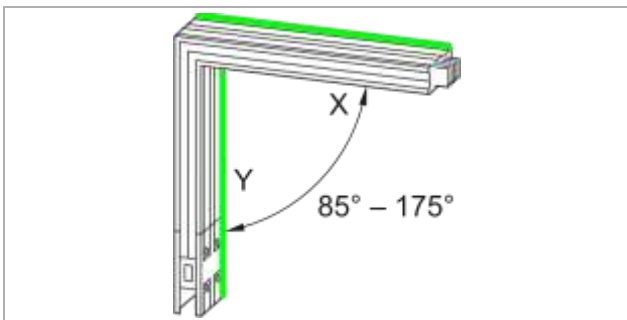
- Standard length of 0.36 m for both legs X and Y.
- Standard length of 0.36 m for leg X and length of 0.36 m to 1.25 m available to order for leg Y.
- Length of 0.36 m to 1.25 m available to order for leg X and standard length of 0.36 m for leg Y.
- Length of 0.36 m to 1.25 m available to order for both legs X and Y.

One joint block is included in the scope of delivery.

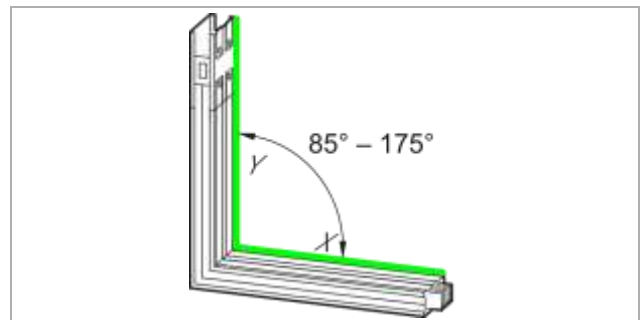
A fire barrier can be configured as an ordering option from a minimum leg length, see the section on fire protection.

**Changes of direction: L-Elements with configurable angle in increments of 5° from 85° to 175°**

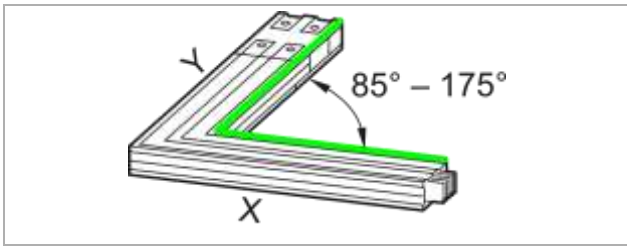
L-Elements with a with configurable angle from 85° to 175° (increments of 5°) are used for changes of direction. Four different versions are available.



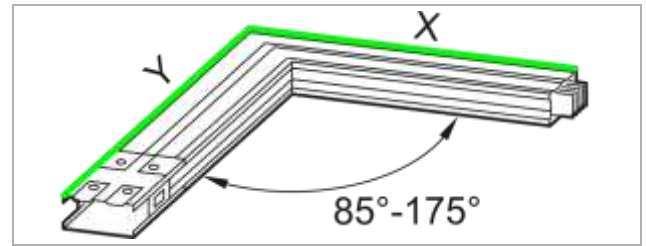
Vertical L-Element (angle), 85° to 175° downwards



Vertical L-Element (angle), 85° to 175° upwards



Horizontal L-Element (angle), 85° to 175° to the right (PE inside)

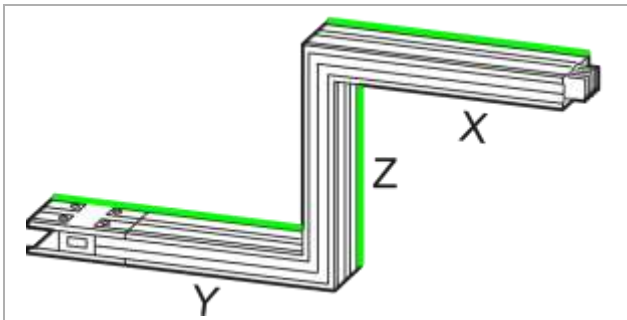


Horizontal L-Element (angle), 85° to 175° to the left (PE outside)

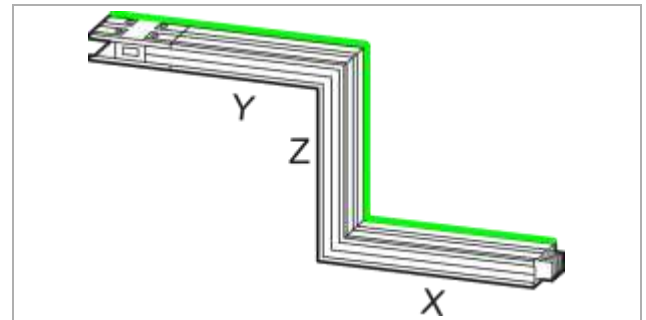
L-Elements with a with configurable angle can be supplied in the same leg lengths as 90° L-Elements. One joint block is included in the scope of delivery.  
A fire barrier can be configured as an ordering option from a minimum leg length, see the section on fire protection.

**Changes of direction: Z-Elements**

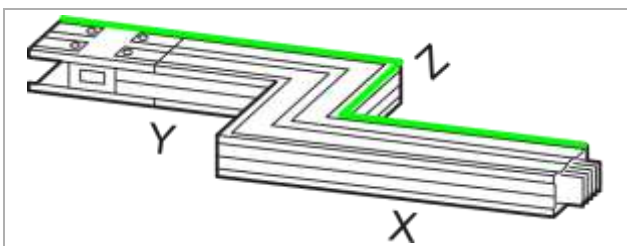
Z-Elements are used for a double change of direction, each by 90°. Four different versions are available.



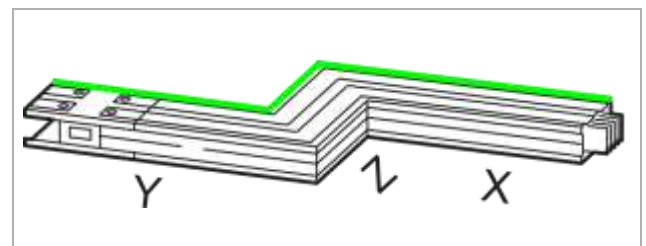
Vertical Z-Elements, first 90° downwards, then 90° upwards



Vertical Z-Elements, first 90° upwards, then 90° downwards



Horizontal Z-Elements, first 90° to the right, then 90° to the left



Horizontal Z-Elements, first 90° to the left, then 90° to the right

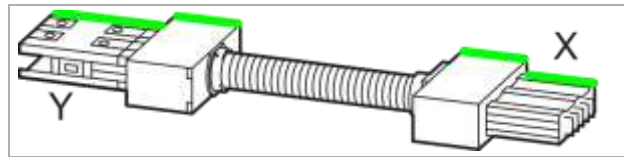
Z-Elements with the following leg lengths can be supplied:

- Leg X and Y:
  - Standard length of 0.36 m for both legs
  - Length from 0.36 m to 0.60 m available to order for both legs
- Leg Z: length can be ordered depending on the position and the rated current:
  - Vertical, for 160 A to 400 A: between 0.14 m and 1.25 m
  - Vertical, for 630 A to 1000 A: between 0.26 m and 1.25 m
  - Horizontal, for 160 A to 1000 A: between 0.34 m and 1.25 m

One joint block is included in the scope of delivery.

**Changes of direction: Flexible direction change element**

Flexible change of direction elements are provided for complex installation conditions that cannot be covered with other busbar elements.



Flexible direction change element

Features:

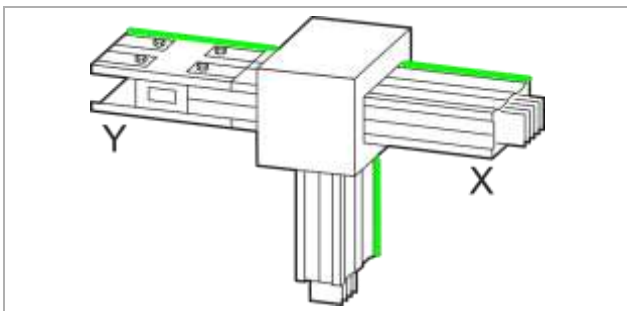
- Flexible routing, e.g. U-shape or Z-shape (see dimensional sketches).
- In the middle with flexible copper conductors in insulating sheath.
- Can be used for rated current up to 800 A.
- One joint block is included in the scope of delivery.

Limitations:

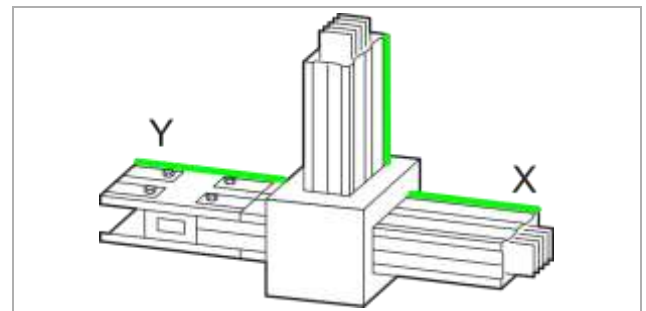
- Cannot be attached directly to a feeding unit.
- IP 54 protection type, cannot be upgraded to IP55.

**Changes of direction: T-Elements**

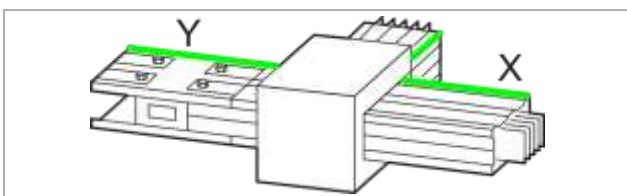
T-Elements are used for a junction, the junction has an angle of 90°. Four different versions are available.



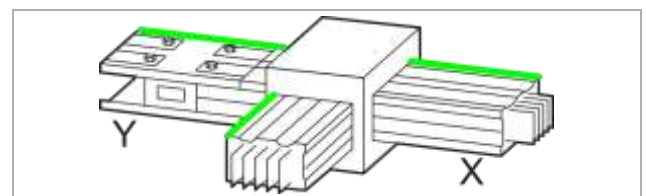
Vertical T-Element, 90° downwards



Vertical T-Element, 90° upwards



Horizontal T-Element, 90° to the right



Horizontal T-Element, 90° to the left

Each of the three legs is 0.36 m long.  
One joint block is included in the scope of delivery.



## 04.05 Fire barrier

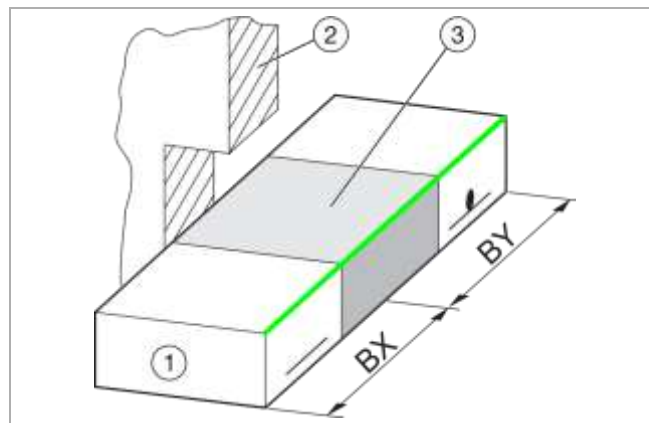
If the Busbar Trunking System is routed through a firewall or fire ceiling, it must be fitted with a fire barrier in the bushing area.

- The length of a fire barrier is always 0.5 m.
- Fire resistance ratings S90 and S120 are available to meet on-site requirements.

The fire barrier can be configured as an ordering option and are supplied ex works.

Busbar elements that can be fitted with fire barrier:

- Straight length elements in standard lengths
- Straight length elements with configurable length from a minimum length of 0.86 m
- L-Elements from certain minimum leg lengths, see main section on fire protection



Use of fire barrier as fire protection (principle sketch)

- ① The side with the open bar end, i.e. the side without the joint block
  - ② Firewall or fire ceiling
  - ③ Fire barrier area (0.5 m)
- BX Distance between open bar end and centre of firewall or fire ceiling  
 BY Distance between bar end with joint block and centre of firewall or fire ceiling

Fittings ex works:

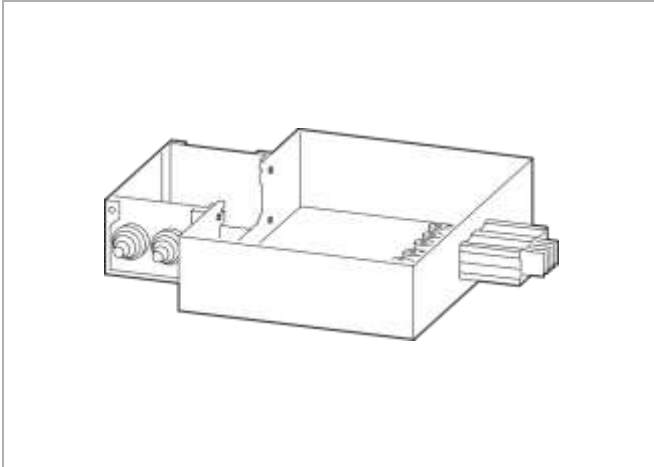
- Internal fire protection (fire barrier)
- Documentation (approval document, wall plates and confirmation of conformity), as separate kit KEM31S86R0LMF (for S90) or KEM31S87R0LMF (for S120) for Germany.

Comment: Mineral wool to be cut to size must be provided by the customer for closing the joints between the busbar trunking element and the component.

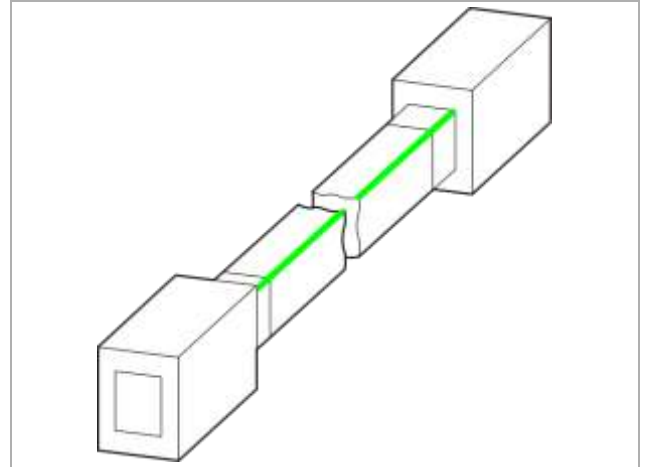
## 04.06 Cable feeders

Various cable feeder versions are available depending on requirements.

### Cable end feeders (single or double-sided)



Example: Cable end feeders  
with cable compartment built on



Double-sided cable end feeder (principle sketch)

### Features

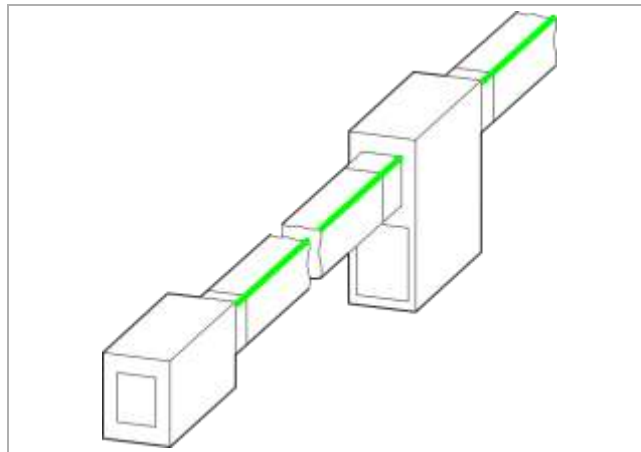
- The cables are inserted from the face end, lateral cable entry is possible in the version with cable connection compartment.
- With cable entry plate (aluminium) for single conductor cable entry.
- The cables are connected via bolts included in the scope of delivery.
- The phasing can be changed on site by turning the busbar connection terminal.
- The factory-mounted bridge between PE and N can be removed when connecting 5-conductor cables.
- Cannot be attached to L-Elements, Z-Elements or T-Elements directly.
- Delivery without joint block. An additional joint block must be provided in the case of a double-sided feeding unit.

### Versions

- Cable end feeders without joint block
- Cable end feeders without joint block, with cable entry plate
- Cable end feeders without joint block, with cable compartment
- Cable end feeders without joint block, with cable compartment and cable entry plate

### Intermediate cable feeders

It is sometimes practical to use a centre feed to distribute large outputs with small busbar cross-sections. An intermediate cable feeder is mounted in the middle of a run between two busbar elements for this purpose.



Example: Centre feed with additional cable end feeder  
(principle sketch)

**Features**

- The left and right runs are supplied simultaneously with one cable feed.
- For example, 2000 A can be fed in with a 1000 A centre feed.
- Delivery without joint block. When using cable end feeders in addition to the centre feed, an additional jointblock is required for each cable end feeder.
- Please pay particular attention to the overload protection and short-circuit protection of the busbar system.

**Overload protection and short-circuit protection**

Additional protective measures are required if short-circuit protection is not guaranteed by the upstream protective device and/or the overload is not provided by the type and number of consumers.

There are two possible options here:

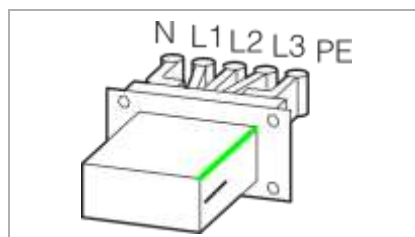
- Use of a centre feed with a coupling unit for the right and left beside the feeding unit. The coupling unit is fitted with a safety device (fuse or circuit breaker) to guarantee short-circuit and overload function. Coupling units can always be configured as a special version. Contact your Hager partner for project planning and configuration.
- Use of two cable end feeders arranged centrally in the strand run. The two supply lines are fused separately in the distribution board.

**Versions**

- Intermediate cable feeders without joint block
- Intermediate cable feeders without joint block, with cable entry plate

**Distribution board feeding unit**

- For connection to a switchgear and controlgear assembly.
- Delivery without joint block.



Distribution board feeding unit

### 04.07 Tap-off boxes and expansion tap-off boxes



#### Attention

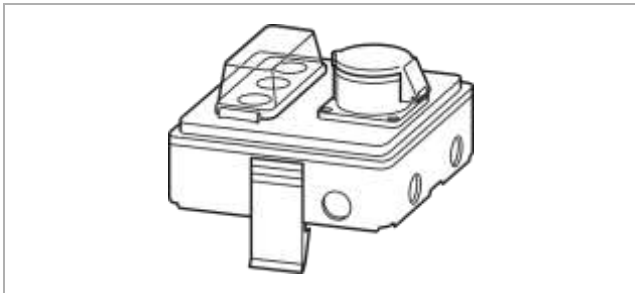
Tap-off boxes may not be used for feeding into the Busbar Trunking System.

- Use tap-off boxes only for tapping-off from the Busbar Trunking System.

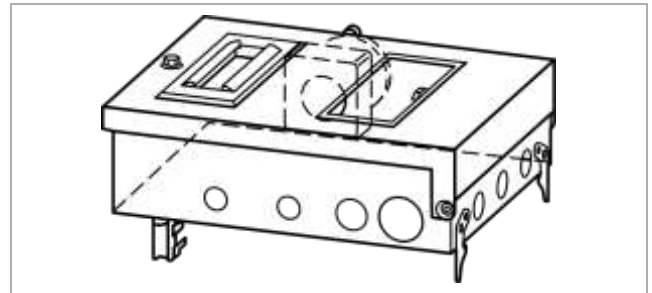
#### Examples

Tap-off boxes are available in various sizes and in different versions with specific features to suit the relevant application.

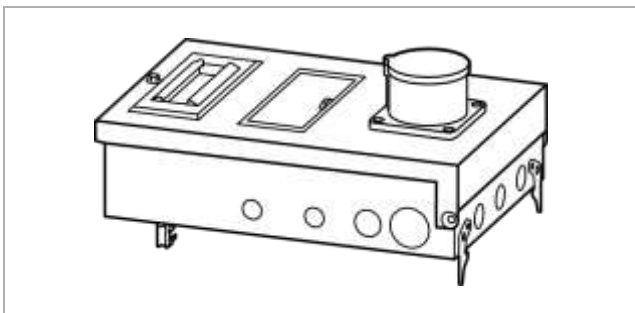
The standard protection type is IP54. Versions without a transparent flap can be upgraded to IP55 protection type using a sealing set, see product selection.



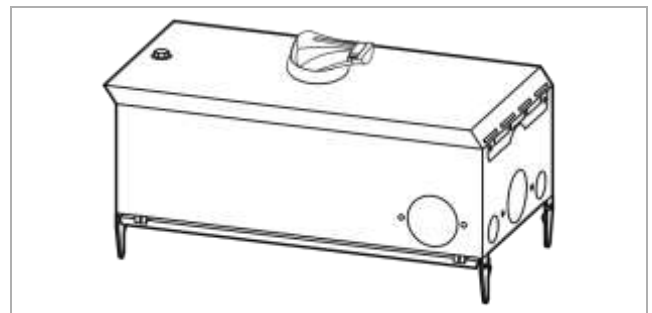
Example of a size 1 tap-off box:  
KEB771A1 with 2 x LD042 fuse socket and CEE socket



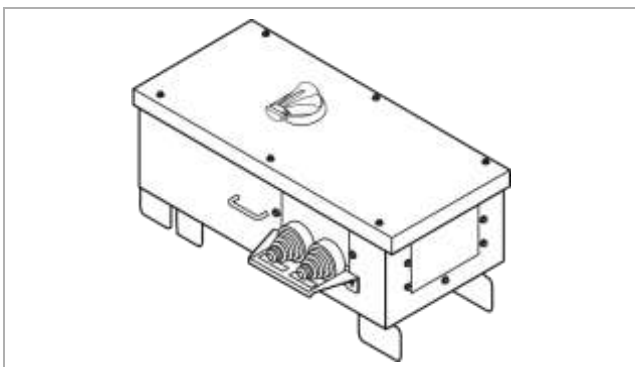
Example of a size 2 tap-off box:  
KEB772F1 with NCN332 miniature circuit breaker and CEE socket



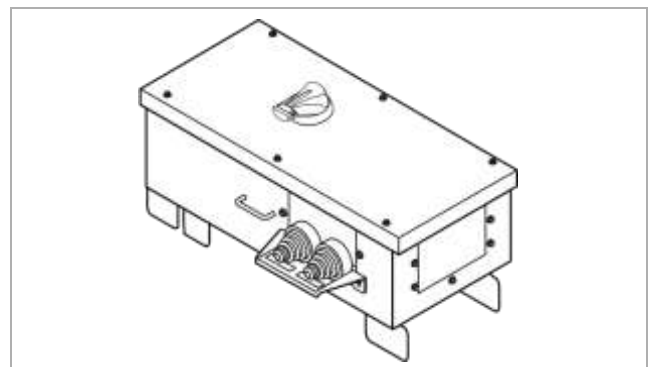
Example of a size 3 tap-off box:  
KEB772D1 with NCN363 miniature circuit breaker, transparent flap for operation from the outside and a CEE socket



Example of a size 03 tap-off box:  
KEB773A1 with HFD312 fuse switch disconnecter and HZC001 rotary drive



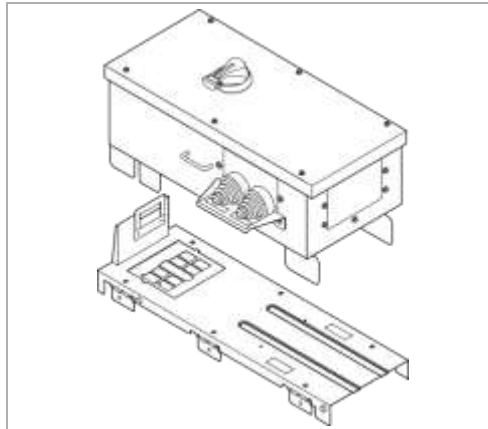
Example of a size 04 tap-off box:  
KEB774C1 with h3+ HNT250JR moulded case circuit breaker and HXT031H rotary drive



Example of a size 05 tap-off box:  
KEB776C1 with h3+ HNW630JR moulded case circuit breaker and HXE031H rotary drive

#### Mounting plate for sizes 04 and 05

These tap-off boxes are delivered with a mounting plate to adjust the width to the busbar elements, see the "Dimensional sketches" section also



Mounting plate for width adjustment

#### Overview of versions

Installed protection device	Socket(s)	Tap-off box size (design size)					
		1	2	3	03	04	05
Fuse socket	without	x	x	-	-	-	-
	CEE	x	x	-	-	-	-
Fuse base	without	-	-	x	-	-	-
Miniature circuit breaker	without	x	-	-	x	-	-
	CEE	x	x	x	-	-	-
	Schuko	x	-	-	-	-	-
	CEE and Schuko	-	x	-	-	-	-
Fuse switch disconnecter	without	-	x	-	x	x	x
Residual current circuit breaker	without	-	-	-	-	-	-
	CEE	x	x	-	-	-	-
	Schuko	x	-	-	-	-	-
h3+ moulded case circuit breaker	without	-	-	-	x	x	x
Freely assignable	without	x	x	x	x	x	x
Prepared for installation of an h3+ moulded case circuit breaker	without	-	-	-	-	x	x

#### Overview of features

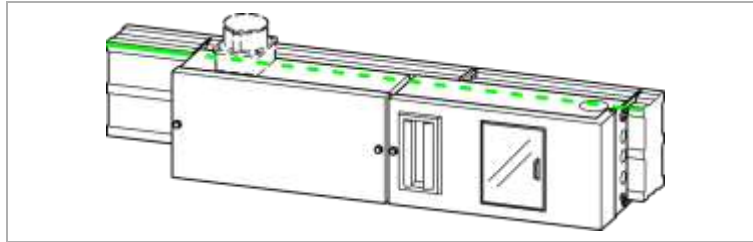
Feature/characteristic/Notes	Tap-off box size (design size)					
	1	2	3	03	04	05
Plastic housing – Light grey colour (similar to RAL 7035).	x	-	-	-	-	-
Sheet steel housing, galvanised – Powder-coated lid – Colour light grey RAL 7035.	-	x	x	x	x	x
With cover disconnecter: – Disconnecter integrated in the lid to guarantee that installed components are free of voltage when the lid is open. – Switching capacity at 63 A AC-22B up to 400 V or at 125 A AC-21B. – Lid with handle. – Fitting a padlock can prevent unintentional closing of the lid.	-	x	x	-	-	-
Anti-twist protection prevents incorrect fitting.	x	x	x	x	x	x
Can be fitted on all busbar elements (with single-row or double-row tap-off points).	x	x	x	x	x	-

## Design and characteristics

### Tap-off boxes and expansion tap-off boxes



Feature/characteristic/Notes	Tap-off box size (design size)					
	1	2	3	03	04	05
Can be fitted only on busbar elements with double-row tap-off points (from 630 A).	-	-	-	-	-	x
Supplied with mounting plate (for adjusting width to busbar elements, see dimensional sketches).	-	-	-	-	x	x
Do not fit or remove the tap-off boxes under load.	x	x	x	x	x	x
Load switching capacity AC-22B up to 400 V is reached when fitting and removing the tap-off boxes.	x	-	-	-	-	-
Tap-off boxes can only be fitted and removed with the lid open.	-	x	x	-	x	x
Tap-off boxes can be fitted and removed with the lid open and closed.	-	-	-	x	-	-
When the lid is open, the voltage remains on the installed devices (testing possibility). – Protection type IP20 (finger safety) is guaranteed.	-	-	-	x	-	-
Energy tap-off via silver-plated Iyra contacts.	x	x	x	x	x	x
Cables can be inserted from 3 directions.	x	x	x	x	x	x
Connections for multi-conductor or single-conductor cable possible.	-	-	-	-	x	x
Opening the box and connecting the cables is only possible with the tap-off box removed.	x	-	-	-	-	-
Connecting bolts for lines.	-	-	x	x	-	-
Integrated strain relief.	x	-	-	-	-	-
Use plastic cable glands with strain relief (not included in the scope of delivery).	-	x	x	x	x	x
Secure the connecting cable separately if necessary.	x	x	x	x	x	x
Note the following when using the PE conductor as PEN conductor: – The PE contact has only half the cross-section and therefore cannot carry the full rated current.	-	-	x	x	x	x
Versions with fuse switch disconnecter or moulded case circuit breaker: – The lid is locked with the switching element and can therefore only be operated when the switching element is turned off.	-	-	x	x	x	x
Versions with fuse base: – Cover disconnecter does not serve as a load disconnecter, but only to ensure that the installed fuse bases are voltage-free when the lid is open.	-	-	x	-	-	-
Transparent cover for the protective devices.	x	-	-	-	-	-
Versions with miniature circuit breaker: – With transparent flap to enable operation from the outside.	-	x	x	x	-	-
Versions that can be fitted as required: – Device installation as per customer needs in compliance with the requirements for type-tested low-voltage switchgear and controlgear assemblies. – Devices fixed on perforated plates, module bar or mounting rail according to EN 60715. – Project planning, proposal and delivery are carried out in conjunction with the contact person in the Hager branches.	x	x	x	x	x	x
Versions that can be fitted as required: Available with device installation unit. – For device installation (e.g. miniature circuit breakers) based on DIN 43871. – Space for 9 modules, 1 module corresponds to a space requirement of 18 mm. – Transparent flap to enable operation from the outside.	-	x	x	x	-	-

**Expansion tap-off boxes**

Example: Expansion tap-off box (left, with socket), fitted on a size 2 tap-off box

Expansion tap-off boxes are used to extend sizes 2, 3 and 03 tap-off boxes. They are flanged onto the side of these.

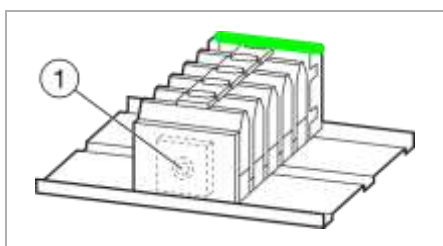
Features:

- Housing made of galvanised sheet steel
- Freely assignable
- Can only be combined with sizes 2/3/03 tap-off boxes
- With or without device installation unit (with transparent flap to enable activation from the outside)
- Cables can be inserted from 4 directions
- Integrated DIN rail for device installation (9 modules, 1 module = 18 mm space requirement)
- Device installation (e.g. miniature circuit breakers) possible based on DIN 43871 up to and including 63 A

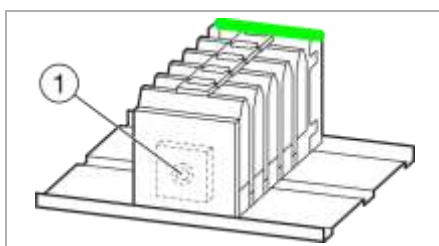
## 04.08 Additional equipment

### Joint blocks

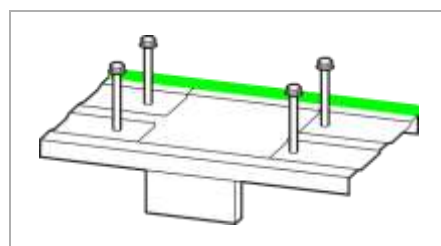
- See the section on the basic principles of busbar elements also.
- For connecting busbar elements.
- 2 versions
  - For 160 A to 400 A
  - For 630 A to 1000 A
- Laterally operated single bolt clamp to secure contact between busbars.
- With bolted joint block cover.



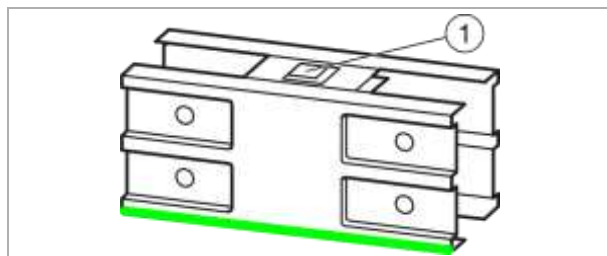
Joint block for 160 A to 400 A  
① Single bolt clamp (behind cover)



Joint block for 630 A to 1000 A  
① Single bolt clamp (behind cover)



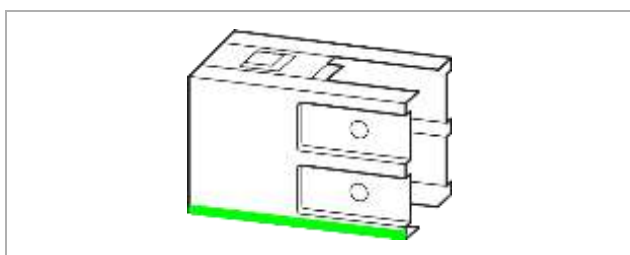
Joint block cover



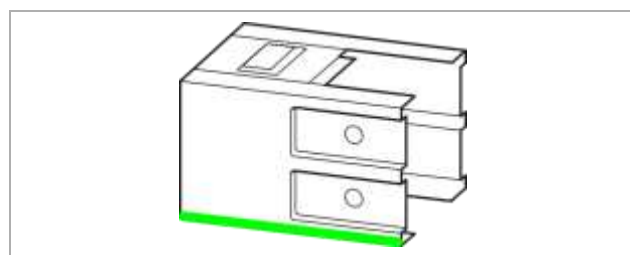
Delivered form: Joint block with mounted  
joint block cover  
① Cover for single bolt clamp

### End flanges

- To terminate a bar run
- 2 versions
  - For 160 A to 400 A
  - For 630 A to 1000 A



End flange for 160 A to 400 A



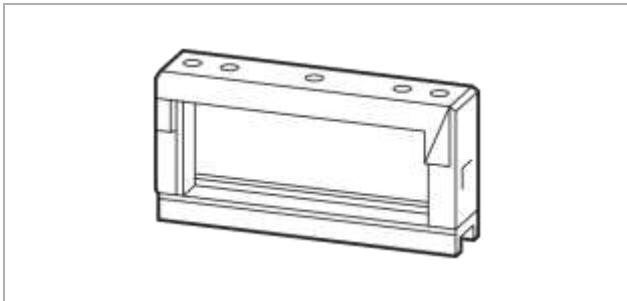
End flange for 630 A to 1000 A



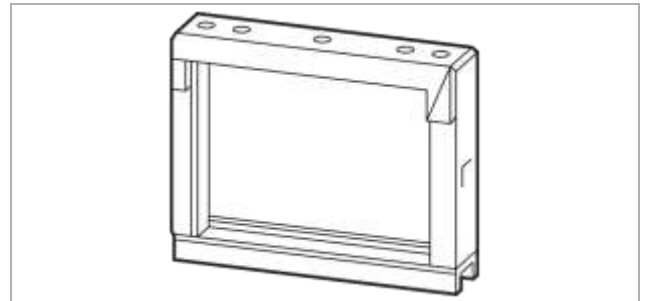
**04.08.01 Additional equipment for fastening**

**Fixing bracket**

- For mounting housing in flat or upright position
- 2 versions
  - For 160 A to 400 A
  - For 630 A to 1000 A



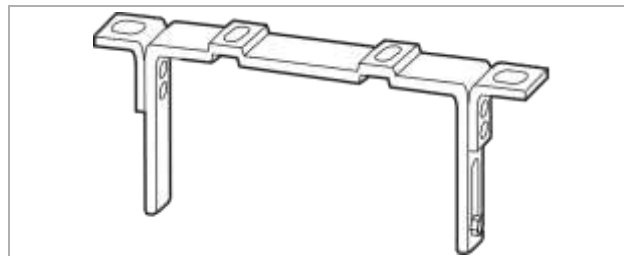
Fixing bracket for 160 A to 400 A



Fixing bracket for 630 A to 1000 A

**Spacer bracket**

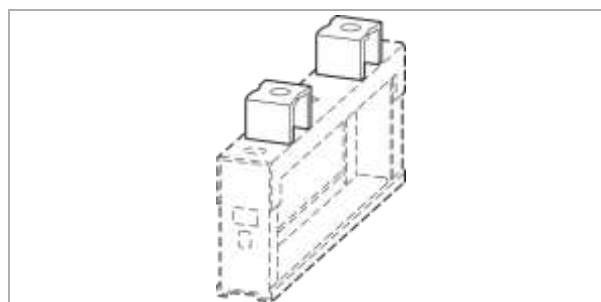
- To compensate for dimensional tolerances between the trunking unit and wall or ceiling
- Is pushed onto the fixing bracket and screwed on
- Can also be used as intermediate fastening tool when unibar M runs are arranged vertically



Spacer bracket

**Spacers**

- Used to compensate for the wall or ceiling distance between cable feeders and bar elements (40 mm)
- Required for every fixing bracket if the following conditions apply:
  - Horizontal strand run on the wall or ceiling mounting and
  - Busbar elements and cable feeders are mounted on the same wall/ceiling
- Snapped onto the fixing bracket
- Two spacers required per bracket



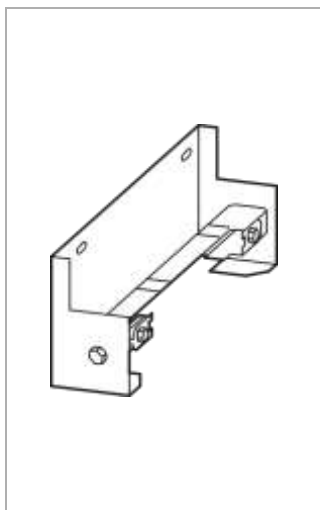
Spacers mounted on the fixing bracket

#### Fastening elements for vertical runs

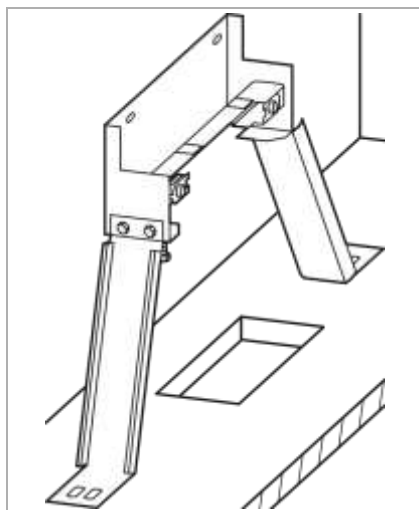
- Wall fixing element for fastening the busbar elements vertically on the wall directly.
- Ceiling mounting element to fasten the busbar run to the ceiling or on a raw floor directly at the ceiling duct.
- Wall fixing element for fastening the busbar run vertically on the joint block
- Wall fixing element for fastening to mounting rails (distance 1.6 m)

#### Features

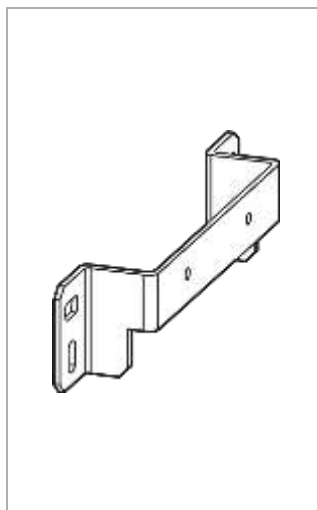
- Can be adjusted to compensate for uneven walls
- See project planning for maximum mechanical stress



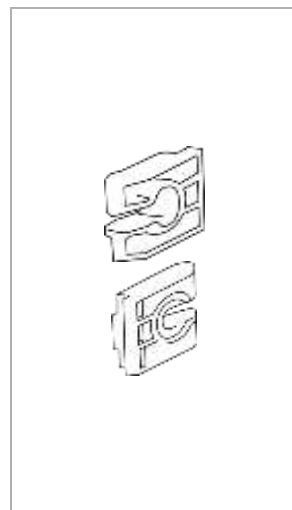
Wall fixing element for fastening vertically on the wall directly



Ceiling mounting element for fastening to the ceiling or on a raw floor (directly at the ceiling duct)



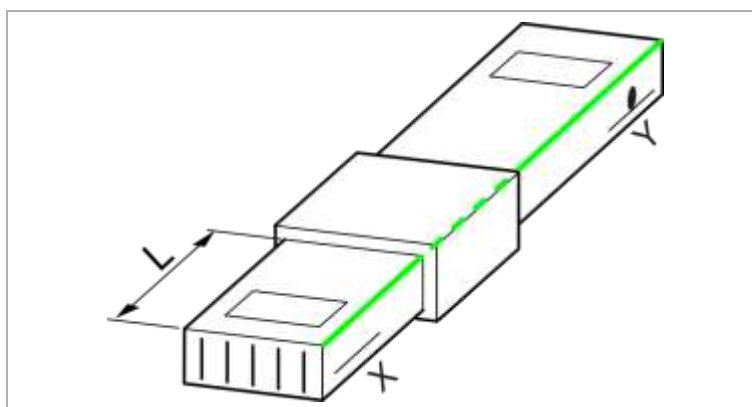
Wall fixing element for fastening vertically on the joint block



Wall fixing element for fastening to mounting rails

#### Protective sleeve

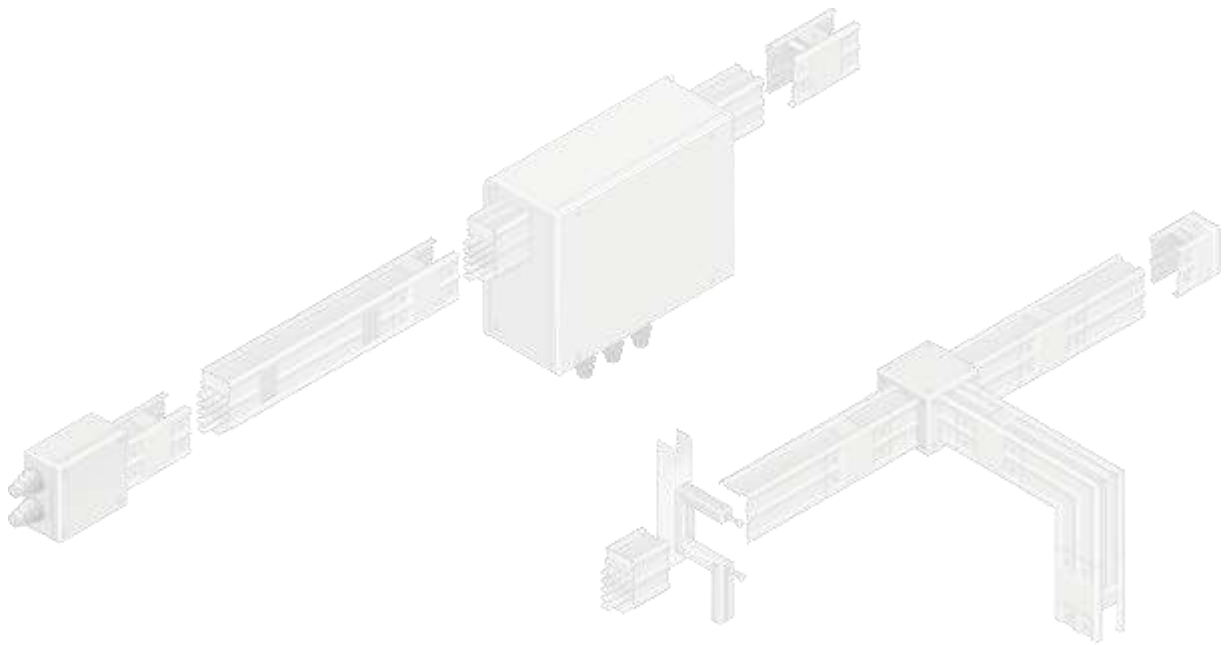
- Protection against mechanical damage when feeding through walls and ceilings
- Can be mounted subsequently
- Length 0.5 m
- Minimum distance L from the open bar end 185 mm
- 2 versions:
  - For 160 A to 400 A
  - For 630 A to 1000 A



Protective sleeve mounted on a straight length element



# Busbar elements and accessories



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Type key	44
Explanation for the following sketches	47
Straight length elements	48
Changes of direction	50
Fire barrier and fire approval kit	57
Cable feeders	57
Additional equipment	61

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### 05.01 Type key

#### Reference

K	E	M	3	n	S	n	n	α	n	α	α	F
---	---	---	---	---	---	---	---	---	---	---	---	---

#### Meaning

Medium current range = M

AI = 3

Rated current (see tables below)

Single body = S

Element type (see tables below)

Length (see tables below)

L = IP55

M = RAL 7035

F = 5 bars, sheet steel housing

#### Examples:

- Straight length element, 160 A, configurable length 3.25 m, IP55, RAL 7035: KEM31S00Z3LMF
- Horizontal L-Element, 90° to the left, 400 A, planning length X 0.36 m, planning length Y 0.36 m, IP55, RAL 7035: KEM34S04N1LMF

Please contact your Hager partner for information on additional types.

#### Rated current code

Rated current I <sub>N</sub>	Code
160 A	1
250 A	2
400 A	4
630 A	6
800 A	8
1000 A	9

#### Element type code

Element type	Code
Straight length element	00
Horizontal L-Element, 90° to the right	01
Vertical L-Element, 90° downwards	02
Distribution board feeding unit	03
Horizontal L-Element, 90° to the left	04
Vertical L-Element, 90° upwards	05
Flexible direction change element	06
End flange	10
Fixing bracket	20
Spacer	21
Vertical wall fixing	23
Vertical ceiling mounting	24
Fastener for mounting rail	25
Vertical fastening to connecting flange	26
Protective sleeve	27
Joint block	29
Horizontal Z-Element, first 90° to the right, then 90° to the left	40
Horizontal Z-Element, first 90° to the left, then 90° to the right	41

<b>Element type</b>	<b>Code</b>
Vertical Z-Element, first 90° downwards, then 90° upwards	42
Vertical Z-Element, first 90° upwards, then 90° downwards	43
Cable end feeder multi-conductor cable	50
Cable end feeder single-conductor cable	51
Cable end feeder multi-conductor cable with cable compartment	52
Cable end feeder single-conductor cable with cable compartment	53
Cable entry plate for single-conductor cable	55
Centre feed multi-conductor cable	56
Cable entry plate for centre feed	57
Centre feed single-conductor cable	58
Cable compartment	59
Vertical T-Element, 90° downwards	60
Vertical T-Element, 90° upwards	61
Horizontal T-Element, 90° to the left	62
Horizontal T-Element, 90° to the right	63
Spacer bracket	64
Adapter plate without socket cut-out	65
Adapter plate with socket cut-out	66
Adapter housing for sockets	67
Firewall EI90	82
Firewall EI120	83
Firewall approval kit S90	86
Firewall approval kit S120	87
Schuko socket	90
CEE 16A socket, 3-pole	91
CEE 16A socket, 5-pole	92
CEE 32A socket, 5-pole	93

### Length code

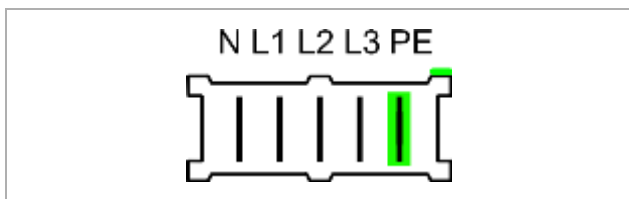
<b>Length</b>	<b>Code</b>
No length specified	Z0
1.25 m with tap-off points	Z1
2.25 m with tap-off points	Z2
3.25 m with tap-off points	Z3
1.25 without tap-off points	N1
2.25 without tap-off points	N2
3.25 without tap-off points	N3
0.5 to 1.24 m with tap-off points	S1
1.26 to 2.24 m with tap-off points	S2
2.26 to 3.24 m with tap-off points	S3
0.5 to 1.24 m without tap-off points	P1
1.26 to 2.24 m without tap-off points	P2
2.26 to 3.24 m without tap-off points	P3
Standard length, adjustable, 400 A	P7

Length	Code
Standard length, adjustable, 1000 A	P8
L-Element standard length	N1
L-Element with X 0.36 to 1.25 m, Y standard length	X4
L-Element with Y 0.36 to 1.25 m, X standard length	Y4
L-Element with X/Y 0.36 to 1.25 m	B4
Z-Element standard length	N1
Z-Element with Z 0.14 to 1.25 m, X/Y standard length	Z4
Z-Element with diverse X/Y/Z	B4
L-Element standard length $\neq 90^\circ$	G1
L-Element with X 0.36 to 1.25 m, $\neq 90^\circ$	G4
L-Element with Y 0.36 to 1.25 m, $\neq 90^\circ$	G5
L-Element with X/Y 0.36 to 1.25 m, $\neq 90^\circ$	G6
Firewall on the X-side of L-Elements and Z-Elements	X4
Firewall on the Y-side of L-Elements and Z-Elements	Y4
Firewall for straight length elements	W4
Accessories	R0

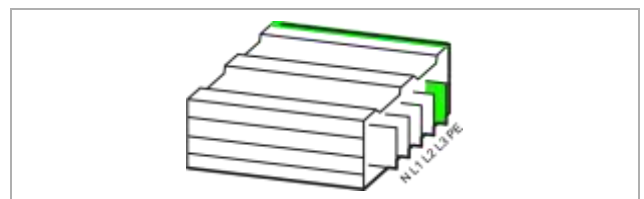


**05.02 Explanation for the following sketches**

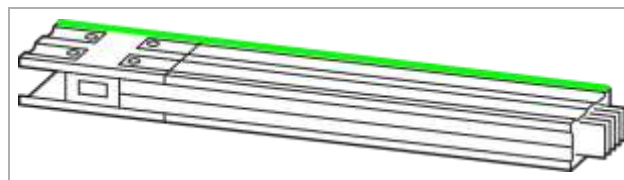
- The reference point is the side with the open bar end, i.e. the side without the joint block.
- The PE bar is always shown on the right and this side is marked with a green line.
- All elements are supplied with a joint block except for the cable feeders and tap-off boxes.
- In the case of the L-Elements and Z-Elements, the joint block is mounted on the Y side, the X side is always without a joint block.
- The lengths are specified as what are termed as "planning lengths" in order to simplify configuration of a busbar run system using a grid system. The planning lengths are not identical to the actual dimensions of an element with a joint block. For more detailed information on this, see the "Project planning" (see page 84) section.
- Special colours on request.



Cross-section through a busbar with green marking for the PE side (right)

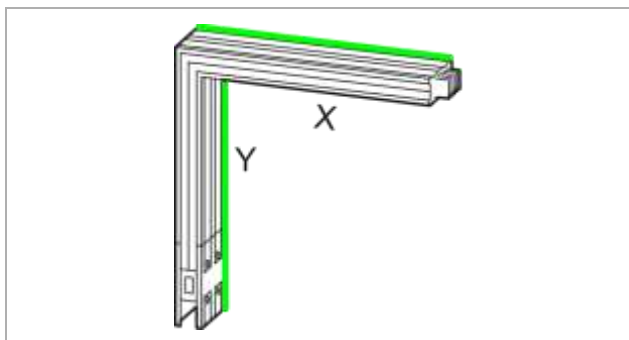


Open bar end with green marking for the PE side (right)

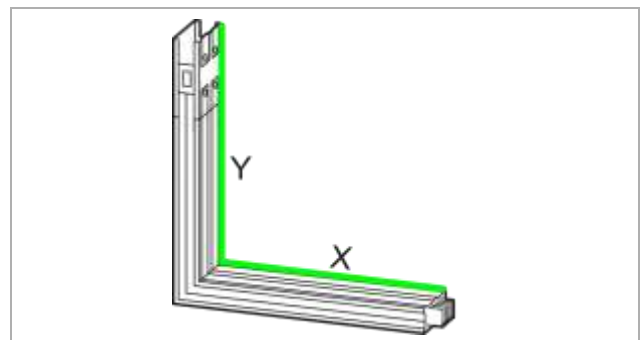


Joint block mounted on a straight length element (left)

**Examples**



Vertical L-Element, 90° downwards

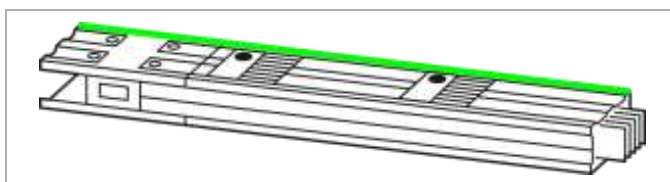


Vertical L-Element, 90° upwards

### 05.03 Straight length elements

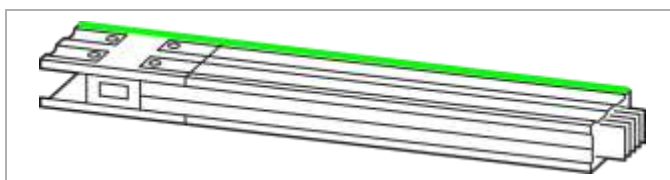
Straight length elements can be configured with a fire barrier as an ordering option (see page 57).

#### Straight length elements in standard planning lengths, with tap-off points on both sides



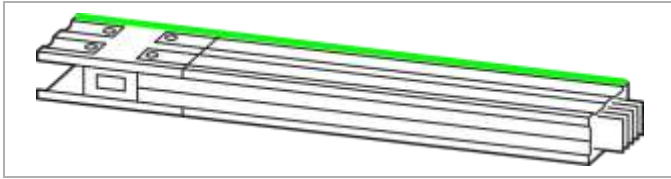
Rated current $I_{nA}$	Planning length	Number of tap-off points	Tap-off points Distance	Reference	Approximate weight
160 A	1.25 m	4	0.5 m	KEM31S00Z1LMF	8.4 kg
	2.25 m	8		KEM31S00Z2LMF	14.0 kg
	3.25 m	12		KEM31S00Z3LMF	20.0 kg
250 A	1.25 m	4	0.5 m	KEM32S00Z1LMF	8.6 kg
	2.25 m	8		KEM32S00Z2LMF	16.5 kg
	3.25 m	12		KEM32S00Z3LMF	22.2 kg
400 A	1.25 m	4	0.5 m	KEM34S00Z1LMF	12.0 kg
	2.25 m	8		KEM34S00Z2LMF	19.0 kg
	3.25 m	12		KEM34S00Z3LMF	26.0 kg
630 A	1.25 m	4	0.5 m	KEM36S00Z1LMF	19.1 kg
	2.25 m	8		KEM36S00Z2LMF	27.5 kg
	3.25 m	12		KEM36S00Z3LMF	39.9 kg
800 A	1.25 m	4	0.5 m	KEM38S00Z1LMF	19.1 kg
	2.25 m	8		KEM38S00Z2LMF	27.5 kg
	3.25 m	12		KEM38S00Z3LMF	39.9 kg
1000 A	1.25 m	4	0.5 m	KEM39S00Z1LMF	23.2 kg
	2.25 m	8		KEM39S00Z2LMF	35.0 kg
	3.25 m	12		KEM39S00Z3LMF	51.0 kg

#### Straight length elements in standard planning lengths, without tap-off points



Rated current $I_{nA}$	Planning length	Reference	Approximate weight
400 A	1.25 m	KEM34S00N1LMF	12.0 kg
	2.25 m	KEM34S00N2LMF	19.0 kg
	3.25 m	KEM34S00N3LMF	25.3 kg
630 A	1.25 m	KEM36S00N1LMF	19.6 kg
	2.25 m	KEM36S00N2LMF	28.5 kg
	3.25 m	KEM36S00N3LMF	40.9 kg
800 A	1.25 m	KEM38S00N1LMF	19.6 kg
	2.25 m	KEM38S00N2LMF	28.5 kg
	3.25 m	KEM38S00N3LMF	40.9 kg
1000 A	1.25 m	KEM39S00N1LMF	23.7 kg
	2.25 m	KEM39S00N2LMF	36.0 kg
	3.25 m	KEM39S00N3LMF	52.0 kg

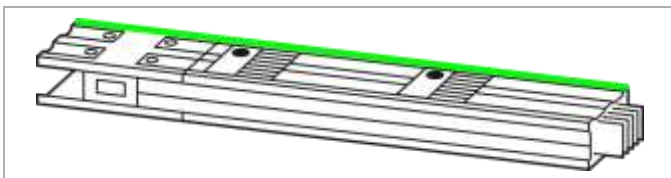
### Straight length elements with adjustable planning length, without tap-off points



- Can be shortened by the customer up to 0.5 m
- For information on determining the planning length, see the section "Determining the reference dimensions during project planning" (page 94)

Rated current $I_{nA}$	Planning length	Reference	Approximate weight
400 A	1.25 m	KEM34S00P7LMF	12.0 kg
1000 A	1.25 m	KEM39S00P8LMF	23.7 kg

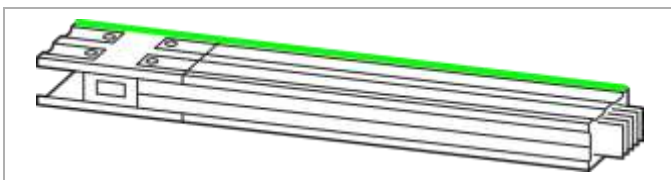
### Straight length elements in planning lengths to order, with tap-off points



- For information on determining the planning length, see the section "Determining the reference dimensions during project planning" (page 94)

Rated current $I_{nA}$	Planning length	Number of tap-off points	Tap-off points Distance	Reference	Approximate weight
160 A	1.26 to 2.24 m	4 to 8	0.5 m	KEM31S00S2LMF	15.0 kg
	2.26 to 3.24 m	8 to 12		KEM31S00S3LMF	20.0 kg
250 A	1.26 to 2.24 m	4 to 8	0.5 m	KEM32S00S2LMF	16.3 kg
	2.26 to 3.24 m	8 to 12		KEM32S00S3LMF	21.9 kg
400 A	1.26 to 2.24 m	4 to 8	0.5 m	KEM34S00S2LMF	18.5 kg
	2.26 to 3.24 m	8 to 12		KEM34S00S3LMF	25.3 kg
630 A	1.26 to 2.24 m	4 to 8	0.5 m	KEM36S00S2LMF	31.5 kg
	2.26 to 3.24 m	8 to 12		KEM36S00S3LMF	45.9 kg
800 A	1.26 to 2.24 m	4 to 8	0.5 m	KEM38S00S2LMF	31.5 kg
	2.26 to 3.24 m	8 to 12		KEM38S00S3LMF	45.9 kg
1000 A	1.26 to 2.24 m	4 to 8	0.5 m	KEM39S00S2LMF	39.0 kg
	2.26 to 3.24 m	8 to 12		KEM39S00S3LMF	57.0 kg

### Straight length elements in planning lengths to order, without tap-off points



- For information on determining the planning length, see the section "Determining the reference dimensions during project planning" (page 94)

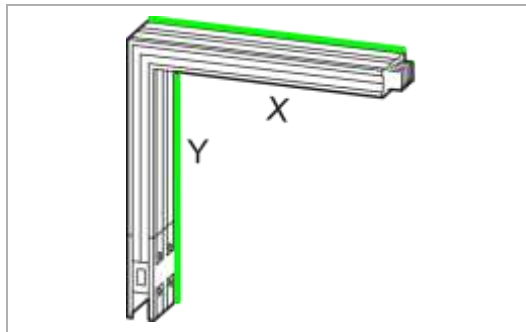
Rated current $I_{nA}$	Planning length	Reference	Approximate weight
400 A	0.50 to 1.24 m	KEM34S00P1LMF	11.6 kg
	1.26 to 2.24 m	KEM34S00P2LMF	18.5 kg
	2.26 to 3.24 m	KEM34S00P3LMF	25.3 kg
630 A	0.50 to 1.24 m	KEM36S00P1LMF	19.9 kg
	1.26 to 2.24 m	KEM36S00P2LMF	31.5 kg
	2.26 to 3.24 m	KEM36S00P3LMF	45.9 kg
800 A	0.50 to 1.24 m	KEM38S00P1LMF	19.9 kg
	1.26 to 2.24 m	KEM38S00P2LMF	31.5 kg
	2.26 to 3.24 m	KEM38S00P3LMF	45.9 kg
1000 A	0.50 to 1.24 m	KEM39S00P1LMF	24.0 kg
	1.26 to 2.24 m	KEM39S00P2LMF	39.0 kg
	2.26 to 3.24 m	KEM39S00P3LMF	57.0 kg

## 05.04 Changes of direction

### 05.04.01 L-Elements

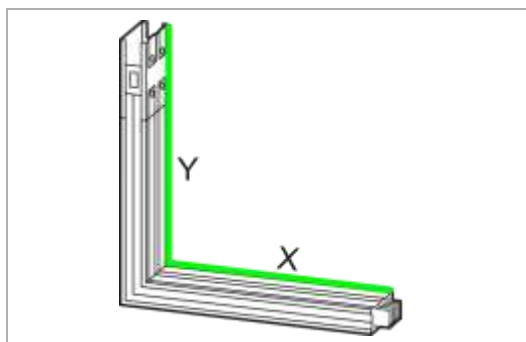
- The joint block is always located on the Y side.
- The specifications in m for X and Y must be entered as additional information when ordering planning lengths that can be ordered. For information on determining the planning length, see the section "Determining the reference dimensions during project planning" (page 94).
- L-Elements can be configured with a fire barrier as an ordering option (see page 57).

#### Vertical L-Elements (angle), 90° downwards



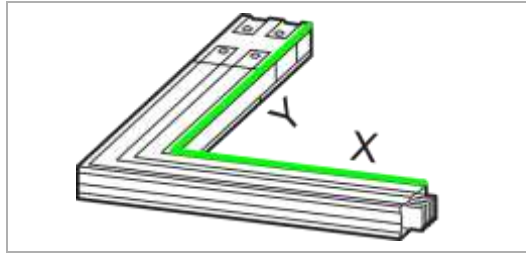
Rated current $I_{nA}$	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S02N1LMF	8.5 kg
	0.36 m to 1.25 m	0.36 m	KEM34S02X4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S02Y4LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S02B4LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S02N1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S02X4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S02Y4LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S02B4LMF	59.0 kg

#### Vertical L-Elements (angle), 90° upwards



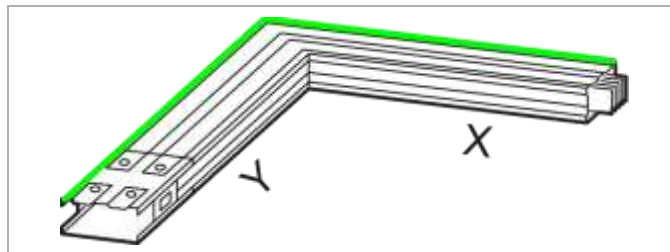
Rated current $I_{nA}$	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S05N1LMF	8.5 kg
	0.36 m to 1.25 m	0.36 m	KEM34S05X4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S05Y4LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S05B4LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S05N1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S05X4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S05Y4LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S05B4LMF	59.0 kg

**Horizontal L-Elements (angle), 90° to the right (PE inside)**



Rated current I <sub>NA</sub>	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S01N1LMF	8.0 kg
	0.36 m to 1.25 m	0.36 m	KEM34S01X4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S01Y4LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S01B4LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S01N1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S01X4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S01Y4LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S01B4LMF	59.0 kg

**Horizontal L-Elements (angle), 90° to the left (PE outside)**

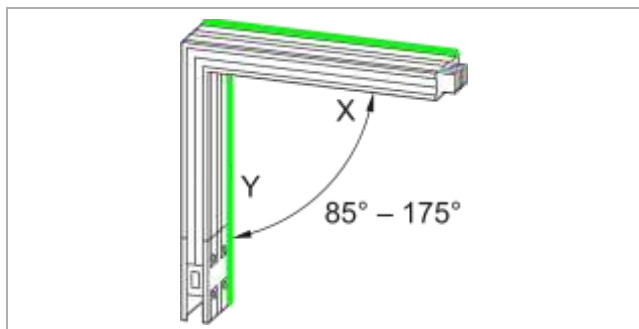


Rated current I <sub>NA</sub>	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S04N1LMF	8.0 kg
	0.36 m to 1.25 m	0.36 m	KEM34S04X4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S04Y4LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S04B4LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S04N1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S04X4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S04Y4LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S04B4LMF	59.0 kg

### 05.04.02 L-Elements with configurable angle

- The joint block is always located on the Y side.
- The angle must be specified in steps of 5° when ordering.
- The specifications in m for X and Y must be entered as additional information when ordering planning lengths that can be ordered. For information on determining the planning length, see the section "Determining the reference dimensions during project planning" (page 94).
- L-Elements can be configured with a fire barrier as an ordering option (see page 57).

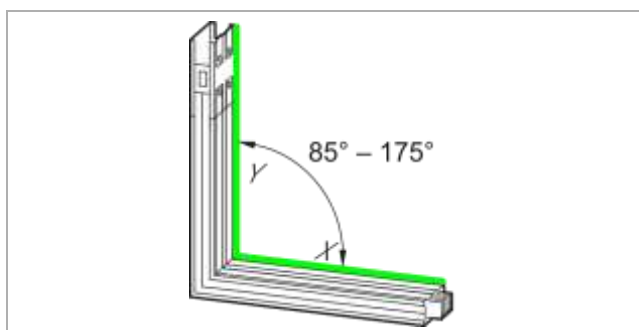
#### Vertical L-Elements (angle), 85° to 175° downwards in increments of 5°



- Angle can be ordered in increments of 5° between 85° and 175°

Rated current I <sub>nA</sub>	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S02G1LMF	8.0 kg
	0.36 m to 1.25 m	0.36 m	KEM34S02G4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S02G5LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S02G6LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S02G1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S02G4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S02G5LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S02G6LMF	59.0 kg

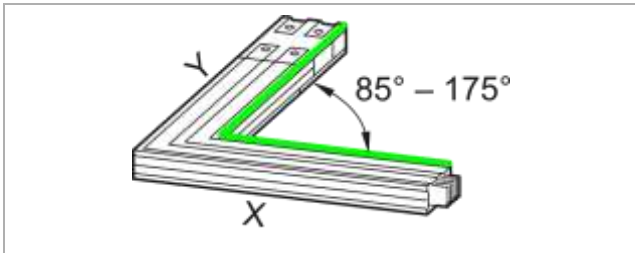
#### Vertical L-Elements (angle), 85° to 175° upwards in increments of 5°



- Angle can be ordered in increments of 5° between 85° and 175°

Rated current I <sub>nA</sub>	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S05G1LMF	8.8 kg
	0.36 m to 1.25 m	0.36 m	KEM34S05G4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S05G5LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S05G6LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S05G1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S05G4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S05G5LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S05G6LMF	59.0 kg

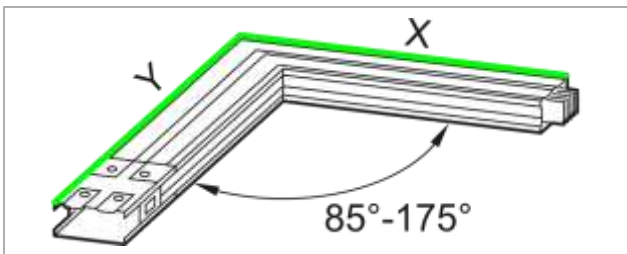
### Horizontal L-Elements (angle), in increments of 5° from 85° to 175° to the right (PE inside)



– Angle can be ordered in increments of 5° between 85° and 175°

Rated current I <sub>NA</sub>	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S01G1LMF	8.0 kg
	0.36 m to 1.25 m	0.36 m	KEM34S01G4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S01G5LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S01G6LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S01G1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S01G4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S01G5LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S01G6LMF	59.0 kg

### Horizontal L-Elements (angle), in increments of 5° from 85° to 175° to the left (PE outside)



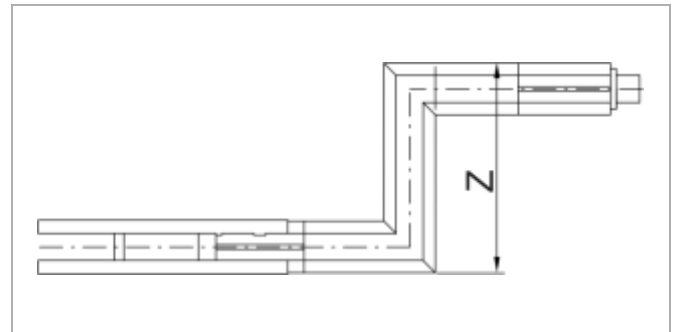
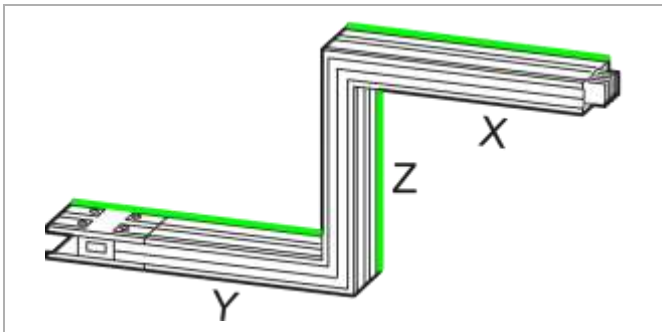
– Angle can be ordered in increments of 5° between 85° and 175°

Rated current I <sub>NA</sub>	Planning length X	Planning length Y	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	KEM34S04G1LMF	8.0 kg
	0.36 m to 1.25 m	0.36 m	KEM34S04G4LMF	18.0 kg
	0.36 m	0.36 m to 1.25 m	KEM34S04G5LMF	18.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM34S04G6LMF	28.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	KEM39S04G1LMF	17.0 kg
	0.36 m to 1.25 m	0.36 m	KEM39S04G4LMF	38.0 kg
	0.36 m	0.36 m to 1.25 m	KEM39S04G5LMF	38.0 kg
	0.36 m to 1.25 m	0.36 m to 1.25 m	KEM39S04G6LMF	59.0 kg

### 05.04.03 Z-Elements

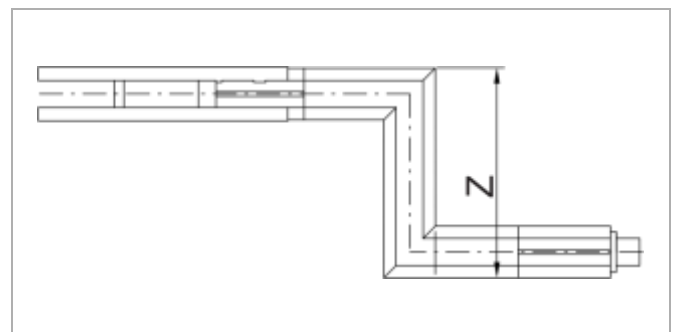
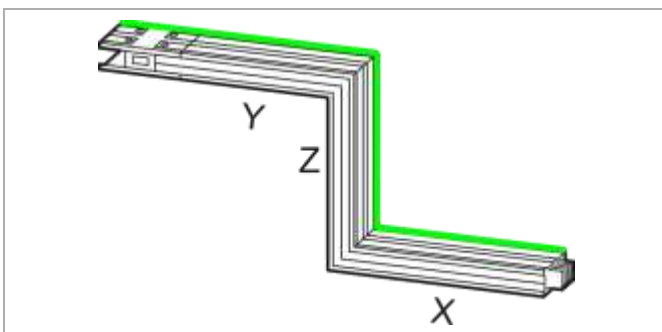
- The joint block is always located on the Y side.
- The measurement Z from outer edge to outer edge of the busbar element must be entered in m as additional information when ordering.
- For planning lengths that can be ordered, the specifications in m for X and Y as the measurement from the centre of the joint block to the outer edge of the trunking unit must be entered as additional information when ordering. For information on determining the planning length, see the section "Determining the reference dimensions during project planning" (page 94).
- Z-Elements with fire barrier on request. Please contact your Hager partner.

#### Vertical Z-Elements, first 90° downwards, then 90° upwards



Rated current $I_{nA}$	Planning length X	Planning length Y	Planning length Z	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	0.14 to 1.25 m	KEM34S42Z4LMF	13.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.14 to 1.25 m	KEM34S42B4LMF	16.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	0.26 to 1.25 m	KEM39S42Z4LMF	26.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.26 to 1.25 m	KEM39S42B4LMF	32.0 kg

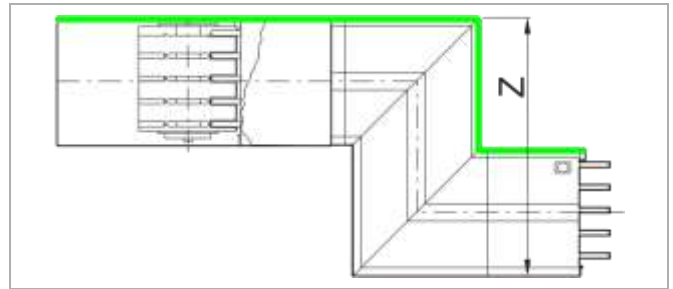
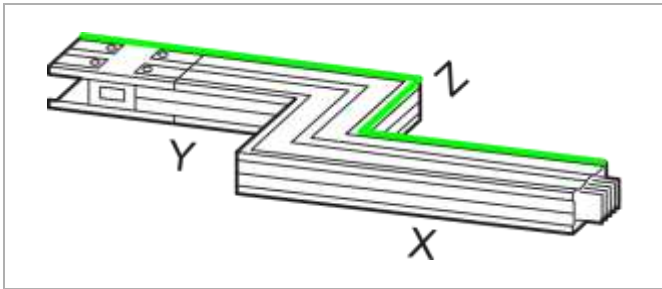
#### Vertical Z-Elements, first 90° upwards, then 90° downwards



Rated current $I_{nA}$	Planning length X	Planning length Y	Planning length Z	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	0.36 m	0.14 to 1.25 m	KEM34S43Z4LMF	13.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.14 to 1.25 m	KEM34S43B4LMF	16.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	0.26 to 1.25 m	KEM39S43Z4LMF	26.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.26 to 1.25 m	KEM39S43B4LMF	32.0 kg

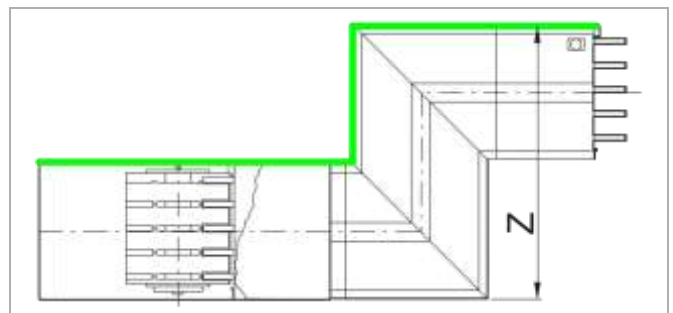
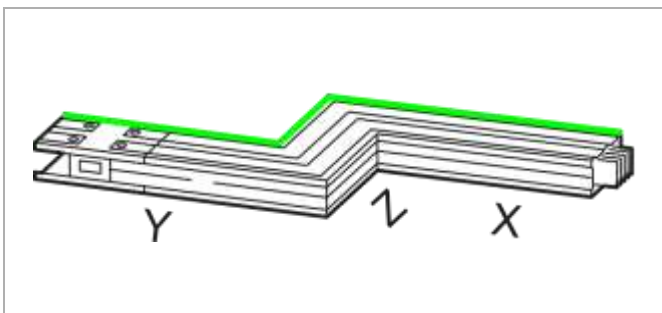


**Horizontal Z-Elements, first 90° to the right, then 90° to the left**



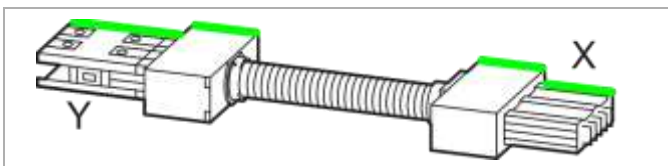
Rated current I <sub>nA</sub>	Planning length	Planning length	Planning length	Reference	Approximate weight
	X	Y	Z		
160 A, 250 A, 400 A	0.36 m	0.36 m	0.34 to 1.25 m	KEM34S40Z4LMF	13.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.34 to 1.25 m	KEM34S40B4LMF	16.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	0.34 to 1.25 m	KEM39S40Z4LMF	26.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.34 to 1.25 m	KEM39S40B4LMF	32.0 kg

**Horizontal Z-Elements, first 90° to the left, then 90° to the right**



Rated current I <sub>nA</sub>	Planning length	Planning length	Planning length	Reference	Approximate weight
	X	Y	Z		
160 A, 250 A, 400 A	0.36 m	0.36 m	0.34 to 1.25 m	KEM34S41Z4LMF	13.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.34 to 1.25 m	KEM34S41B4LMF	16.0 kg
630 A, 800 A, 1000 A	0.36 m	0.36 m	0.34 to 1.25 m	KEM39S41Z4LMF	26.0 kg
	0.36 m to 0.60 m	0.36 m to 0.60 m	0.34 to 1.25 m	KEM39S41B4LMF	32.0 kg

**05.04.04 Flexible direction change elements**



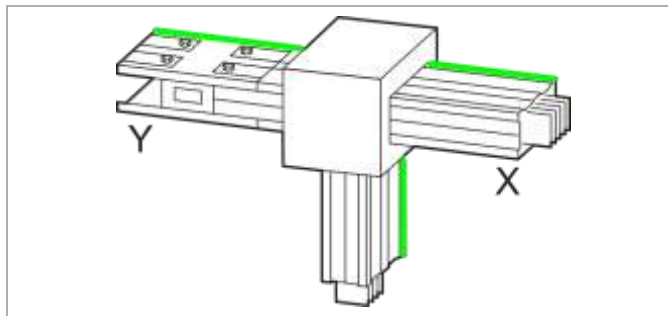
Comments

- Cannot be used for 1000 A
- IP52

Rated current I <sub>nA</sub>	Planning length	Reference	Approximate weight
160 A, 250 A, 400 A	1.25 m	KEM34S06R0LMF	11.0 kg
630 A, 800 A	1.75 m	KEM38S06R0LMF	22.0 kg

**05.04.05 T-Elements**

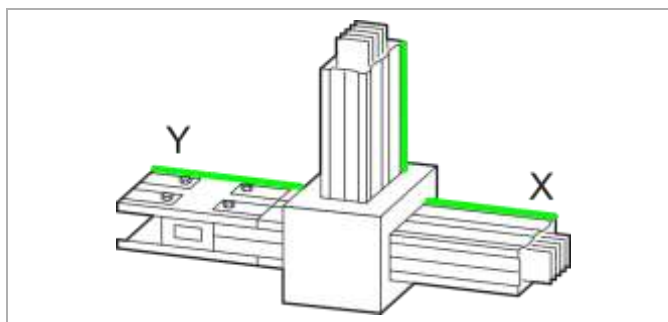
**Vertical T-Element, 90° downwards**



– IP52

Rated current $I_{nA}$	Planning length	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	KEM34S60N1LMF	12.8 kg
630 A, 800 A, 1000 A	0.36 m	KEM39S60N1LMF	25.0 kg

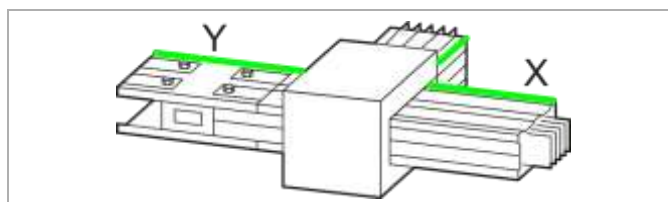
**Vertical T-Element, 90° upwards**



– IP52

Rated current $I_{nA}$	Planning length	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	KEM34S61N1LMF	12.8 kg
630 A, 800 A, 1000 A	0.36 m	KEM39S61N1LMF	25.0 kg

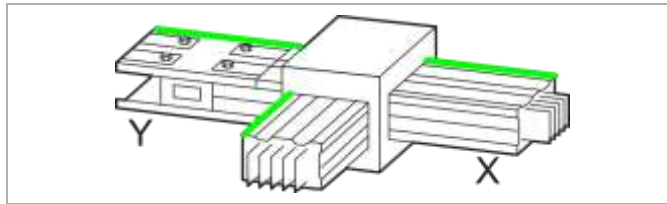
**Horizontal T-Element, 90° to the right**



– IP52

Rated current $I_{nA}$	Planning length	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	KEM34S63N1LMF	12.8 kg
630 A, 800 A, 1000 A	0.36 m	KEM39S63N1LMF	25.0 kg

**Horizontal T-Element, 90° to the left**



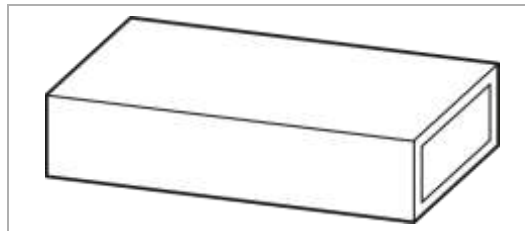
- IP52

Rated current I <sub>NA</sub>	Planning length	Reference	Approximate weight
160 A, 250 A, 400 A	0.36 m	KEM34S62N1LMF	12.8 kg
630 A, 800 A, 1000 A	0.36 m	KEM39S62N1LMF	25.0 kg

**05.05 Fire barrier and fire approval kit**

**Fire barrier for fire resistance ratings EI90 and EI120**

- Length 0.5 m.
- Minimum dimensions for the length of straight length elements, or the leg lengths of L-Elements can be found in the "Fire protection" (see page 124) section.
- When ordering, specify the fire protection position (measurement BX or BY), see "Fire protection" (see page 124) section for information on how to determine this.



Fire resistance rating	Rated current	For busbar elements	Reference
S90	160 A, 250 A, 400 A	Straight length elements	KEM34S82W4LMF
		L-Elements, fire barrier on X side	KEM34S82X4LMF
		L-Elements, fire barrier on Y side	KEM34S82Y4LMF
	630 A, 800 A, 1000 A	Straight length elements	KEM39S82W4LMF
		L-Elements, fire barrier on X side	KEM39S82X4LMF
		L-Elements, fire barrier on Y side	KEM39S82Y4LMF
S120	160 A, 250 A, 400 A	Straight length elements	KEM34S83W4LMF
		L-Elements, fire barrier on X side	KEM34S83X4LMF
		L-Elements, fire barrier on Y side	KEM34S83Y4LMF
	630 A, 800 A, 1000 A	Straight length elements	KEM39S83W4LMF
		L-Elements, fire barrier on X side	KEM39S83X4LMF
		L-Elements, fire barrier on Y side	KEM39S83Y4LMF

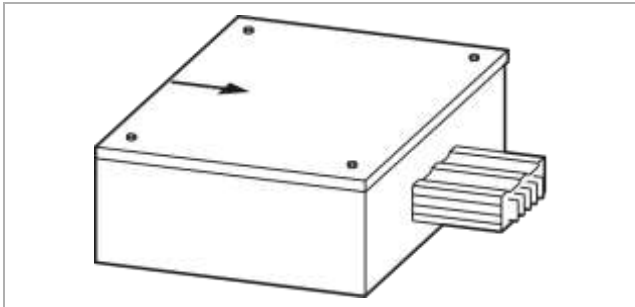
**Fire approval kit**

Fire resistance rating	Reference	Approximate weight
S90	KEM31S86R0LMF	0.2 kg
S120	KEM31S87R0LMF	0.2 kg

### 05.06 Cable feeders

Comment: All cable feeders are supplied without a joint block.

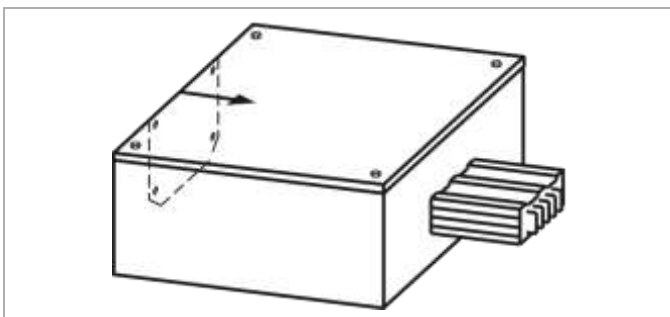
#### Cable end feeders with cable grommet



- Bolt connection (bolts included in the scope of delivery)
- Position of PE can be changed (by turning the entire busbar connection terminal).
- Cable entry for multi-conductor cable from the face end, with cable grommets (see dimensional sketches)
- IP54

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A	KEM32S50Z0LMF	6.6 kg
160 A, 250 A, 400 A	KEM34S50Z0LMF	13.3 kg
630 A, 800 A, 1000 A	KEM39S50Z0LMF	14.9 kg

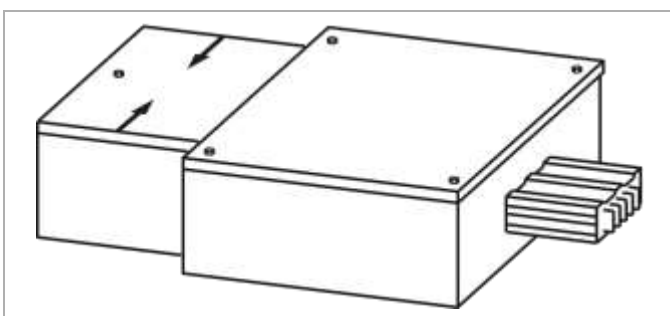
#### Cable end feeders with cable entry plate



- Bolt connection (bolts included in the scope of delivery).
- Position of PE can be changed (by turning the entire busbar connection terminal).
- Cable entry for single-conductor cable from the face end.
- IP54

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A	KEM32S51Z0LMF	6.6 kg
160 A, 250 A, 400 A	KEM34S51Z0LMF	13.3 kg
630 A, 800 A, 1000 A	KEM39S51Z0LMF	14.9 kg

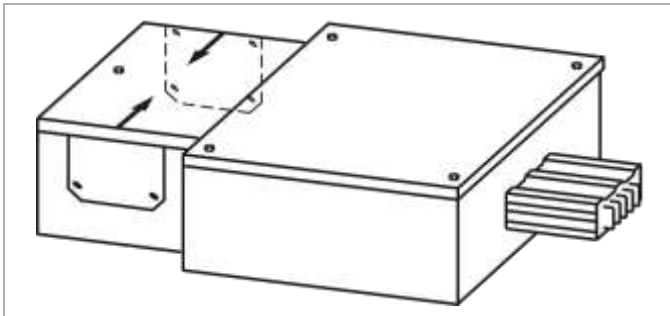
#### Cable end feeders with cable compartment



- Bolt connection (bolts included in the scope of delivery)
- Position of PE can be changed (by turning the entire busbar connection terminal).
- Cable entry for multi-conductor cable from two sides, with cable grommets (see dimensional sketches)
- IP54

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A, 400 A	KEM34S52Z0LMF	16.5 kg
630 A, 800 A, 1000 A	KEM39S52Z0LMF	19.9 kg

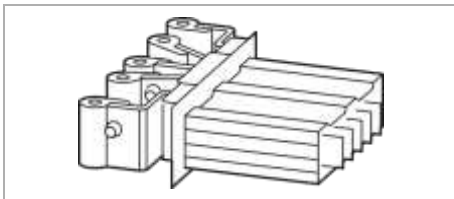
**Cable end feeders with cable compartment and cable entry plate**



- Bolt connection (bolts included in the scope of delivery)
- Position of PE can be changed (by turning the entire busbar connection terminal).
- Cable entry for single-conductor cable from two sides
- Single-conductor cable entry plate undrilled
- IP54

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A, 400 A	KEM34S53Z0LMF	16.5 kg
630 A, 800 A, 1000 A	KEM39S53Z0LMF	19.9 kg

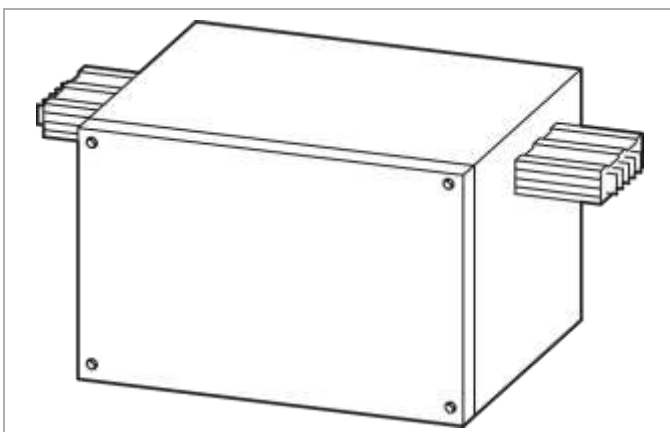
**Distribution board feeding unit**



- Bolt connection (bolts included in the scope of delivery)
- Position of the PE can be changed
- IP00

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A	KEM32S03N1LMF	2.1 kg
160 A, 250 A, 400 A	KEM34S03N1LMF	3.5 kg
630 A, 800 A, 1000 A	KEM39S03N1LMF	4.7 kg

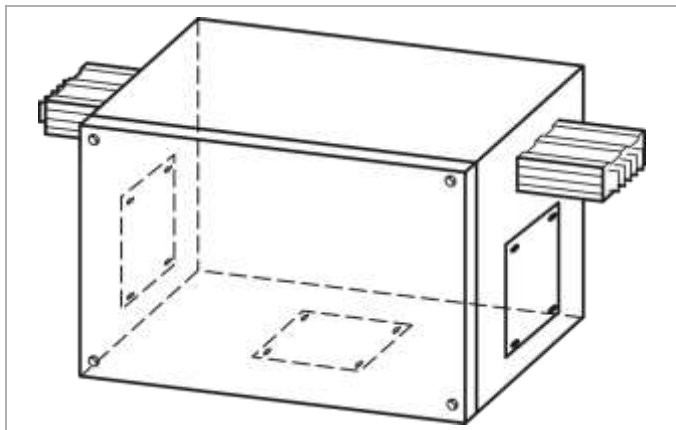
**Intermediate cable feeders**



- Bolt connection (bolts included in the scope of delivery)
- Upright position, flat position and position of PE can be changed (by turning the entire busbar connection terminal)
- Cable entry for multi-conductor cable from three sides, with cable grommets (see dimensional sketches)
- IP54

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A, 400 A	KEM34S56Z0LMF	28.0 kg
630 A, 800 A, 1000 A	KEM39S56Z0LMF	47.0 kg

### Intermediate cable feeders with cable entry plate

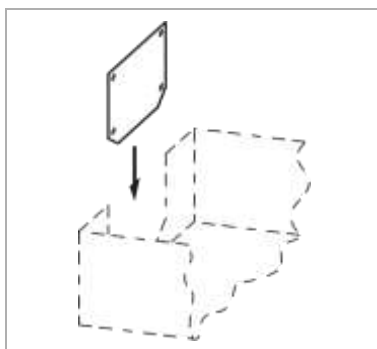


- Bolt connection (bolts included in the scope of delivery)
- Upright position, flat position and position of PE can be changed (by turning the entire busbar connection terminal)
- Cable entry for single-conductor cable from three sides
- IP54

Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A, 400 A	KEM34S58Z0LMF	28.0 kg
630 A, 800 A, 1000 A	KEM39S58Z0LMF	47.0 kg

### Cable entry plates for single-conductor cable entry

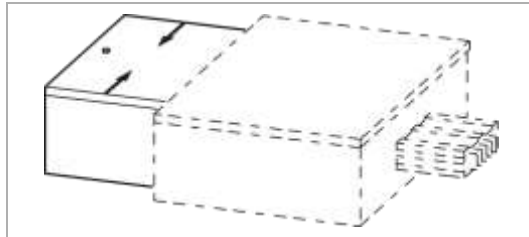
- Suitable for cable end feeders
- Drilled
- Drilling template included in the scope of delivery



Cable entry plate for	Rated current $I_{nA}$	Reference	Approximate weight
Cable end feeder	250 A	KEM32S55R0LMF	0.3 kg
Cable end feeder or cable compartment	400 A	KEM34S55R0LMF	0.5 kg
	1000 A	KEM39S55R0LMF	1.0 kg
Centre feed	400 A	KEM34S57R0LMF	0.5 kg
	1000 A	KEM39S57R0LMF	1.0 kg

**Cable compartment for multi-conductor cable entry**

- Suitable for cable end feeders
- Cable entry for multi-conductor cable from two sides

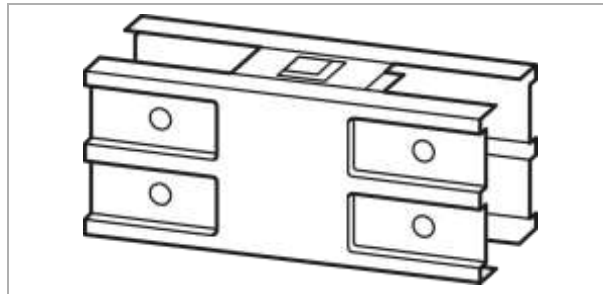


- IP54

Rated current $I_{nA}$	Reference	Approximate weight
400 A	KEM34S59R0LMF	3.1 kg
1000 A	KEM39S59R0LMF	5.0 kg

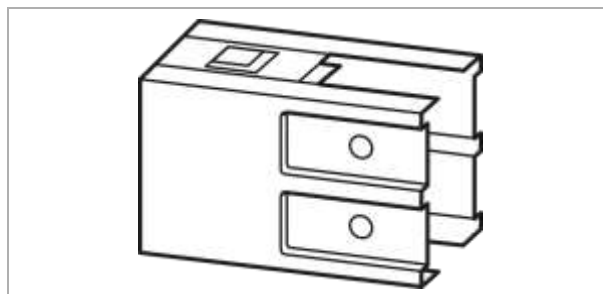
**05.07 Additional equipment**

**Joint blocks**



Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A, 400 A	KEM34S29R0LMF	3.5 kg
630 A, 800 A, 1000 A	KEM39S29R0LMF	6.5 kg

**End flanges**

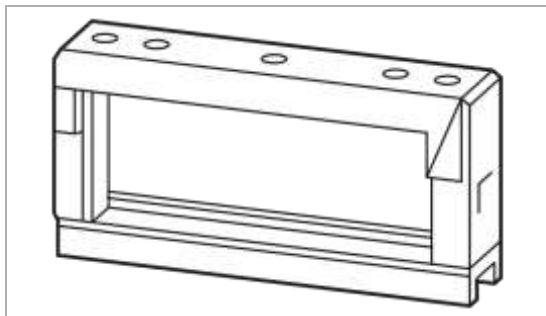


Rated current $I_{nA}$	Reference	Approximate weight
160 A, 250 A, 400 A	KEM34S10R0LMF	1.0 kg
630 A, 800 A, 1000 A	KEM39S10R0LMF	1.3 kg

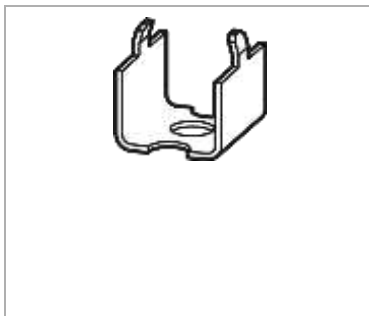
### 05.07.01 Additional equipment for fastening

#### Fastening elements for horizontal and vertical runs

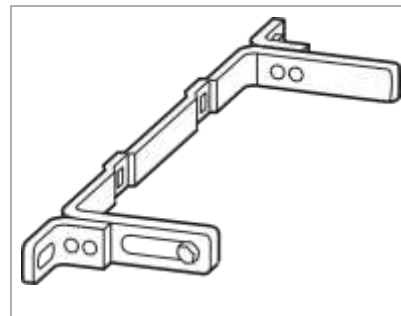
Comment: The following fastening elements are not suitable for supporting the weight of vertical runs. See the next section for details of suitable fastening elements.



Fixing bracket for busbar elements, can be used e.g. for the horizontal installation positions flat and upright



Spacer for 40 mm distance between the wall and fixing bracket (required for cable feeders in busbar run)

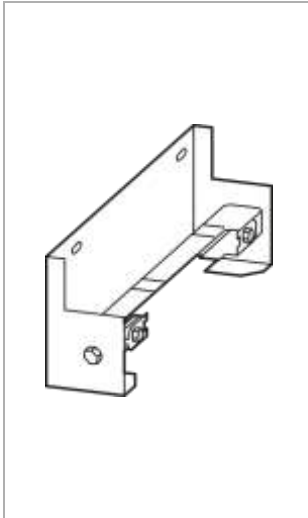


Spacer bracket for wall and ceiling mounting

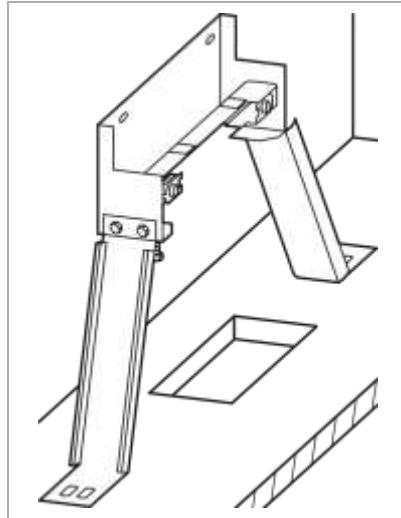
Element	Usage	Rated current $I_{nA}$	Reference	Approximate weight
Fixing bracket	<ul style="list-style-type: none"> <li>– Support in both horizontal mounting positions</li> <li>– In conjunction with spacer bracket as intermediate fastener for vertical runs</li> </ul>	160 A, 250 A, 400 A	KEM34S20R0LMF	0.44 kg
		630 A, 800 A, 1000 A	KEM39S20R0LMF	0.54 kg
Spacer	<ul style="list-style-type: none"> <li>– For 40 mm distance between the fixing bracket and attachment point</li> <li>– Required for cable feeders in busbar run</li> <li>– Suitable for fixing bracket (two per fixing bracket)</li> </ul>	160 A to 1000 A	KEM31S21R0LMF	0.03 kg
Spacer bracket	<ul style="list-style-type: none"> <li>– As a distance piece, suitable for fixing bracket</li> <li>– For wall and ceiling mounting</li> </ul>	160 A to 1000 A	KEM31S64R0LMF	0.44 kg



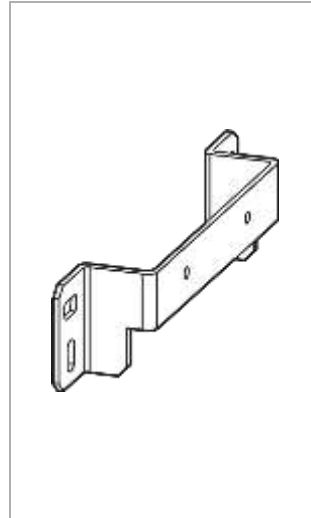
**Special fastening elements for vertical runs**



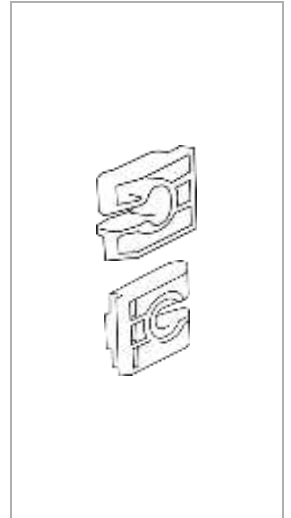
Wall fixing with weight support  
Wall distance can be adjusted



For ceiling openings: Ceiling mounting with weight support



Fixing bracket for vertical wall fixing on joint block



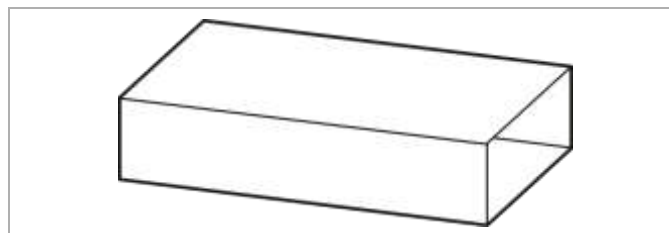
Fastening elements for clamping on mounting rails

Element	Rated current I <sub>nA</sub>	Reference	Approximate weight
Wall fixing <sup>[1]</sup>	160 A to 1000 A	KEM31S23R0LMF	1.6 kg
Ceiling mounting (for ceiling openings)	160 A to 1000 A	KEM31S24R0LMF	4.5 kg
Fixing bracket	160 A to 1000 A	KEM31S26R0LMF	0.5 kg
Fastening elements for clamping on mounting rails <sup>[2]</sup>	160 A to 1000 A	KEM31S25R0LMF	0.5 kg

<sup>[1]</sup> Always to be used as the lowest wall fixing element.

<sup>[2]</sup> E.g. Unistrut P1000; two per attachment point

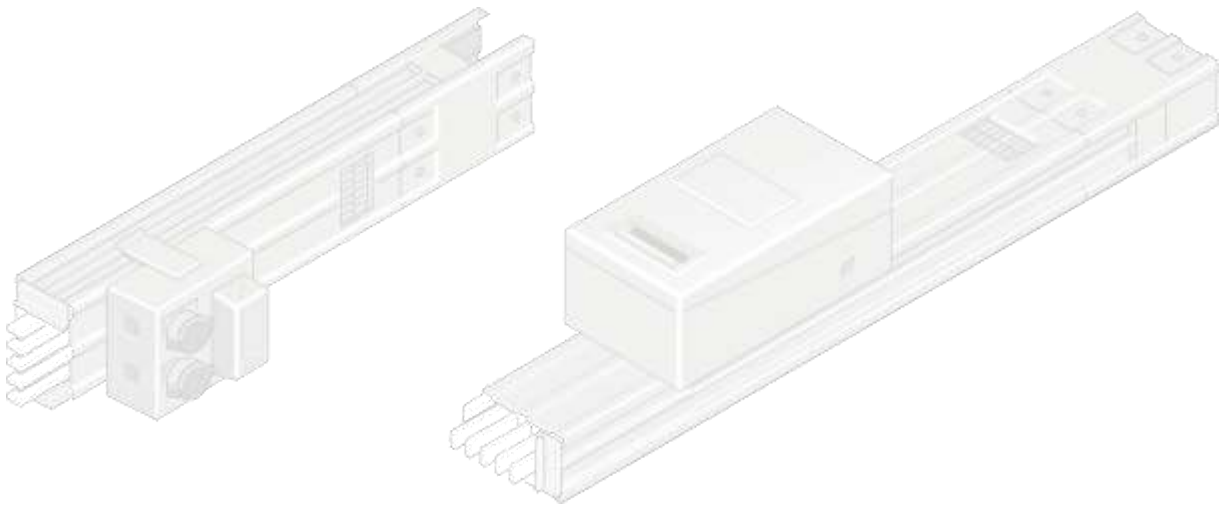
**Other mounting elements**



Protective sleeve

Element	Features	Rated current I <sub>nA</sub>	Reference	Approximate weight
Protective sleeve	Protects straight length elements from mechanical damage when passing through walls or ceilings	160 A, 250 A, 400 A	KEM34S27R0LMF	4.0 kg
		630 A, 800 A, 1000 A	KEM39S27R0LMF	4.0 kg

# Tap-off boxes and accessories



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Safety instructions on tap-off boxes	66
Tap-off boxes - Type key	66
Tap-off boxes	<b>Fehler! Textmarke nicht definiert.</b>
Expansion tap-off boxes, sheet steel housing	80
Tap-off box accessories	81

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## 06.01 Safety instructions on tap-off boxes



### Danger

Risk of electric shocks if installed incorrectly

- When selecting the tap-off boxes, observe the relevant installation guidelines with regard to personal protection and property protection.



### Attention

Tap-off boxes may not be used for feeding into the Busbar Trunking System.

- Use tap-off boxes only for tapping-off from the Busbar Trunking System.



### Attention

- Pay close attention to the dependence of the rated current values on the position of the tap-off boxes (see page 141).

## 06.02 Tap-off boxes - Type key

Meaning	Reference							
	K	E	B	7	n	n	a	n
Medium current range = B			■					
For tap-off points = 7				■				
Empty = 3					■			
Equipped for DIN modules = 4						■		
Interrupted neutral conductor = 5							■	
Direct neutral conductor = 7								■
I <sub>N</sub> code (rated current I <sub>N</sub> , see tables below)								■
Device code (depending on I <sub>N</sub> code, see tables below)								■
Standard/manual = 1								
Special = 2								

### Rated current code

Rated current I <sub>N</sub>	I <sub>N</sub> code	Tap-off box size(s)
Not specified	0	Expansion tap-off box
≤ 25 A	1	Size 1
≤ 63 A	2	Size 2, size 3
≤ 125 A	3	Size 3, size 03
≤ 250 A	4	Size 04
≤ 400 A	5	Size 05
≤ 630 A	6	Size 05

### Device coding

I <sub>N</sub> code	Device code	Device description	Device type	Socket(s)
0	A	Expansion tap-off box, can only be combined with sizes 2 / 3 tap-off boxes, freely assignable, for 9 module units, without device installation unit	without	without
0	B	Expansion tap-off box, can only be combined with sizes 2 / 3 tap-off boxes, freely assignable, for 9 module units, with device installation unit	without	without
1	A	1 x D01 fuse socket, 3-pole, 16 A, 400 V	LD047	without
1	B	2 x D01 fuse socket, 1-pole, 16 A, 230 V	2 x LD042	2 x CEE, 3-pole
1	C	1 x D01 fuse socket, 3-pole, 16 A, 400 V	LD047	1 x CEE, 5-pole
1	D	1 x miniature circuit breaker, 3-pole, characteristic C	NCN316	without
1	E	1 x miniature circuit breaker, 4-pole, characteristic C	NCN416	2 x CEE, 3-pole
1	F	2 x miniature circuit breaker, 1-pole, characteristic B	2 x NBN116	1 x CEE, 5-pole
1	G	1 x residual current circuit breaker, 30 mA, 1+N-pole, tripping characteristic B	ADA516D	2 x Schuko
1	H	1 x miniature circuit breaker, 3-pole, characteristic C	NCN316	1 x CEE, 5-pole
1	J	3 x miniature circuit breaker, 1-pole, characteristic B	3 x NBN116	3 x Schuko
1	K	1 x residual current circuit breaker, 30 mA, 1+N-pole, tripping characteristic C	ADA566D	1 x CEE, 3-pole
1	M	Freely assignable, for 4 module units, P <sub>v</sub> max. 13 W	without	without
1	S	Sealing set to increase protection type to IP55		
2	A	1 x D02 fuse socket, 3-pole, 63 A, 400 V	LD046	without
2	B	1 x D02 fuse socket, 3-pole, 63 A, 400 V	LD046	1 x CEE, 5-pole
2	C	1 x fuse switch disconnecter for D02 fuses, 3-pole	L73M	without
2 *	D	1 x miniature circuit breaker, 3-pole, characteristic C	NCN363	1 x CEE, 5-pole
2 *	E	1 x miniature circuit breaker, 4-pole, characteristic C	NCN463	1 x CEE, 5-pole
2	F	1 x miniature circuit breaker, 3-pole, characteristic C	NCN332	1 x CEE, 5-pole
2	G	1 x miniature circuit breaker, 3-pole, characteristic C 2 x miniature circuit breaker, 1-pole, characteristic C	1 x NCN316 2 x NCN116	1 x CEE, 5-pole 2 x Schuko
2	L	1 x residual current circuit breaker, 30 mA, 4-pole, tripping characteristic A	ADX466D	1 x CEE, 5-pole
2	M	Freely assignable, for 9 module units, P <sub>v</sub> max. 22.5 W, with integrated DIN rail	without	without
2	N	Freely assignable, for 9 module units, P <sub>v</sub> max. 22.5 W, with device installation unit	without	without
2	S	Sealing set to increase protection type to IP55		
3	A	1 x fuse switch disconnecter with NH00 fuses, 3-pole 1 x rotary drive	HFD312 HZC001	without
3	B	1 x fuse switch disconnecter with NH00 fuses, 4-pole 1 x rotary drive	HFD412 HZC001	without
3	C	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 3-pole 1 x rotary drive	HNS160JC HXS031H	without
3	D	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 4-pole 1 x rotary drive	HNS161JC HXS031H	without
3	E	1 x fuse base for NH00 fuses, 3-pole	3NH4 030	without
3	F	1 x miniature circuit breaker, 3-pole, characteristic C	HMC399	without
3	G	1 x miniature circuit breaker, 4-pole, characteristic C	HMC499	without

## Tap-off boxes and accessories

### Tap-off boxes - Type key

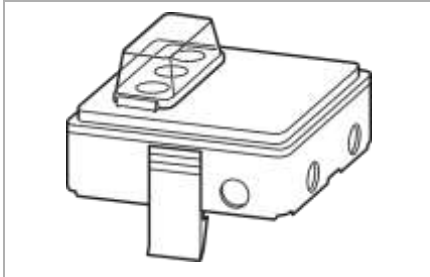


<b>I<sub>N</sub></b> <b>code</b>	<b>Device</b> <b>code</b>	<b>Device description</b>	<b>Device type</b>	<b>Socket(s)</b>
3	M	Freely assignable, for 9 module units, P <sub>v</sub> max. 40 W, with 2 device installation units	without	without
3	N	Freely assignable, for 9 module units, P <sub>v</sub> max. 40 W, with device installation unit	without	without
3	P	Freely assignable, for 9 module units, P <sub>v</sub> max. 40 W, with mounting plate	without	without
3	R	Sealing set for tap-off boxes with cover disconnecter to increase protection type to IP55		
3	S	Sealing set for tap-off boxes without cover disconnecter to increase protection type to IP55		
4	A	1 x fuse switch disconnecter with NH1 fuse, 3-pole 1 x rotary drive	HFD325 HZC001	without
4	B	1 x fuse switch disconnecter with NH1 fuse, 4-pole 1 x rotary drive	HFD425 HZC001	without
4	C	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 3-pole 1 x rotary drive	HNT250JR HXT031H	without
4	D	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 4-pole 1 x rotary drive	HNT251JR HXT031H	without
4	M	Prepared for installation of a h3+ moulded case circuit breaker, max 250 A, 3-pole	without	without
4	N	Prepared for installation of a h3+ moulded case circuit breaker, max 250 A, 4-pole	without	without
4	P	Freely assignable, max. 250 A	without	without
4	S	Sealing set to increase protection type to IP55		
5	A	1 x fuse switch disconnecter with NH2 fuse, 3-pole 1 x rotary drive	HFD340 HZC002	without
5	B	1 x fuse switch disconnecter with NH2 fuse, 4-pole 1 x rotary drive	HFD440 HZC002	without
5	C	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 3-pole 1 x rotary drive	HNW400JR HXW031H	without
5	D	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 4-pole 1 x rotary drive	HNW401JR HXW031H	without
5	M	Prepared for installation of a h3+ moulded case circuit breaker, max 400 A, 3-pole	without	without
5	N	Prepared for installation of a h3+ moulded case circuit breaker, max 400 A, 4-pole	without	without
5	P	Freely assignable, max. 400 A	without	without
5	S	Sealing set to increase protection type to IP55		
6	C	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 3-pole 1 x rotary drive	HNW630JR HXE031H	without
6	D	1 x h3+ moulded case circuit breaker, 40 kA, LSI electronic release, 4-pole 1 x rotary drive	HNW631JR HXE031H	without

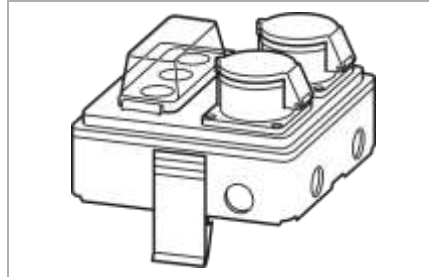
## 06.03 Tap-off boxes

### 06.03.01 Size 1 tap-off boxes, plastic housing

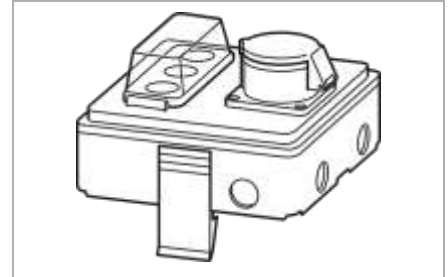
#### Size 1 tap-off boxes, with fuse socket



Tap-off box without socket



Tap-off box with 2 CEE sockets, 3-pole



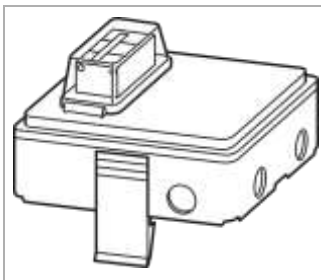
Tap-off box with 1 CEE socket, 5-pole

Fuse socket type	Features (in each case)	Rated operating voltage U <sub>e</sub>	Sockets	Reference
1 x LD047	D01, 3-pole	400 V	without	KEB771A1 <sup>[1]</sup> <sup>[2]</sup>
2 x LD042	D01, 1-pole	230 V	2 x CEE, 3-pole	KEB771B1 <sup>[2]</sup>
1 x LD047	D01, 3-pole	400 V	1 x CEE, 5-pole	KEB771C1 <sup>[2]</sup>

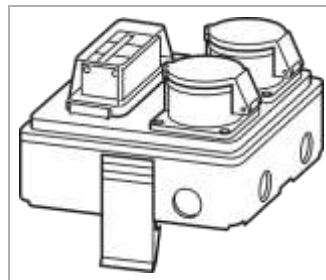
<sup>[1]</sup> M25 cable grommet is included in the scope of delivery. Use plastic cable glands with strain relief (not included in the scope of delivery).

<sup>[2]</sup> Fitting screws, fuse links and screw caps are not included in the scope of delivery.

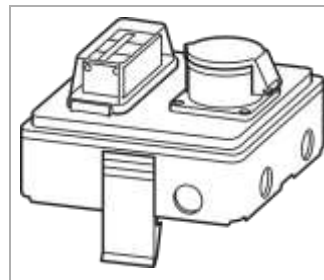
#### Size 1 tap-off boxes, with miniature circuit breaker



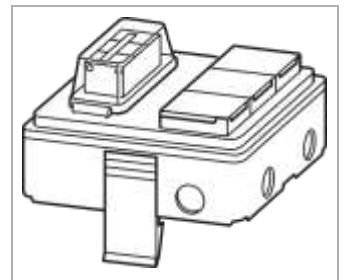
Tap-off box without socket



Tap-off box with 2 CEE sockets, 3-pole



Tap-off box with 1 CEE socket, 5-pole

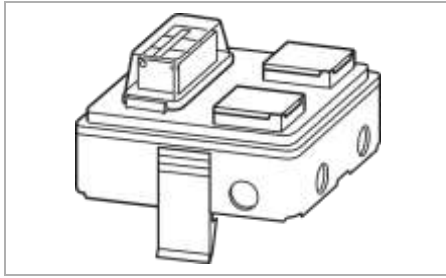


Tap-off box with 3 Schuko sockets

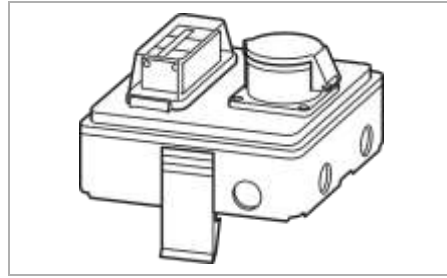
Miniature circuit breaker type	Features (in each case)	Rated operating voltage U <sub>e</sub>	Sockets	Reference
1 x NCN316	3-pole, characteristic C	400 V	without	KEB771D1 <sup>[1]</sup>
1 x NCN416	4-pole, characteristic C	400 V	without	KEB771E1 <sup>[1]</sup>
2 x NBN116	1-pole, characteristic B	230 V	2 x CEE, 3-pole	KEB771F1
1 x NCN316	3-pole, characteristic C	400 V	1 x CEE, 5-pole	KEB771H1
3 x NBN116	1-pole, characteristic B	230 V	3 x Schuko	KEB771J1

<sup>[1]</sup> M25 cable grommet is included in the scope of delivery. Use plastic cable glands with strain relief (not included in the scope of delivery).

### Size 1 tap-off boxes, with residual current circuit breaker



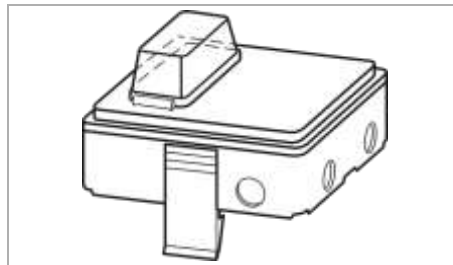
Tap-off box with 2 Schuko sockets



Tap-off box with 1 CEE socket, 3-pole

Residual current circuit breaker type	Features (in each case)	Rated operating voltage $U_e$	Sockets	Reference
1 x ADA516D	30 mA, 1+N-pole, tripping characteristic B	230 V	2 x Schuko	KEB771G1
1 x ADA566D	30 mA, 1+N-pole, tripping characteristic C	230 V	1 x CEE, 3-pole	KEB771K1

### Size 1 tap-off box, freely assignable



Freely assignable tap-off box

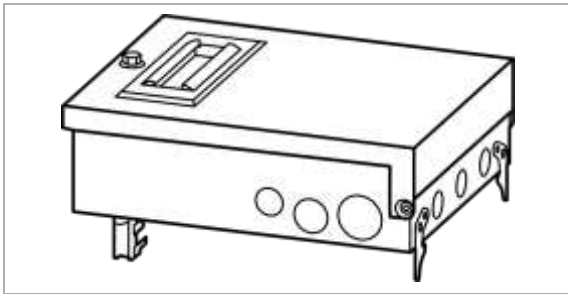
Installation space	Features	Rated operating voltage $U_e$	Sockets	Reference
For 4 module units	Pv max. 13 W	400 V	without	KEB741M1 <sup>[1]</sup>

<sup>[1]</sup> M25 cable grommet is included in the scope of delivery. Use plastic cable glands with strain relief (not included in the scope of delivery).

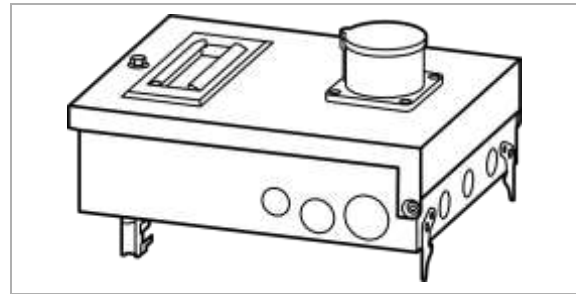


**06.03.02 Size 2 tap-off boxes, sheet steel housing, with cover disconnecter**

**Size 2 tap-off boxes, with fuse socket**



Tap-off box without socket



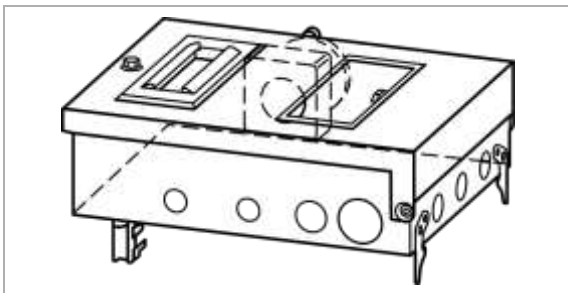
Tap-off box with 1 CEE socket, 5-pole

Fuse socket type	Features	Rated operating voltage U <sub>e</sub>	Sockets	Reference
1 x LD046	D02, 3-pole	400 V	without	KEB772A1 <sup>[1]</sup> <sup>[2]</sup>
1 x LD046	D02, 3-pole	400 V	1 x CEE, 5-pole	KEB772B1 <sup>[2]</sup>

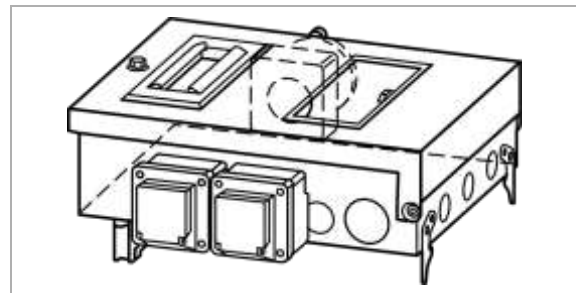
<sup>[1]</sup> M25 cable grommet is included in the scope of delivery. Use plastic cable glands with strain relief (not included in the scope of delivery).

<sup>[2]</sup> Fitting screws, fuse links and screw caps are not included in the scope of delivery.

**Size 2 tap-off boxes, with miniature circuit breaker and transparent flap**



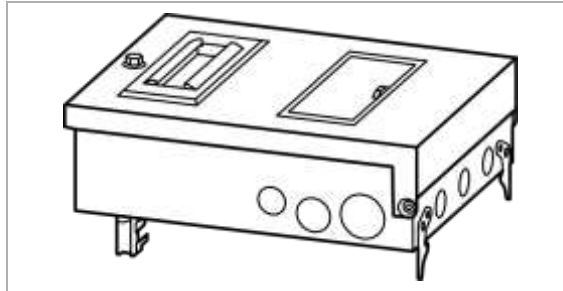
Tap-off box with 1 CEE socket, 5-pole



Tap-off box with 1 CEE socket, 5-pole and 2 Schuko sockets

Miniature circuit breaker type	Features (in each case)	Rated operating voltage U <sub>e</sub>	Sockets	Reference
1 x NCN332	3-pole, characteristic C	400 V	1 x CEE, 5-pole	KEB772F1
1 x NCN316	3-pole, characteristic C	400 V	1 x CEE, 5-pole	KEB772G1
2 x NCN116	1-pole, characteristic C		2 x Schuko	

### Size 2 tap-off boxes, with fuse switch disconnecter and transparent flap



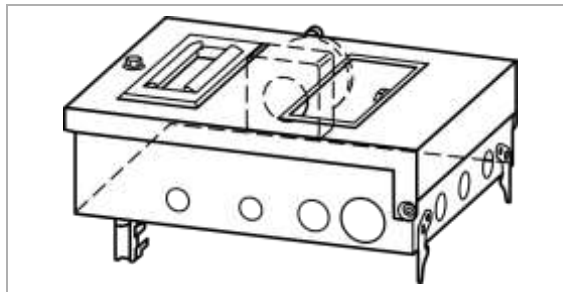
Tap-off box without socket

Fuse switch disconnecter type	Features	Rated operating voltage $U_e$	Sockets	Reference
L73M	For D02 fuses, 3-pole	400 V	without	KEB772C1 <sup>[1]</sup> <sup>[2]</sup>

<sup>[1]</sup> M25 cable grommet is included in the scope of delivery. Use plastic cable glands with strain relief (not included in the scope of delivery).

<sup>[2]</sup> Fitting screws, fuse links and screw caps are not included in the scope of delivery.

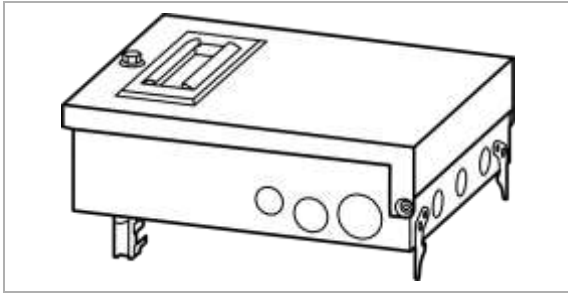
### Size 2 tap-off boxes, with residual current circuit breaker and transparent flap



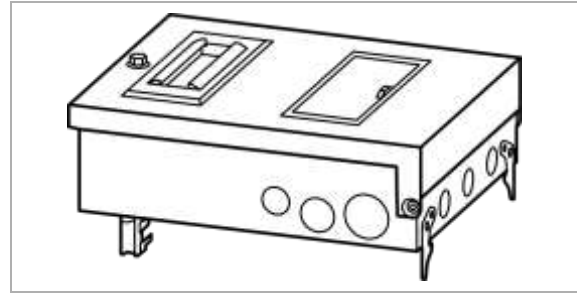
Tap-off box with 1 CEE socket, 5-pole

Residual current circuit breaker type	Features	Rated operating voltage $U_e$	Sockets	Reference
ADX466D	30 mA, 4-pole, tripping characteristic A	400 V	1 x CEE, 5-pole	KEB772L1

**Size 2 tap-off boxes, freely assignable**



Freely assignable tap-off box, with integrated DIN rail

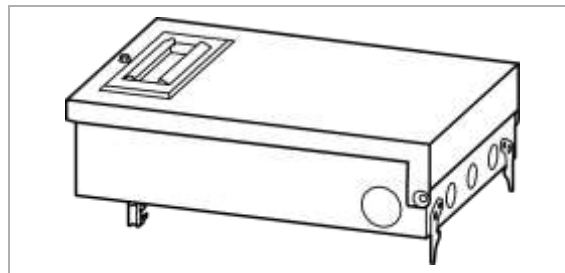


Freely assignable tap-off box, with device installation unit (with transparent flap)

Installation space	Features	Rated operating voltage $U_e$	Sockets	Reference
For 9 module units	Pv max. 22.5 W, with integrated DIN rail	690 V	without	KEB742M1
For 9 module units	Pv max. 22.5 W, with device installation unit (with transparent flap)	690 V	without	KEB742N1

**06.03.03 Size 3 tap-off boxes, sheet steel housing, with cover disconnecter**

**Size 3 tap-off boxes, with fuse base**



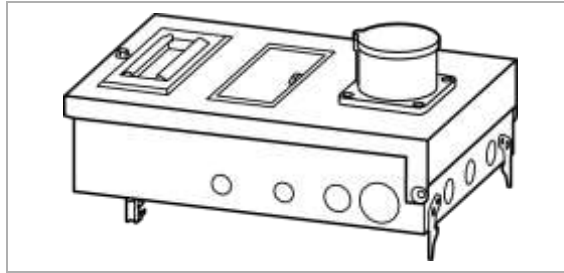
Tap-off box with fuse base

Fuse base type	Features	Rated operating voltage $U_e$	Sockets	Reference
3NH4 030	For NH00 fuses, 3-pole	690 V	without	KEB773E1

## Tap-off boxes and accessories

### Tap-off boxes

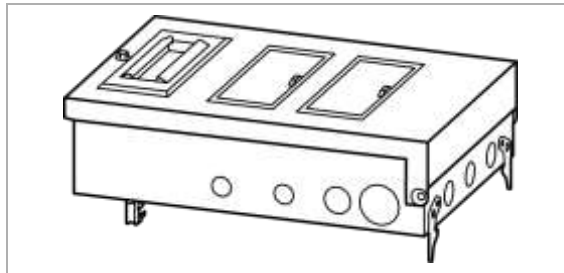
#### Size 3 tap-off boxes, with miniature circuit breaker and transparent flap



Tap-off box with 1 CEE socket, 5-pole

Miniature circuit breaker type	Features	Rated operating voltage U <sub>e</sub>	Sockets	Reference
NCN363	3-pole, characteristic C	400 V	1 x CEE, 5-pole	KEB772D1
NCN463	4-pole, characteristic C	400 V	1 x CEE, 5-pole	KEB772E1

#### Size 3 tap-off box, freely assignable, with transparent flap

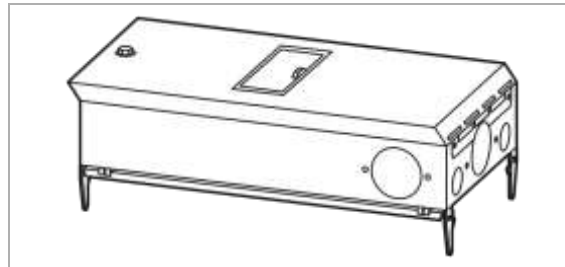


Freely assignable tap-off box, with 2 device installation units (with transparent flaps)

Installation space	Features	Rated operating voltage U <sub>e</sub>	Sockets	Reference
For 9 module units	Pv max. 40 W, with 2 device installation units (with transparent flaps)	690 V	without	KEB743M1

**06.03.04 Size 03 tap-off boxes, sheet steel housing, without cover disconnecter**

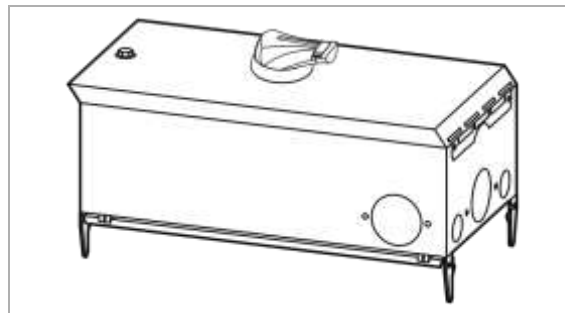
**Size 03 tap-off boxes, with miniature circuit breaker and transparent flap**



Tap-off box with miniature circuit breaker

Miniature circuit breaker type	Features	Rated operating voltage $U_e$	Reference
HMC399	3-pole, characteristic C	400 V	KEB773F1
HMC499	4-pole, characteristic C	400 V	KEB753G1

**Size 03 tap-off boxes, with fuse switch disconnecter**



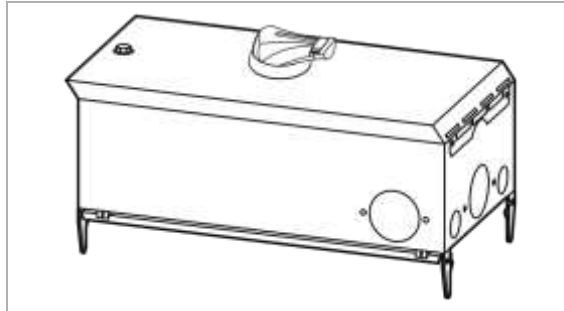
Tap-off box with fuse switch disconnecter and rotary drive

Fuse switch disconnecter type	Features	Rated operating voltage $U_e$	Reference
HFD312	With NH00 fuses, 3-pole HZC001 rotary drive	400 V	KEB773A1
HFD412	With NH00 fuses, 4-pole HZC001 rotary drive	400 V	KEB773B1

# Tap-off boxes and accessories

## Tap-off boxes

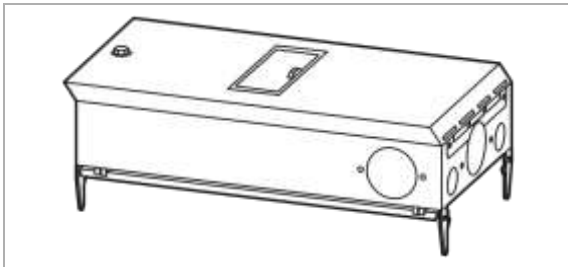
### Size 03 tap-off boxes, with h3+ moulded case circuit breaker



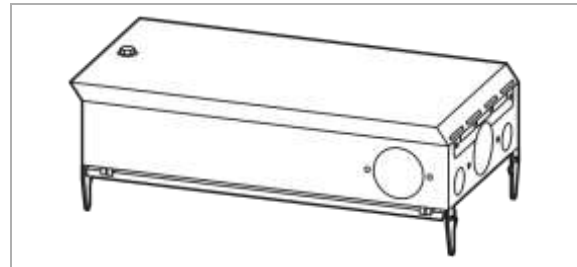
Tap-off box with h3+ moulded case circuit breaker and rotary drive

Moulded case circuit breaker type	Features	Rated operating voltage $U_e$	Reference
HNS160JC	40 kA, LSI electronic release, 3-pole HXS031H rotary drive	400 V	KEB773C1
HNS161JC	40 kA, LSI electronic release, 4-pole HXS031H rotary drive	400 V	KEB753D1

### Size 03 tap-off box, freely assignable



Freely assignable tap-off box, with device installation unit (with transparent flap)



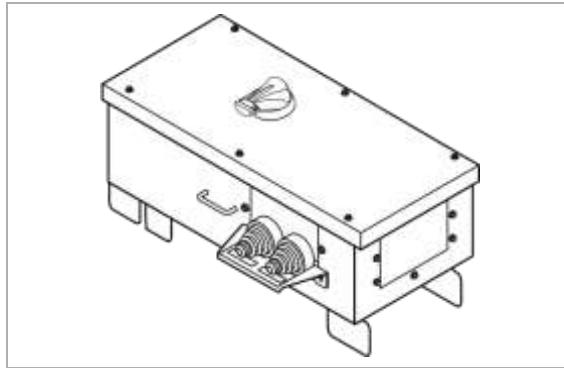
Freely assignable tap-off box, with mounting plate

Installation space	Features	Rated operating voltage $U_e$	Reference
For 9 module units	Pv max. 40 W, with device installation unit (with transparent flap)	690 V	KEB733N1
For 9 module units	Pv max. 40 W, with mounting plate	690 V	KEB733P1

**06.03.05 Size 04 tap-off boxes, sheet steel housing, without cover disconnecter**

**Size 04 tap-off boxes, with fuse switch disconnecter**

- Supplied with mounting plate (see dimensional sketches).

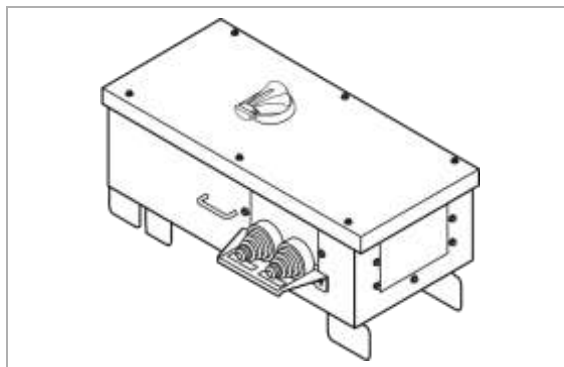


Tap-off box with fuse switch disconnecter and rotary drive

Fuse switch disconnecter type	Features	Rated operating voltage U <sub>e</sub>	Reference
HFD325	With NH1 fuse, 3-pole HZC001 rotary drive	400 V	KEB774A1
HFD425	With NH1 fuse, 4-pole HZC001 rotary drive	400 V	KEB754B1

**Size 04 tap-off boxes, with h3+ moulded case circuit breaker**

- Supplied with mounting plate (see dimensional sketches).

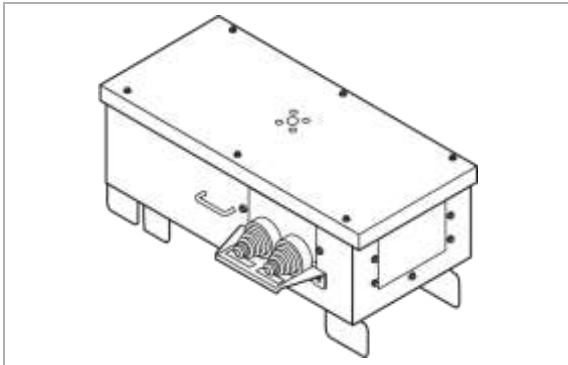


Tap-off box with h3+ moulded case circuit breaker and rotary drive

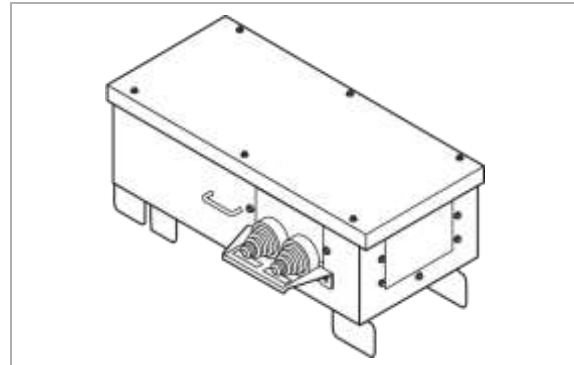
Moulded case circuit breaker type	Features	Rated operating voltage U <sub>e</sub>	Reference
HNT250JR	40 kA, LSI electronic release, 3-pole HXT031H rotary drive	400 V	KEB774C1
HNT251JR	40 kA, LSI electronic release, 4-pole HXT031H rotary drive	400 V	KEB754D1

### Size 04 tap-off box, prepared for device installation

- Supplied with mounting plate (see dimensional sketches).



Tap-off box prepared for installation of an h3+ moulded case circuit breaker (with holes for the axle and fixing screws of a rotary drive)



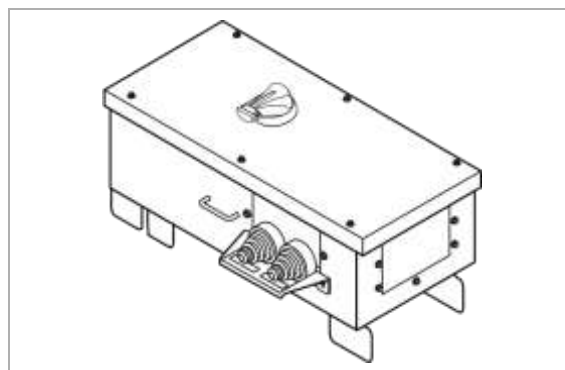
Freely assignable tap-off box

Prepared for	Features	Rated operating voltage $U_e$	Reference
h3+ moulded case circuit breaker	Max. 250 A, 3-pole	400 V	KEB734M1
h3+ moulded case circuit breaker	Max 250 A, 4-pole	400 V	KEB734N1
Can be freely fitted with devices	Max. 250 A	400 V	KEB734P1

### 06.03.06 Size 05 tap-off boxes, sheet steel housing, without cover disconnecter

#### Size 05 tap-off boxes, with fuse switch disconnecter

- Supplied with mounting plate (see dimensional sketches).
- Can only be mounted on busbar elements with double-row tap-off points (from 630 A).



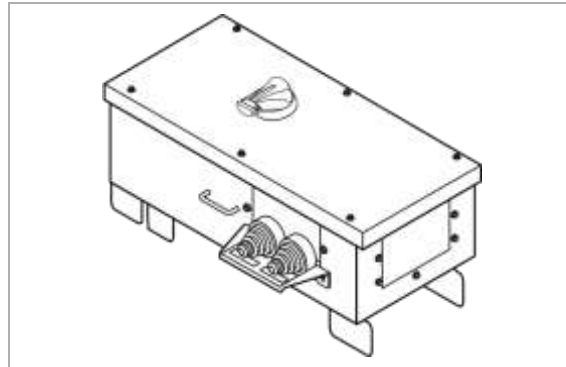
Tap-off box with fuse switch disconnecter and rotary drive

Fuse switch disconnecter type	Features	Rated operating voltage $U_e$	Reference
HFD340	With NH2 fuse, 3-pole HZC002 rotary drive	400 V	KEB775A1
HFD440	With NH2 fuse, 4-pole HZC002 rotary drive	400 V	KEB755B1



**Size 05 tap-off boxes, with h3+ moulded case circuit breaker**

- Supplied with mounting plate (see dimensional sketches).
- Can only be mounted on busbar elements with double-row tap-off points (from 630 A).

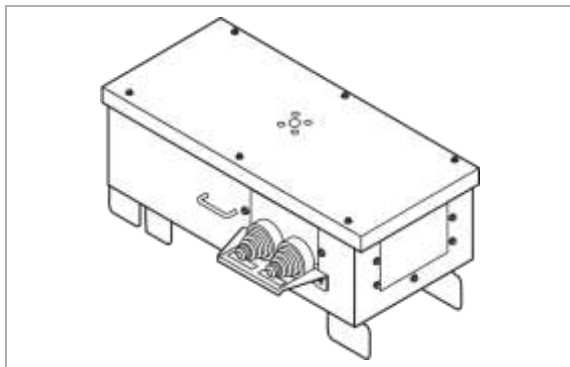


Tap-off box with h3+ moulded case circuit breaker and rotary drive

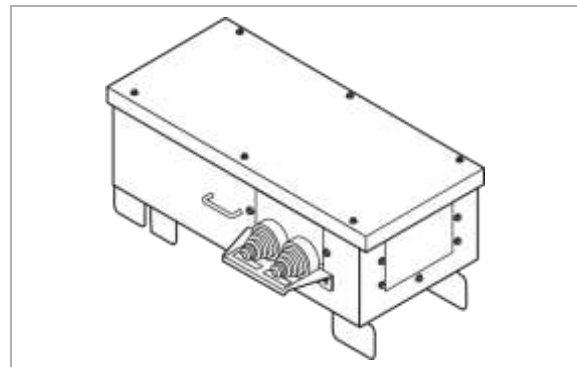
Moulded case circuit breaker type	Features	Rated operating voltage U <sub>e</sub>	Reference
HNW400JR	40 kA, LSI electronic release, 3-pole HXW031H rotary drive	400 V	KEB775C1
HNW401JR	40 kA, LSI electronic release, 4-pole HXW031H rotary drive	400 V	KEB755D1
HNW630JR	40 kA, LSI electronic release, 3-pole HXE031H rotary drive	400 V	KEB776C1
HNW631JR	40 kA, LSI electronic release, 4-pole HXE031H rotary drive	400 V	KEB756D1

**Size 05 tap-off box, prepared for device installation**

- Supplied with mounting plate (see dimensional sketches).
- Can only be mounted on busbar elements with double-row tap-off points (from 630 A).



Tap-off box prepared for installation of an h3+ moulded case circuit breaker

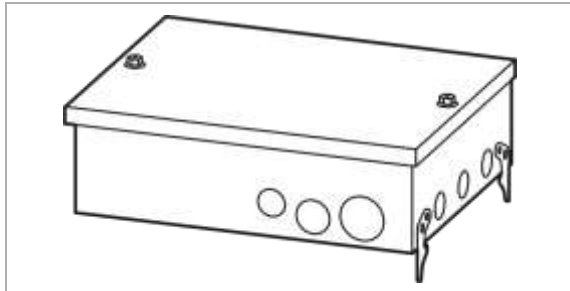


Freely assignable tap-off box

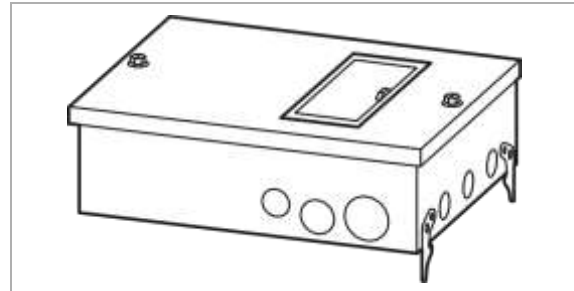
Prepared for	Features	Rated operating voltage U <sub>e</sub>	Reference
h3+ moulded case circuit breaker	Max. 400 A, 3-pole	400 V	KEB735M1
h3+ moulded case circuit breaker	Max. 400 A, 4-pole	400 V	KEB735N1
Can be freely fitted with devices	Max. 400 A	400 V	KEB735P1

## 06.04 Expansion tap-off boxes, sheet steel housing

Expansion tap-off boxes, freely assignable, can only be combined with sizes 2/3/03 tap-off boxes



Expansion tap-off box without device installation unit



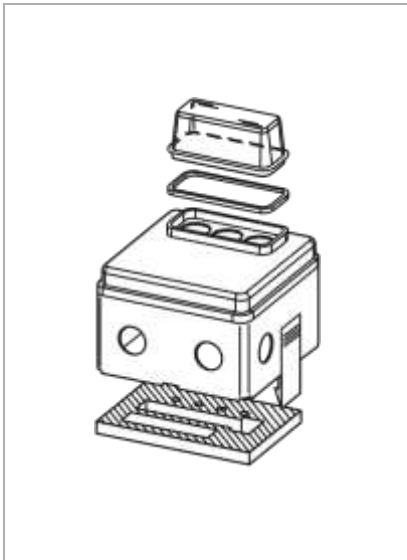
Expansion tap-off box with device installation unit (with transparent flap)

Installation space	Features	Rated operating voltage $U_e$	Used for	Reference
For 9 module units, integrated DIN rail	Pv max. 30 W, without device installation unit (with transparent flap)	400 V	<ul style="list-style-type: none"> <li>- Surge protection device</li> <li>- Remote control/</li> <li>- Remote switching</li> <li>- Intelligence</li> <li>- Fuse socket</li> <li>- Miniature circuit breaker</li> </ul>	KEB740A1
For 9 module units, integrated DIN rail	Pv max. 30 W, with device installation unit (with transparent flap)	400 V	<ul style="list-style-type: none"> <li>- Remote control/remote switching</li> <li>- Intelligence</li> <li>- Miniature circuit breaker</li> <li>- Energy meter</li> </ul>	KEB740B1

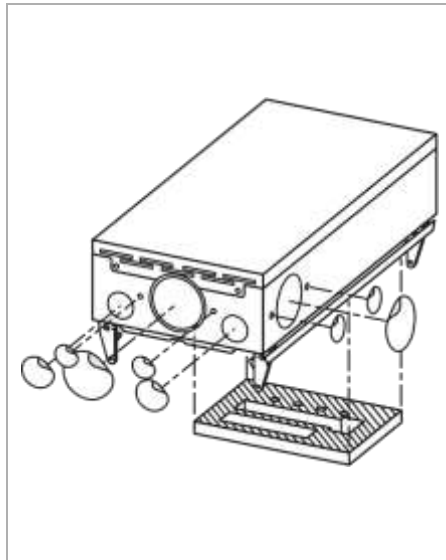
**06.05 Tap-off box accessories**

**Sealing set for tap-off boxes to increase protection type to IP55**

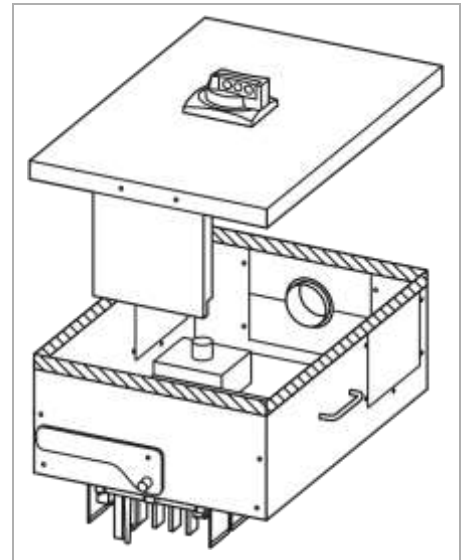
Tap-off boxes without transparent flap can be upgraded from protection type IP54 to protection type IP55.



Sealing set for size 1 tap-off box



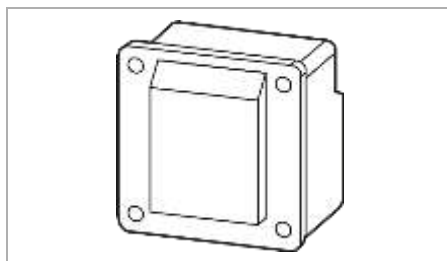
Sealing set for sizes 2, 3 and 03 tap-off boxes



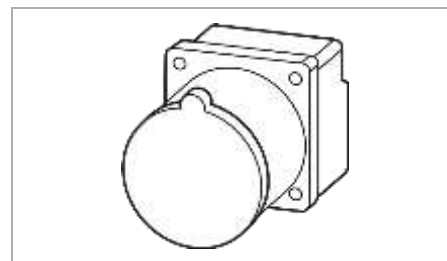
Sealing set for sizes 04 and 05 tap-off boxes

Tap-off box size	Sealing set reference	Weight
1	KEB731S1	0.03 kg
2	KEB732S1	0.07 kg
3	KEB733R1	0.07 kg
03	KEB733S1	0.04 kg
04	KEB734S1	0.05 kg
05	KEB735S1	0.07 kg

**Sockets for tap-off boxes and expansion tap-off boxes**



Schuko socket



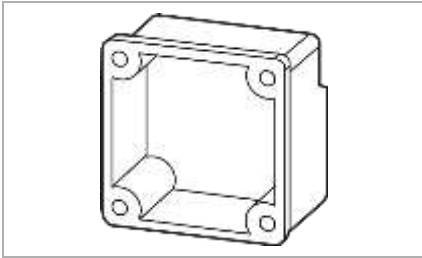
CEE socket

Socket type	Features	Reference	Weight
Schuko socket	16 A, 3-pole	KEM31S90R0LMF	0.28 kg
CEE socket	16 A, 3-pole	KEM31S91R0LMF	0.26 kg
	16 A, 5-pole	KEM31S92R0LMF	0.31 kg
	32 A, 5-pole	KEM31S93R0LMF	0.35 kg

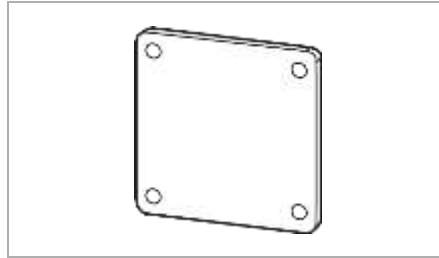
## Tap-off boxes and accessories

### Tap-off box accessories

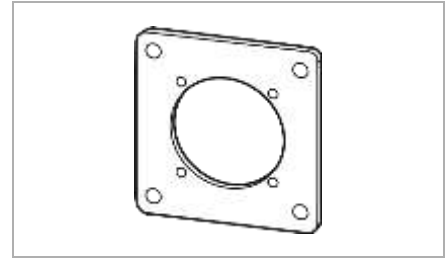
#### Adapter housing for sockets



Adapter housing for sockets



Adapter plate for adapter housing, for custom socket cut-outs



Adapter plate for adapter housing, with  $\varnothing$  44 mm socket cut-out

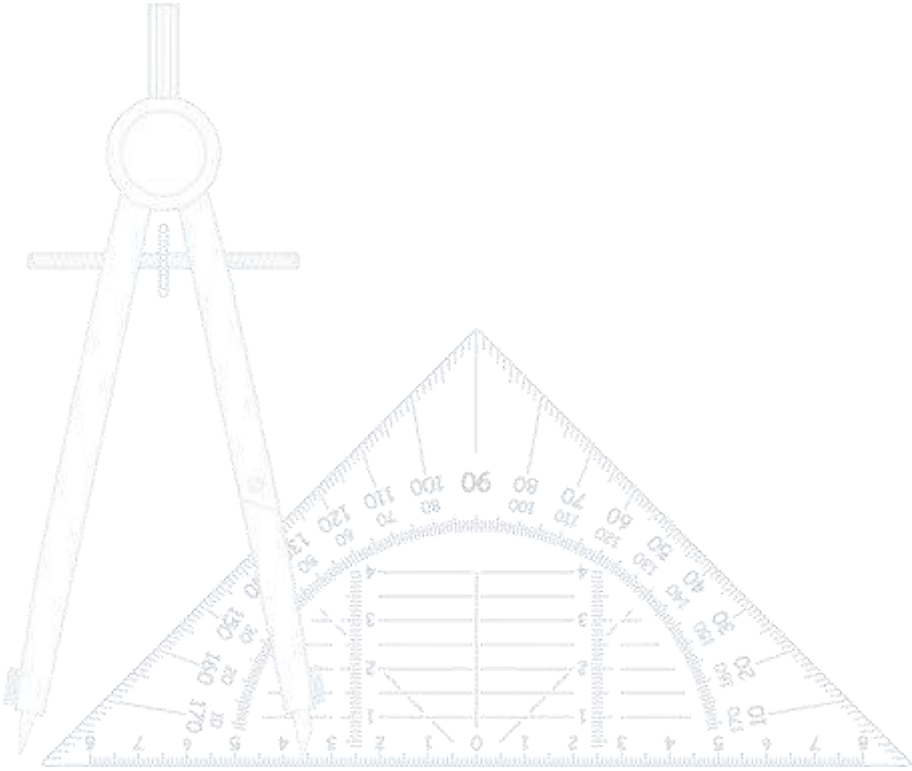
Item	Features	Reference	Weight
Adapter housing	With fixing kit	KEM31S65R0LMF	0.15 kg
Adapter plate	For custom socket cut-out	KEM31S66R0LMF	0.09 kg
	With $\varnothing$ 44 mm socket cut-out	KEM31S67R0LMF	0.06 kg

#### Tap-off box special flange for Sweden

Special flange type	For tap-off box size	Reference
FL13	04	KEB734V1
FL21	05	KEB736W1



# Project planning



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## 07.01 Basic principles of project planning

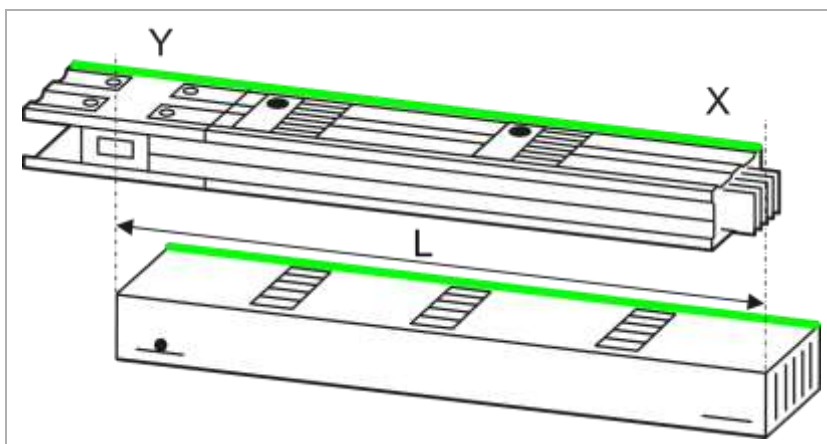
### Project planning symbols and planning lengths

Project planning symbols have been defined to make it easier to configure unibar M systems. The following properties are defined by means of these symbols in the project planning sketch:

- Installation position of the component
- Phasing
- Open bar end (side without joint block)
- Side with the joint block
- Position of the joint block cover
- Position of the single bolt clamp of the joint block (on the N bar side, i.e. opposite the PE bar)

The following definitions apply to all busbar trunking components (feeding units, straight length elements and changes of direction).

- The side with the PE bar is marked with a green line.
- A black line at the side at the bar end marks the open end of the busbar.
- A black line at the side with a dot above it at the bar end marks the bar end with joint block.



#### Sketch of a straight length element

- PE side marked with green line
- Open bar end on the right
- Left of joint block

#### Associated project planning symbol

- PE side marked with green line
- On the right, marking for the open bar end by a line at the side
- On the left, marking for bar end with joint block by a line at the side with a dot

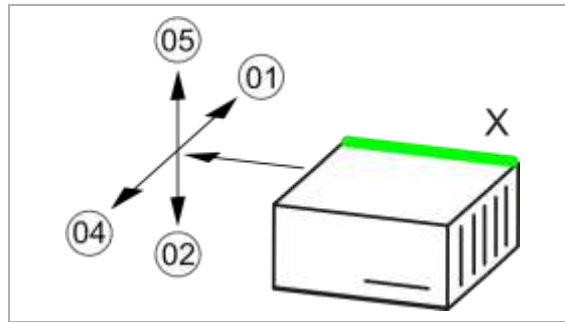
The planning length "L" is not identical to the actual length of a straight length element but is rather defined as follows:

- From the fictitious centre of a joint block at the open bar end to
- the centre of the joint block at the bar end with the joint block.

### Determining the direction for L-Elements and Z-Elements

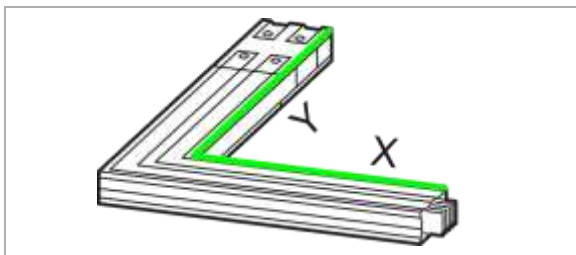
- The definition of the direction codes refers to a housing in flat position (conductor upright) with the PE busbar on the right, see the "Route planning for horizontal installation" section also.
- The reference point is the side with the open bar end, i.e. the side without the joint block.
- The direction codes ①, ②, ④ and ⑤ correspond to the codes 01, 02, 04 and 05 of the type key for L-Elements.
- For Z-elements, there is a sequence of two direction codes each, see the table below.



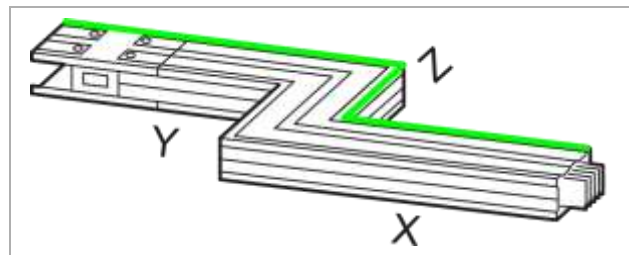


Determining the direction for L-Elements and Z-Elements.  
The defined reference is a housing in flat position with the PE on the right.

Element type	Reference	Change of direction	Corresponds to direction code
L	KEM3xS01xxLxF	Horizontal, 90° to the right	①
L	KEM3xS02xxLxF	Vertical, 90° downwards	②
L	KEM3xS04xxLxF	Horizontal, 90° to the left	④
L	KEM3xS05xxLxF	Vertical, 90° upwards	⑤
Z	KEM3xS40xxLxF	Horizontal, first 90° to the right, then 90° to the left	①, then ④
Z	KEM3xS42xxLxF	Vertical, first 90° downwards, then 90° upwards	②, then ⑤
Z	KEM3xS41xxLxF	Horizontal, first 90° to the left, then 90° to the right	④, then ①
Z	KEM3xS43xxLxF	Vertical, first 90° upwards, then 90° downwards	⑤, then ②



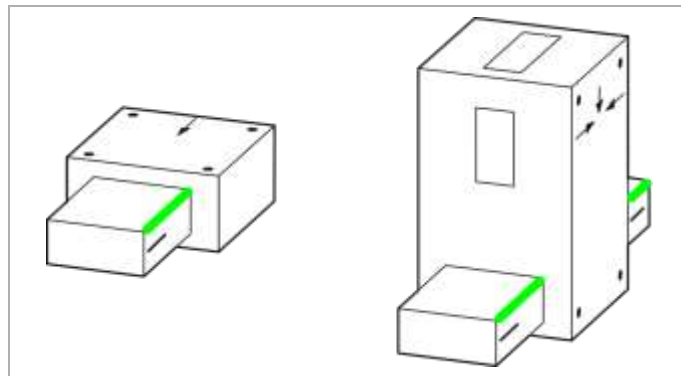
Example: Horizontal L-Element, 90° to the right, type KEM3xS01xxLxF  
Direction code: ①



Example: Horizontal Z-Element, first 90° to the right, then 90° to the left, type KEM3xS40xxLxF  
Direction codes: ①, then ④

### Determining the direction for cable feeders

The position of the cable connection compartment can be adjusted in relation to the straight length element for cable feeders. The busbar connection terminals can be released when the housing is opened and turned to the required phasing.



Cable end feeder (left) and centre feed (right), at busbar connection terminals with the symbol for open bar ends in each case

## 07.02 Route planning

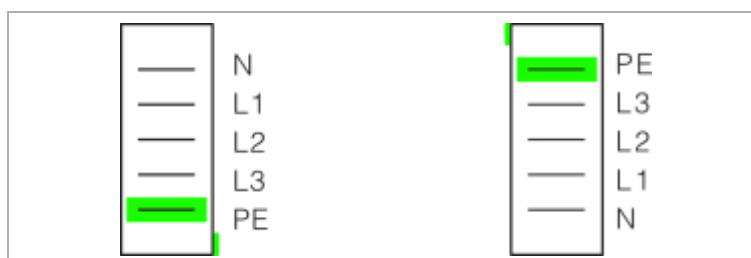
### 07.02.01 Horizontal installation

#### Installation positions

Any installation position can be selected for the unibar M system. Therefore, two types of installation are possible for horizontal routing of runs.



Installation position: Housing in flat position, conductor upright position

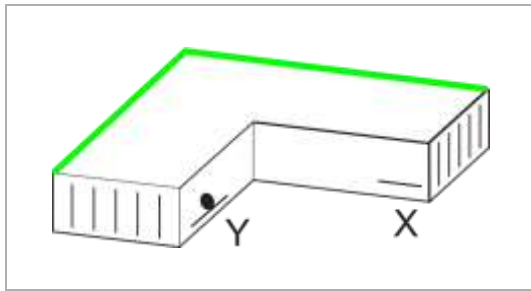


Installation position: Housing in upright position, conductor flat position

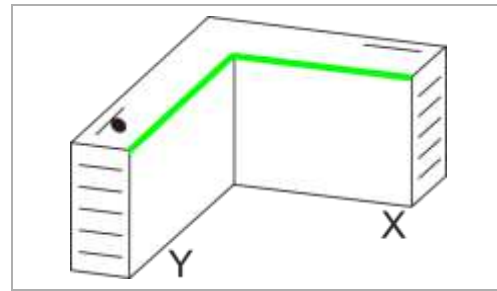
Any phasing is possible here.

Please note the following in relation to the housing upright, conductor flat installation position:

- Less additional equipment is required due to the large span.
- A reduction factor ( $\times 0.9$ ) is required for the transport of energy. This applies to straight length elements and changes of direction.



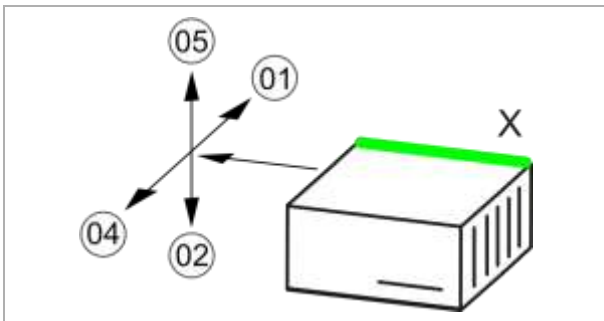
Example: "Housing in flat position, conductor upright position":  
horizontal L-Element, 90° to the left.  
Type KEM3xS01xxLMF



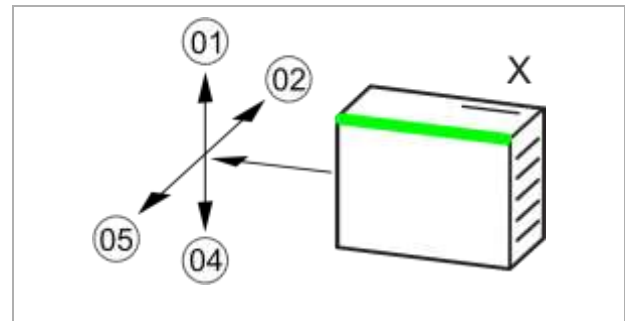
Example: "Housing in upright position, conductor flat position":  
vertical L-Element turned on its side, 90° upwards.  
Type KEM3xS02xxLMF

**Determining the direction for "housing upright" installation position**

- The busbar elements are rotated by 90° when configuring in the "housing upright" installation position.
- The definitions for determining the direction remain unchanged relative to the (rotated) busbar element, but are nevertheless offset by 90° in the actual position. The busbar element references remain the same.

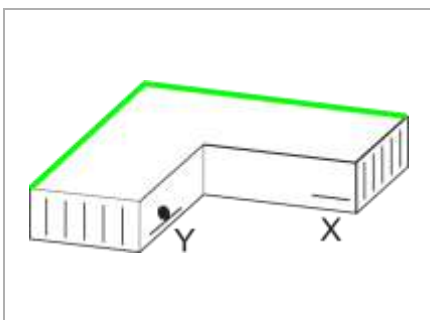


The changes of direction are defined for L-Elements and Z-Elements in the "housing flat" installation position.

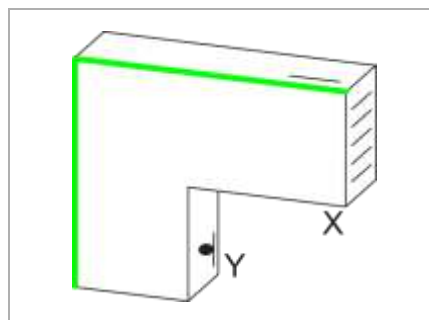


The changes of direction remain unchanged relative to the busbar element for the "housing upright" installation position, but are nevertheless offset by 90° in the actual position.

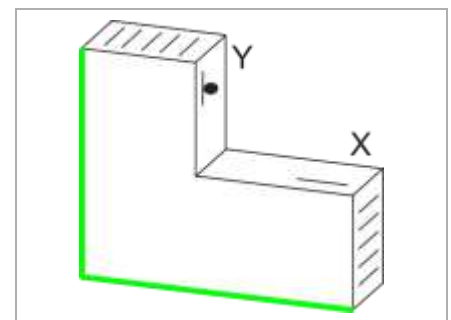
**Sample installation positions for a horizontal L-Element, 90° to the left, type KEM3xS01xxLMF**



Housing flat, PE on right



Element rotated downwards by 90°  
Housing in upright position, PE at the top



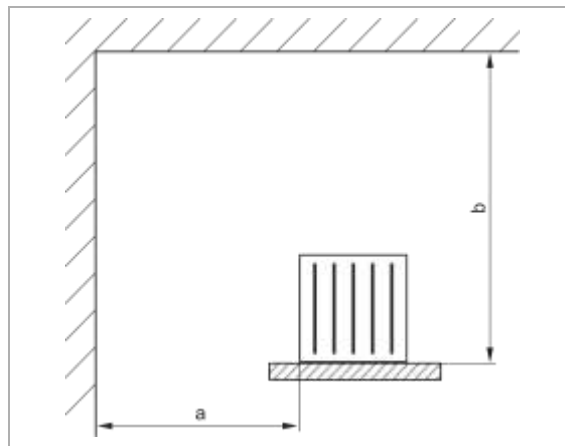
Element rotated upwards by 90°  
Housing in upright position, PE at the bottom

**Space requirement**

Minimum distances to the structures must be observed when configuring the route in order to guarantee easy assembly of the busbar elements and tap-off boxes.

**Space requirement for straight length elements without tap-off points**

Minimum dimensions for straight length elements without tap-off boxes including system-compliant fixing bracket, mounted horizontally on platform or wall bracket.

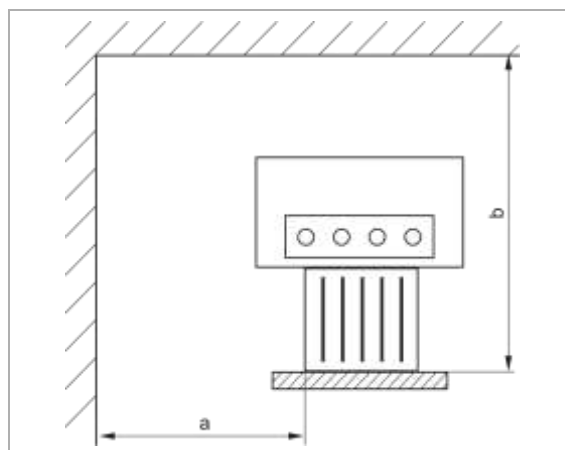


Space requirement straight length elements without tap-off points

Rated current	a	b
160 to 400 A	100 mm	160 mm
630 to 1000 A	100 mm	280 mm

**Space requirement for straight length elements with tap-off points**

Straight length elements with tap-off boxes including system-compliant fixing bracket, mounted horizontally on platform or wall bracket. Minimum dimension a applies to cable entry at the face end.



Space requirement straight length elements with tap-off points

Rated current	a	b
160 to 400 A	300 mm	620 mm
630 to 1000 A	300 mm	680 mm

**07.02.02 Vertical installation**

**Installation positions**

When configuring vertical busbar runs, the floor height from centre of ceiling to centre of ceiling determines the busbar lengths to select.

If fire protection is not required, standard lengths with protective sleeve are suitable. Ensure that a minimum distance of 0.185 m is provided from the end of the trunking unit housing to the upper edge of the protective sleeve.

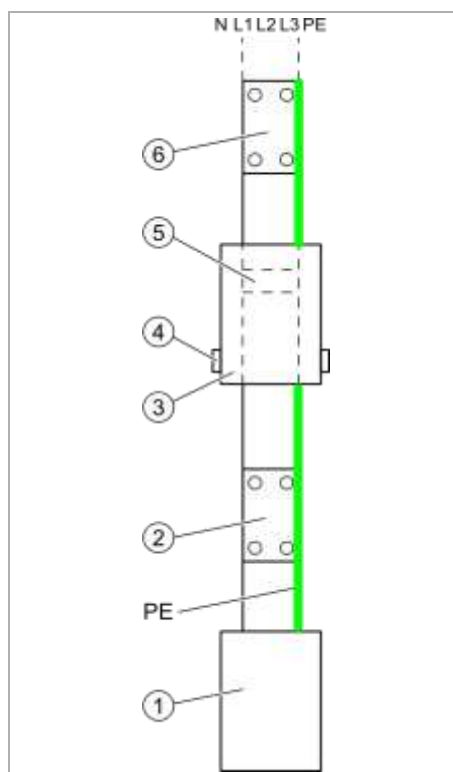
A specific installation position must be provided for vertical installation:

- The PE must always be on the right-hand side.
- The side with the joint block of the busbar element must be pointing upwards.

Compliance with this installation position is the only way to guarantee that:

- The joint block cover can be fitted onto the joint block from the front.
- The screw connection of the joint block cover can be mounted.
- Tap-off boxes cannot be mounted upside-down, which is not permitted.

Current reduction is not required in the case of vertical run routing.



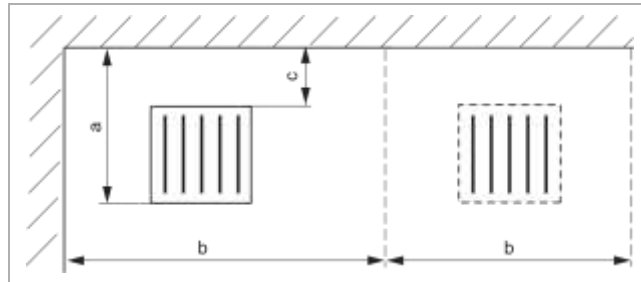
Vertical installation

- ① Cable end feeders
- ② Joint block (of the last/lowest busbar element in the vertical run)
- ③ Tap-off box
- ④ Cable entry
- ⑤ Tap-off point
- ⑥ Joint block

**Space requirement**

Minimum distances to the structures must be observed when configuring the route in order to guarantee easy assembly of the busbar elements and tap-off boxes.

**Space requirement for straight length elements without tap-off points**



Space requirement straight length elements without tap-off points

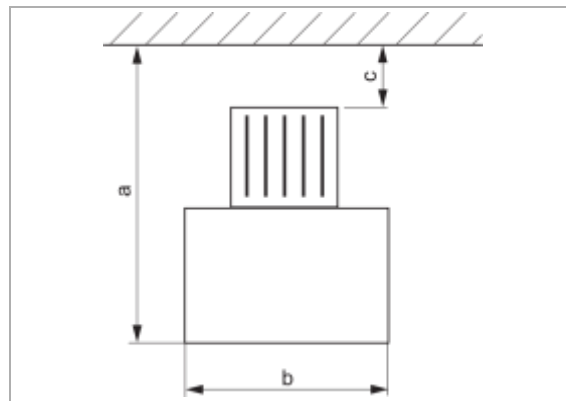
Rated current	a	b <sup>[1]</sup>	c <sup>[2]</sup>
160 to 400 A	130 mm	640 mm	30 mm
630 to 1000 A	170 mm	640 mm	30 mm

<sup>[1]</sup> Required space requirement due to fixing bracket

<sup>[2]</sup> Measurement of wall distance due to fixing bracket

**Space requirement for straight length elements with tap-off points**

- The following graphic shows a busbar system with tap-off box fitted on.
- Cable entry is from the bottom.



Space requirement straight length elements with tap-off points

Rated current	a	b	c <sup>[1]</sup>
160 to 400 A	660 mm	640 mm	30 mm
630 to 1000 A	700 mm	640 mm	30 mm

<sup>[1]</sup> Measurement of wall distance due to fixing bracket

**Tap-off boxes**

The installation position is pre-defined for the tap-off boxes in the vertical run.

- The outgoing cable must be connected from below or from below to the side. This is the case when the PE conductor is on the right-hand side when viewed from the front.

**Vertical fastening**

- The weight is supported by fastening elements KEM31S23R0LMF or KEM31S24R0LMF.
  - Both types can carry a load of up to 175 kg max.
  - They must be fitted in the area of the lowest joint block.
  - The maximum values for the length (or height) specified in the table below at maximum weight load apply to each fastening element.
  - Additional fastening elements KEM31S23R0LMF or KEM31S24R0LMF must be used for weight support in the case of higher unibar M busbar runs.
- In addition, the busbar run must be secured to the wall with fixing brackets.
  - The joint block flanges are each secured with the fixing bracket for the connecting flange KEM31S26R0LMF.
  - Attachment points are implemented in between using spacer bracket KEM31S64R0LMF combined with fixing bracket KEM3xS20R0LMF.

Maximum length or height of vertical unibar M busbar runs when supported by a vertical fastening element KEM31S23R0LMF or KEM31S24R0LMF:

<b>Rated current</b>	<b>Max. length or height</b>	<b>Max. weight-loading <sup>[1]</sup></b>
160 A	11.3 m	50 kg
250 A	10.9 m	53 kg
400 A	7.9 m	74 kg
630 A	5.8 m	106 kg
800 A	5.8 m	108 kg
1000 A	5.3 m	108 kg

<sup>[1]</sup> per straight length element with length of 3.25 m, fitted with tap-off boxes

The wall distance can be varied:

<b>Rated current</b>	<b>Min.</b>	<b>Max.</b>
160 to 400 A	30 mm	82 mm
630 to 1000 A	50 mm	82 mm

### 07.03 Defining the reference dimensions during project planning

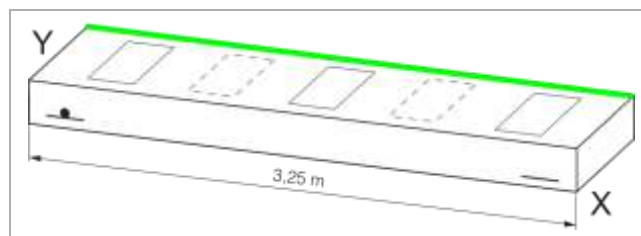
For details on dimensioning, see "Dimensional sketches" (page 107).

#### Reference dimensions for straight length elements in standard planning lengths

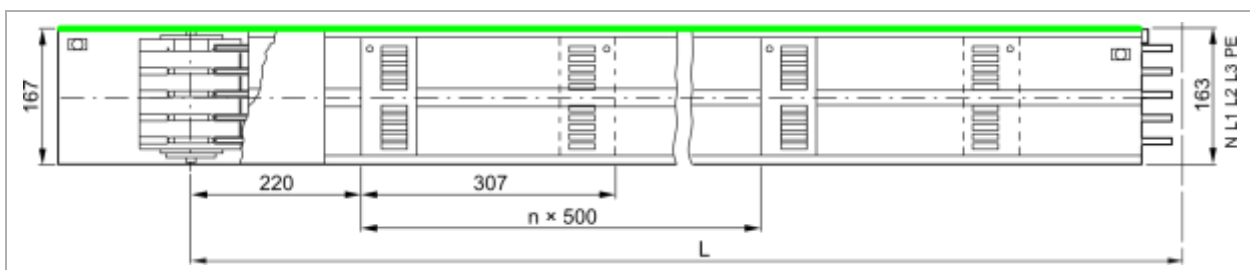
The planning length "L" is not identical to the actual length of a straight length element but is rather defined as follows:

- From the fictitious centre of a joint block at the open bar end to
- the centre of the joint block at the bar end with the joint block.

See the section on "Basic principles of project planning" also.



Example: Straight length element with a standard planning length of 3.25 m, type KEM3xS00ZxLMF

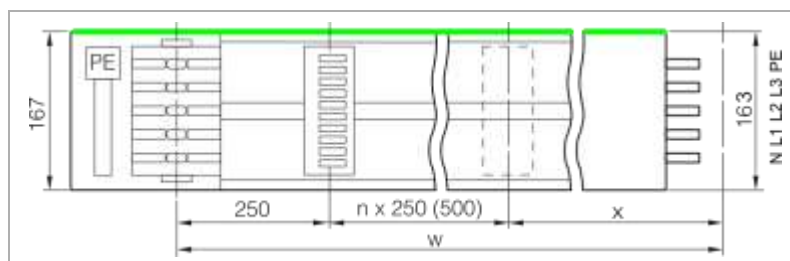


Dimension drawing for KEM3xS00ZxLMF, tap-off points distance = 0.5 m

#### Reference dimensions for straight length elements in planning lengths to order

The planning lengths "w" is not identical to the actual length of a straight length element but is rather defined as follows:

- From the fictitious centre of a joint block at the open bar end to
- the centre of the joint block at the bar end with the joint block.



Example: KEM3xS00ZxLMF, tap-off points distance = 0.5 m

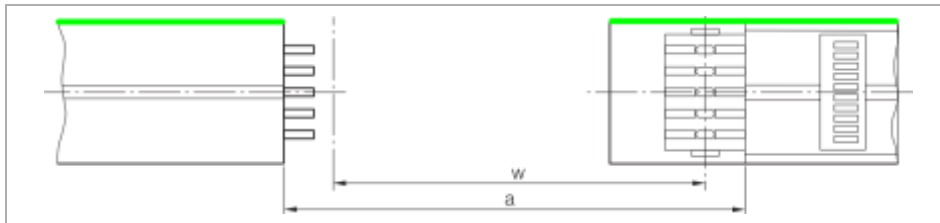
Length	Number of tap-off points both sides
0.5 to 1.24	-
1.25 to 2.25	4 to 8
2.26 to 3.25	8 to 12



Comments:

- In the case of lengths to order, not all tap-off points can be fitted with tap-off boxes.
- The reference edge is the open bar end, the grid for the tap-off points can be seen in the diagram.
- The distance "x" is between the fictitious centre of the joint block at the open end and the next tap-off point on the straight length element.
- The distance  $x = 250 \text{ mm}$  for the standard length. In lengths that can be ordered,  $260 \text{ mm} \leq x \leq 490 \text{ mm}$  (varies depending on planning length "w").

**Sizing and calculating planning lengths to order at the installation site**



Sizing between the plate edges

At the installation site, the dimension "a" between the plate edges of the two straight length elements to be connected is measured.

The configurable planning length "w" which can be ordered is calculated based on the following formula:

$$w \text{ [m]} = a \text{ [m]} - 0.14 \text{ m}$$

**Reference dimensions for L-Elements and Z-Elements**

The planning lengths of the X leg and Y leg are not identical to the actual length of the leg in question. The planning lengths are defined as follows (see section on "Dimensional sketches" (page 107) also):

- Planning length X leg (side with the open bar end): from the fictitious centre of the joint block to the outer edge of the housing.
- Planning length Y leg (side with the joint block): from the centre of the joint block to the outer edge of the housing.
- Planning length Z leg: from outer edge to outer edge of the housing.

**07.04 Protective functions**

**Overload protection and short-circuit protection**

Busbar trunking systems must be protected against short-circuit and overload. Fuses and circuit breakers are used as protective devices. The level of short-circuit currents to be expected, selectivity requirements and operating and signalling functions are important factors when selecting the protective devices.

If circuit breakers are used, the thermally delayed overload release is set to the value of the busbar trunking system's rated current. This means that the busbar trunking system can be loaded to 100%. When defining the short-circuit protection by means of fuses and circuit breakers, the specified short-circuit resistance of the busbar trunking system must not be exceeded.

Whether a current-limiting protective device is required, and what short-circuit breaking capacity the protective device must have, depend on the level of short-circuit current expected.

The table below provides an overview of the circuit breakers that are suitable for short-circuit and overload protection (400 V and 50 Hz) of the relevant Busbar Trunking System and that we would recommend as protection.

The following applies:  $I'_k \leq I_{cc} \leq I_{cu}$

where

- $I'_k$  = Short-circuit current to be expected at the installation site
- $I_{cc}$  = Rated conditional short-circuit current of the busbar trunking system
- $I_{cu}$  = Rated short-circuit breaking capacity of the circuit breaker

Busbar Type	Rated current $I_e$ [A]	Circuit breaker					
		with standard switching capacity Type	Rated short-circuit current $I_{cu}$ [kA]	with medium switching capacity Type	Rated short-circuit current $I_{cu}$ [kA]	with high switching capacity Type	Rated short-circuit current $I_{cu}$ [kA]
KEM31S*	160	HN*160*/ HN*161*	40	HM*160*/ HM*161*	50 <sup>[1]</sup>	HE*160*/ HE*161*	70 <sup>[1]</sup>
KEM32S*	250	HN*250*/ HN*251*	40	HM*250*/ HM*251*	50	HE*250*/ HE*251*	70 <sup>[1]</sup>
KEM34S*	400	HN*400*/ HN*401*	40	HM*400*/ HM*401*	50	HE*400*/ HE*401*	70 <sup>[1]</sup>
KEM36S*	630	HN*630*/ HN*631*	40	HM*630*/ HM*631*	50	HE*630*/ HE*631*	70
KEM38S*	800	-	-	HN*800*/ HN*801*	50	HE*800*/ HE*801*	70
KEM39S*	1000	-	-	HN*970*/ HN*971*	50	HE*970*/ HE*971*	70

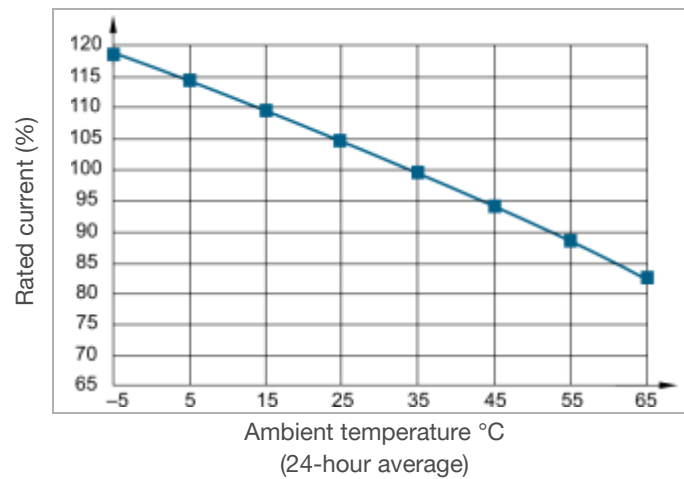
<sup>[1]</sup> Rated conditional short-circuit current  $I_{cc} = 55$  kA

The values for the rated conditional short-circuit current  $I_{cc}$  apply to the busbar trunking systems without taking the tap-off boxes into account.

### Backup protection miniature circuit breaker/fuse

If the level of short-circuit current at the installation site of the miniature circuit breaker is unknown or if the specified rated switching capacity is exceeded, a further protective device must be connected upstream as backup protection to protect the circuit breaker from excessive load. A fuse is generally used for this purpose. Please contact your Hager partner if necessary.

### 07.05 Temperature behaviour of unibar M systems

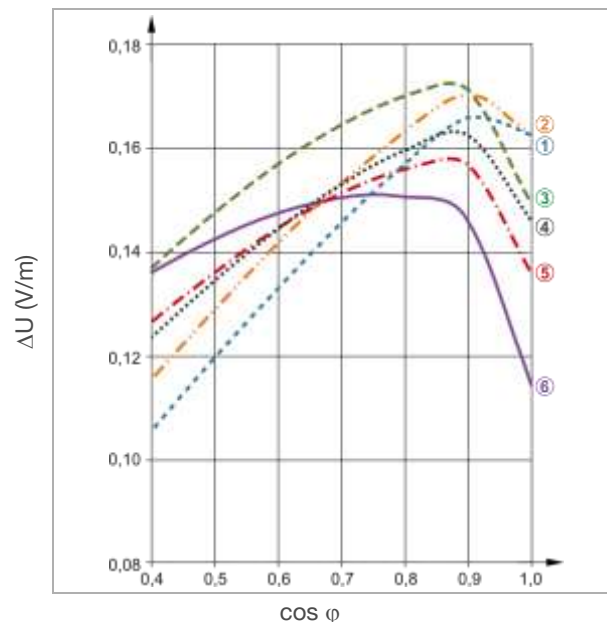


### 07.06 Voltage drop

#### Voltage drop at rated current

The diagram below shows the voltage drop of the unibar M system under the following conditions:

- Taking into account warm resistances (in accordance with IEC/EN 60439-2).
- For a current distribution factor  $a = 1$ .
- When loaded with the rated current (in the case of a different current distribution factor, the curve value must be multiplied by the corresponding distribution factor).



- ① 160 A (KEM31x)
- ② 250 A (KEM32x)
- ③ 400 A (KEM34x)
- ④ 630 A (KEM36x)
- ⑤ 800 A (KEM38x)
- ⑥ 1000 A (KEM39x)

### Calculating the voltage drop

It may be necessary to calculate the voltage drop using the following formula for long run lengths.

$$\Delta U = a \times \sqrt{3} \times I \times l \times (R \times \cos \varphi + X \times \sin \varphi) \times 10^{-3}$$

where

- $\Delta U$  = Voltage drop [V]
- $a$  = Current distribution factor (see table below)
- $I$  = Load current [A]
- $l$  = Length [m]
- $R$  = Ohmic resistance  $R_1$  [m $\Omega$ /m]
- $\cos \varphi$  = Power factor
- $X$  = Inductive resistance  $X_1$  [m $\Omega$ /m]

Factor  $a$  depends on the current distribution.

Current distribution sketch	Explanation	Factor $a$
	Feeding unit at A, 1 tap-off point at B	1
	Feeding unit at A, Tap-off points at B, C, D, E	0.5
	Feeding unit at A, Tap-off points at B, C	0.25
	Feeding unit at A, Tap-off points at B, C, D, E	0.125
	Feeding unit at A, B Tap-off points at C, D, E, F	0.25

<sup>[1]</sup> Supply is from a separate compartment with protection type IP40, for example.

## 07.07 Sample configurations

### 07.07.01 Horizontal installation position

#### Required information

The following details are necessary when configuring horizontal installation of unibar M systems:

- Position, direction, number, type and approximated connected loads of consumers,  $\cos \varphi$
- Rated diversity factor  $\alpha$
- Feeding transformers (short-circuit current)
- Condition of the installation site (dimensions, building design, transport paths, cellar etc.)
- Routing of supply lines from other energy sources
- Coordination of lighting with the unibar M busbar run
- Crane operation

### Details given for example

1. Total consumption: 600 kW,  $\cos \varphi = 0.8$ ;  $U_e = 400 \text{ V}$
2. Floor plan and machinery plan
3. Rated diversity factor  $\alpha = 0.6$
4. Supply cable:  $2 \times 185 \text{ mm}^2$  from distribution board
5. Transformer:  $1 \times 500 \text{ kVA}$
6. Single level construction with steel beam structure
7. Suspension at 3 m height
8. Installed power of the machine lines: 200, 182, 118, 100 kW
9. No crane operation
10. Installation position: Housing in upright position, conductor flat position
11. The tap-off boxes are used to connect the unibar M runs for the machine lines. Additional tap-off boxes are required for connecting the individual machines.

### Calculating the operating current

The operating current is calculated using the following formula:

$$I_B = \frac{P_{\text{inst}} \times \alpha \times b}{\sqrt{3} \times U_e \times \cos \varphi} \times 10^3 \quad \text{where}$$

$I_B$  = Operating current [A]

$P_{\text{inst}}$  = Installed power [kW]

$U_e$  = Rated operating voltage [V]

$\cos \varphi$  = Power factor

$\alpha$  = Rated diversity factor

$b$  = Supply factor                   $b = 1 =$  single feeding unit  
     $b = \frac{1}{2} =$  double-end feeding unit, centre feed

If no information is available on the actual currents occurring at the same time (reduction factor), the following values apply according to IEC/EN 60439-1 or IEC/EN 61439-1:

Number of main circuits	Rated diversity factor $\alpha$
2 and 3	0.9
4 and 5	0.8
6 to 9 inclusive	0.7
10 and more	0.6

### Determining the operating current

Main run: (unibar M run I)	$I_B = \frac{600 \times 0.6 \times 1}{\sqrt{3} \times 400 \times 0.8} \times 10^3 = 650 \text{ A}$
Machine line 118 kW: (unibar M run II)	$I_B = \frac{118 \times 0.6 \times 1}{\sqrt{3} \times 400 \times 0.8} \times 10^3 = 128 \text{ A}$
Machine line 200 kW: (unibar M run III)	$I_B = \frac{200 \times 0.6 \times 1}{\sqrt{3} \times 400 \times 0.8} \times 10^3 = 217 \text{ A}$
Machine line 182 kW: (unibar M run IV)	$I_B = \frac{182 \times 0.6 \times 1}{\sqrt{3} \times 400 \times 0.8} \times 10^3 = 197 \text{ A}$
Machine line 100 kW: (unibar M run V)	$I_B = \frac{100 \times 0.6 \times 1}{\sqrt{3} \times 400 \times 0.8} \times 10^3 = 108 \text{ A}$

**Installation plan**

Contains the following information:

- Location of the busbar trunking system in the building
- Position of the PE and tap-off openings, and thus the installation direction of the tap-off boxes
- Number of components with item numbers
- Suspension method and suspension height

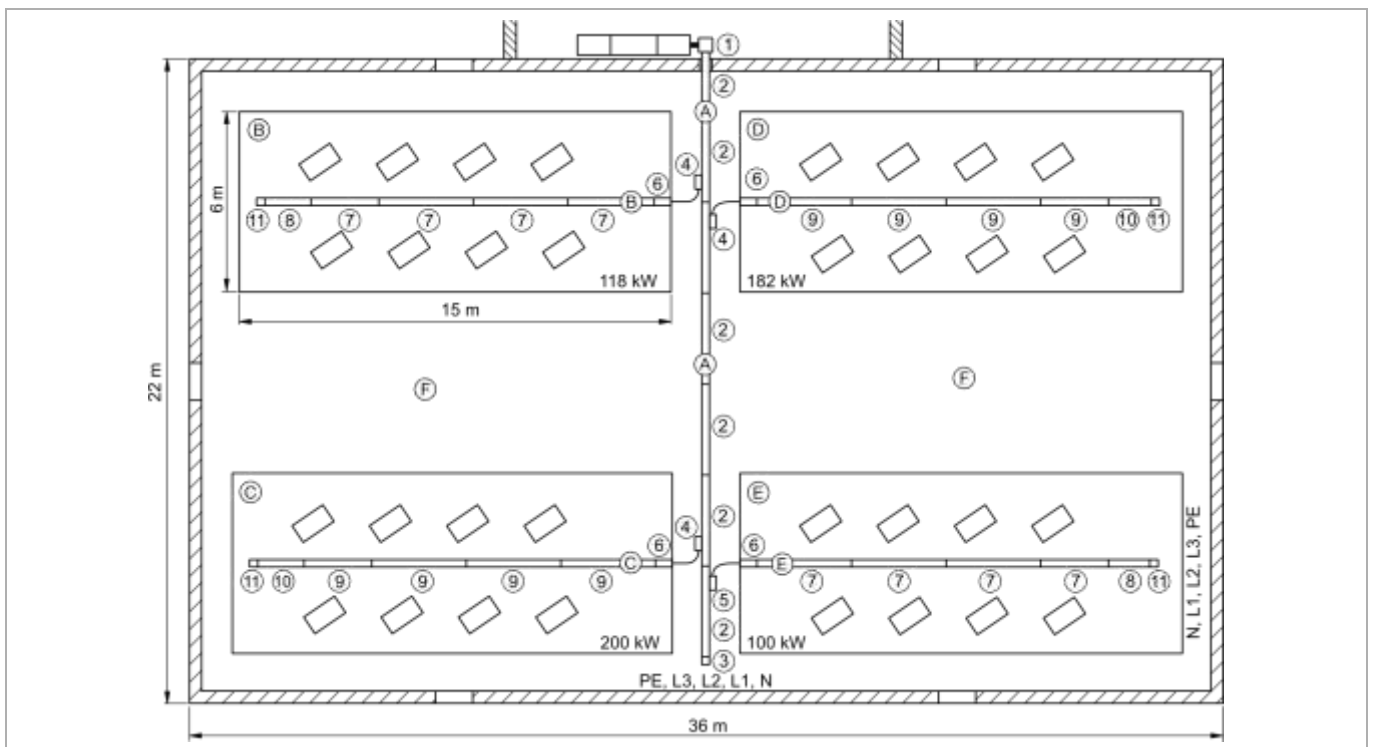
This information will help the installer later.

If the system is correctly assembled, the entire system will have the same direction of rotation as the three-phase motors throughout the entire system. As a result, it will not be necessary to check the direction of rotation of the motors when relocating a machine.

**Installation plan of example**

unibar M run I (800 A) feeds into unibar M runs II, III, IV and V via tap-off boxes and cable end feeders. Short cable lengths are used for the connection.

Suspension is at a height of 3 m with ceiling-mounted supporting structures.



- |  |  |
|--|--|
| Ⓐ Main distribution via unibar M run I   | ① Cable feeder (in separate compartment with IP40 for example) |
| Ⓑ Machine line II with unibar M run II   | ② Straight length element 800 A                                |
| Ⓒ Machine line III with unibar M run III | ③ End flange   |
| Ⓓ Machine line IV with unibar M run IV   | ④ Tap-off box 250 A  |
| Ⓔ Machine line V with unibar M run V     | ⑤ Tap-off box 125 A  |
| Ⓕ Route                                  | ⑥ Cable feeder   |
|  | ⑦ Straight length element 160 A                                |
|  | ⑧ Straight length element 160 A                                |
|  | ⑨ Straight length element 250 A                                |
|  | ⑩ Straight length element 250 A                                |
|  | ⑪ End flange   |

### Parts list

The parts list contains all of the items specified in the installation plan with type information, description and quantity.

Item no. (installation site)	Type	Description, assignment	Quantity
1	KEM39S50Z0LMF	Cable feeder	1
2	KEM38S00Z3LMF	Straight length element	6
3	KEM39S10R0LMF	End flange	1
4	KEB754B1	Tap-off box	3
5	KEB773B1	Tap-off box	1
6	KEM34S50Z0LMF	Cable feeder	4
7	KEM31S00Z3LMF	Straight length element	8
8	KEM31S00Z1LMF	Straight length element	2
9	KEM32S00Z3LMF	Straight length element	8
10	KEM32S00Z1LMF	Straight length element	2
11	KEM34S10R0LMF	End flange	4
12	KEM39S20R0LM	Fixing bracket	5
13	KEM34S20R0LMF	Fixing bracket	14

### 07.07.02 Vertical installation position

#### Required information

- Number and height of floors
- Connected loads per floor and consumer type
- Rated diversity factor  $\alpha$
- Feeding transformers (characteristics, position)
- Special requirements (protection type, fire protection etc.)

#### Details given for example

1. 6 floors, 5 residential units each
2. 38 kW connected load per residential unit
3.  $U_e = 400 \text{ V}$ ,  $\cos \varphi = 0.8$
4. Rated diversity factor  $\alpha = 0.8$
5. Demand factor  $\beta = 0.45$
6. Supply cables  $2 \times 240 \text{ mm}^2$
7. Protection with circuit breaker
8. Information and construction plans required for configuring route

### Calculating the operating current

The operating current per floor and, at the same time, for determining the rated current of the tap-off boxes, is calculated using the following formula:

$$I_{NB} = \frac{P_{inst} \times \alpha}{\sqrt{3} \times U_e \times \cos \varphi} \times 10^3$$

where

$I_{NB}$  = Operating current per floor [A]

$P_{inst}$  = Total installed power per floor [kW]

$U_e$  = Rated operating voltage [V]

$\cos \varphi$  = Power factor

If  $\cos \varphi$  is not specified, a value = 1 can be set for high-rise residential buildings.

$\alpha$  = Rated diversity factor

If  $\alpha$  is not specified, the values from the following table can be used in accordance with IEC/EN 60439-1 or IEC/EN 61439-1:

Number of main circuits	Rated diversity factor $\alpha$
2 and 3	0.9
4 and 5	0.8
6 to 9 inclusive	0.7
10 and more	0.6

### Determining the operating current per floor

The following applies to each of 5 residential units:

$$I_{NB} = \frac{5 \times 38 \times 0.8}{\sqrt{3} \times 400 \times 0.8} \times 10^3 = 274 \text{ A}$$

The operating current per bar run is calculated as follows:

$$I_B = I_{NB} \times \beta$$

Where  $\beta$  = demand factor for the total number of consumers.

Local electrical utility companies can provide good empirical values for demand factors, they vary from region to region. The table below shows average values.

Property	$\beta$ factor
Schools, kindergartens	0.6 to 0.9
Carpenter's workshop	0.2 to 0.7
Restaurants, hotels	0.4 to 0.7
Butcher shops	0.5 to 0.8
Bakeries	0.4 to 0.8
Laundries	0.5 to 0.9
Assembly rooms	0.6 to 0.8
Small offices	0.5 to 0.7
Large offices	0.4 to 0.8
Department stores, supermarkets	0.7 to 0.9
Metalworking plants	0.2 to 0.3
Car factories	0.2 to 0.3
Lighting in road tunnels	1.0
Construction sites	0.2 to 0.4

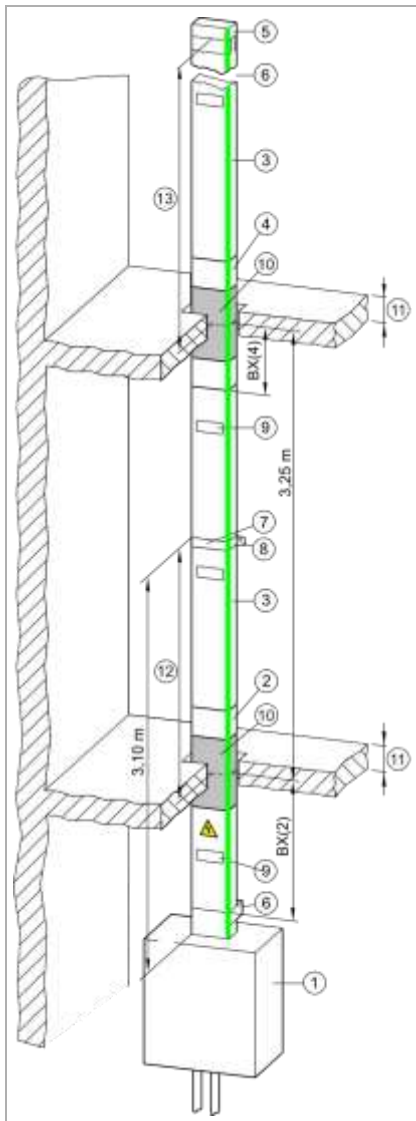


**Installation plan**

Once the system has been selected, the unibar M with a rated current of 800 A in this case, the following documents are prepared for the order:

- Installation plan
- Parts list (see next section)

The attachment points for all wall fixings, fixing brackets and spacer brackets must be specified in the installation plan.



- ① Cable end feeder
- ② Straight length element with planning length of 1.5 m to order, with fire barrier, measurement BX(2) = 1.0 m
- ③ Straight length element, standard planning length 2.25 m
- ④ Straight length element with planning length of 1.0 m to order, with fire barrier, measurement BX(4) = 0.5 m
- ⑤ End flange
- ⑥ Wall fixing KEM31S23R0LMF (fastening and weight support, always on joint block)
  - Second wall fixing at height of approx. 5 m
  - Third wall fixing at height of approx. 10 m
  - Fourth wall fixing at height of approx. 15 m
- ⑦ Fixing bracket KEM39S20R0LMF
- ⑧ Spacer bracket KEM31S64R0LMF
- ⑨ Tap-off point with tap-off box
- ⑩ Area for a fire barrier
- ⑪ Ceiling thickness: 0.25 m
- ⑫ Measurement for spacer bracket/fixing bracket in m
- ⑬ Measurement for top wall fixing in m

### Parts list

The parts list contains all of the items specified in the installation plan with type information, description and quantity.

Item no. (installation site)	Type	Description, assignment	Quantity
1	KEM39S50Z0LMF	Cable end feeders	1
2	KEM38S00S2LMF + KEM39S83W4LMF	Straight length element with planning length of 1.5 m to order, with fire barrier, measurement BX(2) = 1.0 m	1
3	KEM38S00Z2LMF	Straight length element with standard planning length of 2.25 m	5
4	KEM38S00S2LMF + KEM39S83W4LMF	Straight length element with planning length of 1.0 m to order, with fire barrier, measurement BX(4) = 0.5 m	4
5	KEM39S10R0LMF	End flange	1
6	KEM31S23R0LMF	Wall fixing (for fastening and for weight support)	4
7	KEM39S20R0LMF	Fixing bracket	5
8	KEM31S64R0LMF	Spacer bracket	5
9	KEB755B1	Tap-off box with fuse switch disconnecter	6
Alternatively for items 2, 3 and 4	KEM38S00Z3LMF + KEM39S83W4LMF	Straight length element with standard planning length of 3.25 m, with fire barrier, measurement BX = 1.0 m	5

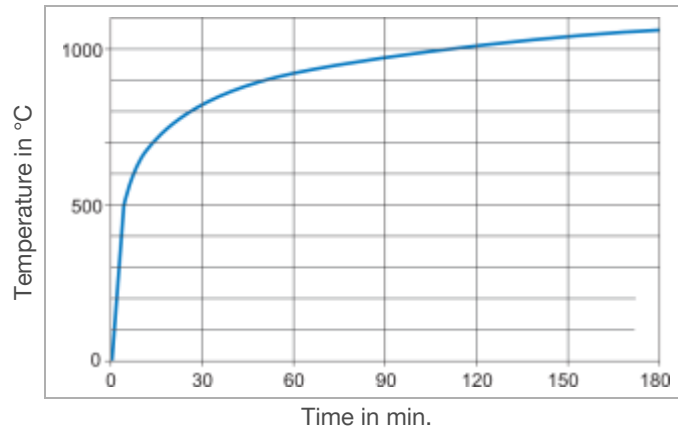
## 07.08 Functional integrity

"Fire protection equipment and fire protection measures" for electrical installations are particularly necessary for structural installations of special type and use. Such structural installations include hospitals or public venues, for example.

In this case, the electrical installations must remain operational for certain times, even in the event of a fire, according to DIN VDE 0108-1 "Structural Installations for Public Assembly" and DIN VDE 0100-710 "Medical Locations".

This applies to the following in particular:

- Fire alarms
- Systems for generating alarms and giving instructions to visitors and employees
- Safety lighting
- Passenger lifts with an evacuation circuit which must remain functional for at least 30 minutes under full-fire conditions in the supply area
- Water pressure boosting systems for supplying extinguishing water
- Ventilation units for safety steps, travelling shafts and for machine rooms for firemen's lifts for which a minimum functional capability of 90 minutes must be ensured.



Standard Time-Temperature Curve (STTC) for assessing functional integrity

In order to provide the functional integrity of the busbar trunking system stipulated by the regulations, successful testing of the unibar M system was carried out in collaboration with Promat at the material testing institution in Braunschweig, Germany.

In the fire test, the busbar trunking systems concerned were tested with a cladding of Promatect L500 boards in various thicknesses (thickness  $t = 20\text{ mm}$ ,  $40\text{ mm}$ ,  $60\text{ mm}$ ) under an outside fire load based on the standard time-temperature curve in order to assess functional integrity according to DIN 4102 Part 12.

Additional information on request.

## 07.09 Magnetic fields

### General information

Busbars intended for power distribution and power transmission generate – as do all other conductors – alternating electromagnetic fields with a base frequency of 50 Hz. These magnetic fields can negatively influence the function of sensitive equipment such as computers or measurement devices.

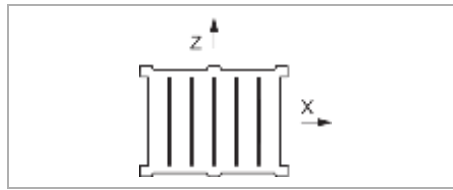
### Limit values

The EMC directives and the standards derived from them do not contain any regulations or recommendations for planning busbar trunking system installations. DIN VDE 0100-710 can be applied if busbar trunking systems are used in medical facilities.

Guideline values for mains frequency magnetic fields in facilities used for medical purposes are defined in DIN VDE 0100-710. Stations where patients are treated must not be subject to magnetic induction at 50 Hz which exceeds the following values:

- $B = 2 \times 10^{-7}$  Tesla for EEG
- $B = 4 \times 10^{-7}$  Tesla for ECG

Extensive magnetic field measurements were nevertheless carried out to decide which busbars were to be used during the planning phase. The magnetic interference radiation of the Busbar Trunking Systems was recorded on a 9.6 m-long straight busbar configuration. The busbars were loaded with rated current symmetrically and the magnetic fields were measured in their horizontal and vertical axes.



Coordinate system for magnetic field measurement

The limit value for inductive interference between multi-core cables and lines of the high-voltage system, conductor cross-section  $> 185 \text{ mm}^2$ , and the patient stations to be protected are safely undershot if the minimum distance of 9 m recommended in DIN VDE 0100-710 is observed.

If busbars are used, this distance can be smaller as a general rule as the sheet steel enclosure reduces the magnetic interference fields in the environment effectively.

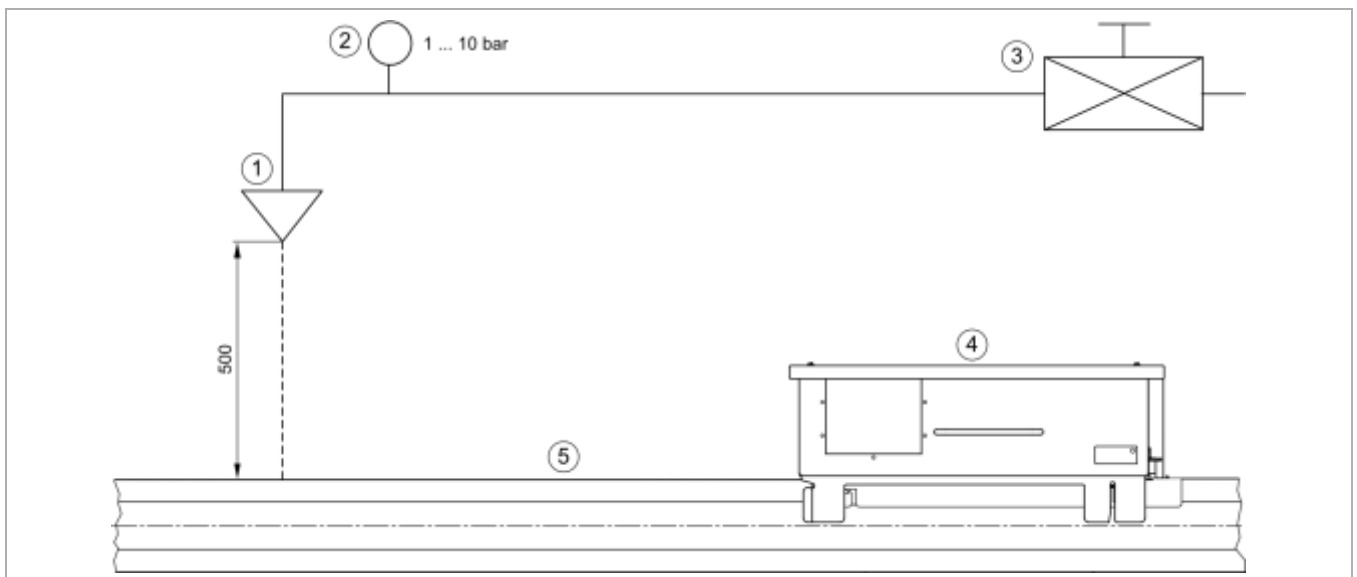
Measured values available on request

## 07.10 Sprinkler test

### General information

Sprinkler extinguishing systems are used in particular to protect cable ducts and cable routes. The cooling effect of water on the burning surface is primarily used in this case. A sprinkling time of at least 30 minutes is to be assumed.

The unibar M system was subjected to a sprinkler test. In the absence of a binding standard, the tests were carried out on the basis of a practical test set-up (see sketch).



Sprinkler test sketch

- ① Sprinkler
- ② Manometer
- ③ Shut-off valve
- ④ Tap-off box
- ⑤ Straight length element

**Test result**

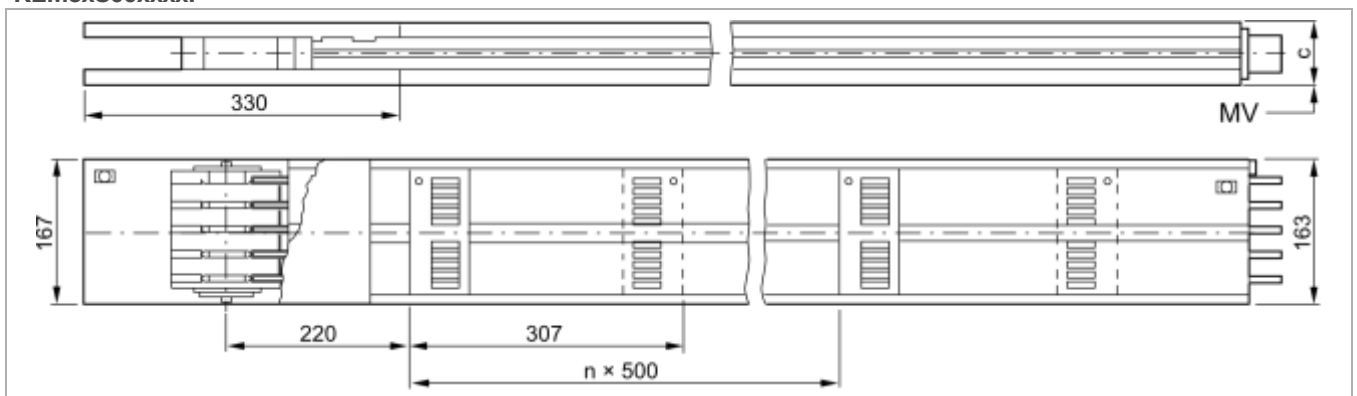
Water application was carried out based on the VdS (German independent testing institution for fire safety and security) guidelines for sprinkler systems for the unibar M system, in all installation positions in the IP55 protection type.

Insulation resistances were measured before and after 90 minutes of sprinkling and a high voltage test was carried out in accordance with EN 61439-6. This test was passed successfully and proves that the unibar M system can be put into operation immediately after sprinkling.

**07.11 Dimensional sketches**

**07.11.01 Straight length elements**

KEM3xS00xxxxF

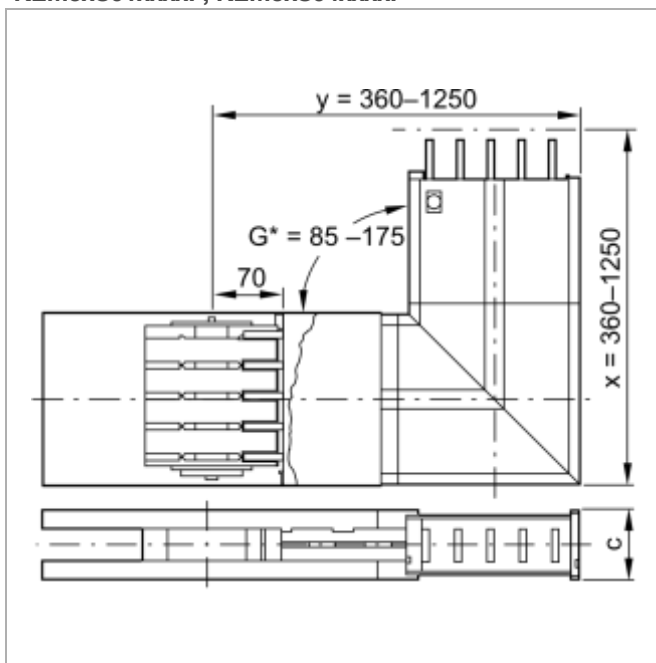


CJB = centre of joint block  
n = Number of tap-off points (on both sides)

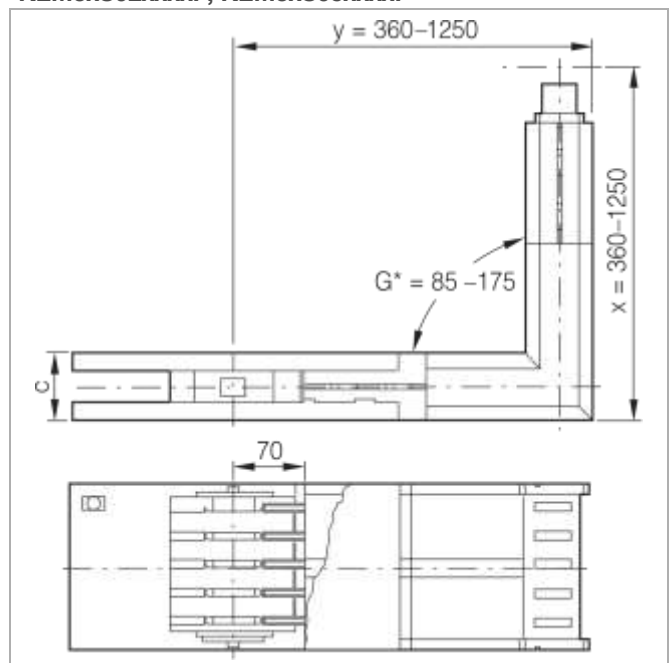
Rated current	c
160 to 400 A	68 mm
630 to 1000 A	126 mm

**07.11.02 L-Elements**

KEM3xS01xxxxF, KEM3xS04xxxxF

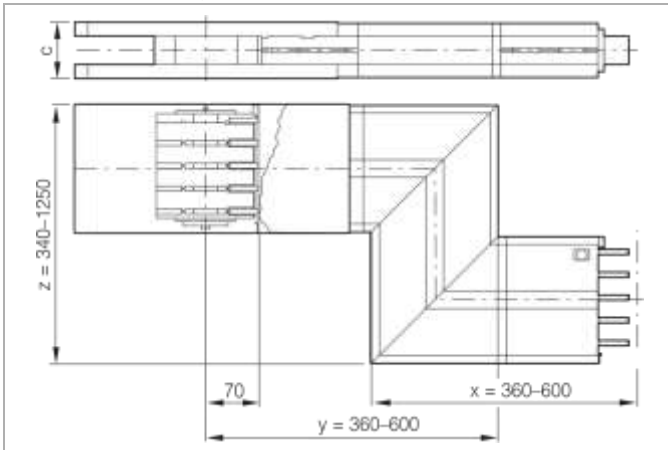


KEM3xS02xxxxF, KEM3xS05xxxxF

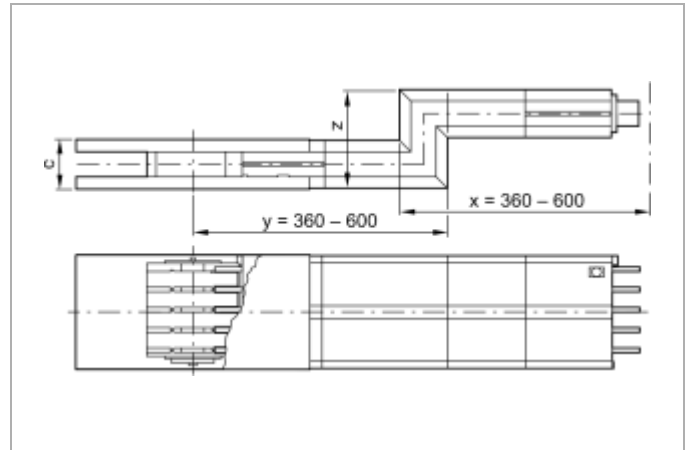


### 07.11.03 Z-Elements

KEM3xS40xxxxF, KEM3xS41xxxxF



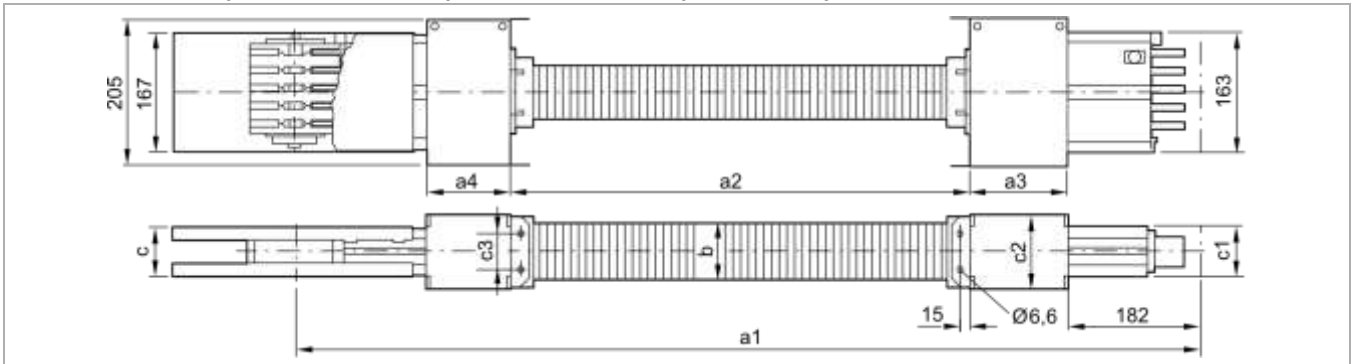
KEM3xS42xxxxF, KEM3xS43xxxxF



Rated current	z
160 to 400 A	140 to 1250 mm
630 to 1000 A	260 to 1250 mm

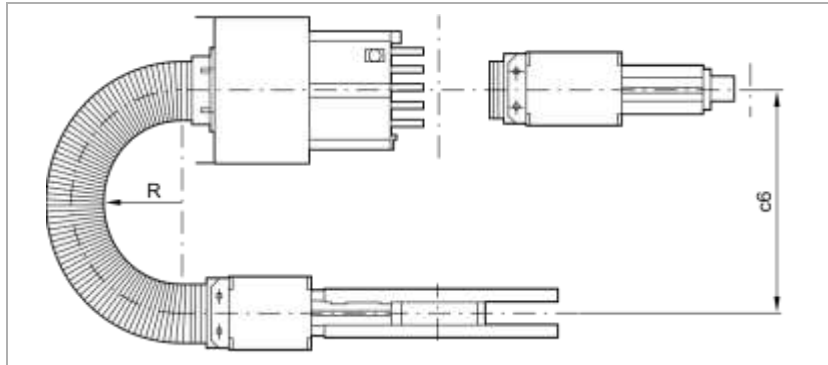
### 07.11.04 Flexible direction change elements

KEM34S06R0LMF (160 A, 250 A, 400 A), KEM39S06R0LMF (630 A, 800 A)



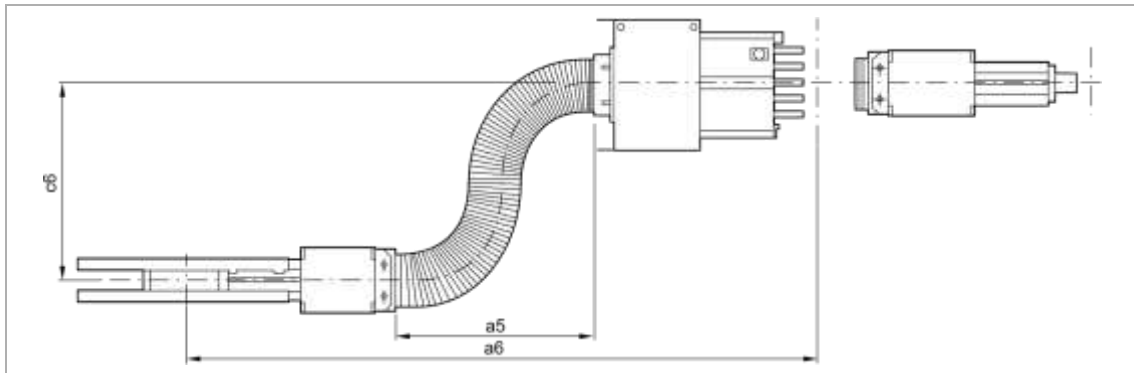
Reference	a1	a2	a3	a4	b	c	c1	c2	c3
KEM34S06R0LMF	1250 mm	512 mm	187 mm	187 mm	79 mm	68 mm	64 mm	101 mm	50 mm
KEM39S06R0LMF	1750 mm	786 mm	350 mm	250 mm	146.5 mm	126 mm	122 mm	195 mm	145 mm

**KEM34S06R0LMF (160 A, 250 A, 400 A), KEM39S06R0LMF (630 A, 800 A)**  
Installation in "U" shape



Reference	c6	R <sub>min</sub>
KEM34S06R0LMF	220 mm	110 mm
KEM38S06R0LMF	340 mm	170 mm

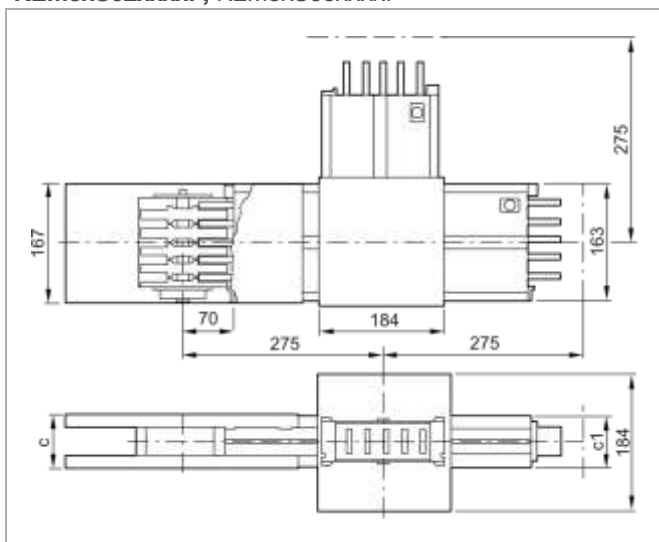
**KEM34S06R0LMF (160 A, 250 A, 400 A), KEM39S06R0LMF (630 A, 800 A)**  
Installation in "Z" shape



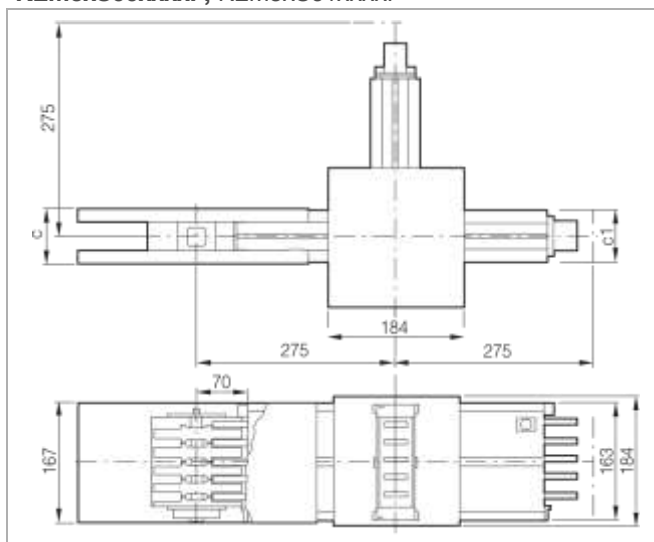
Reference	a5	a6	c6	R <sub>min</sub>
KEM34S06R0LMF	175 mm	1000 mm	355 mm	110 mm
KEM38S06R0LMF	530 mm	1590 mm	400 mm	170 mm

07.11.05 T-Elements

KEM3xS62xxxxF, KEM3xS63xxxxF



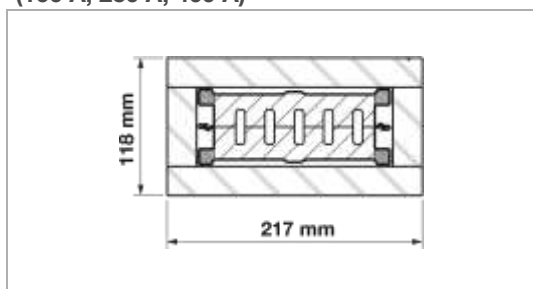
KEM3xS60xxxxF, KEM3xS61xxxxF



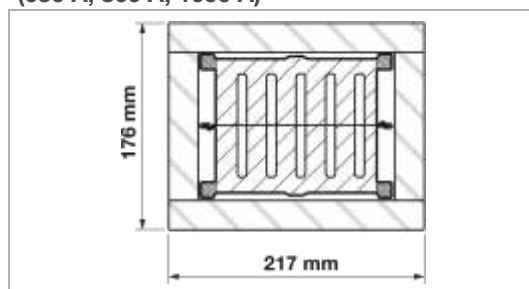
Rated current	c	c1
160 to 400 A	68 mm	64 mm
630 to 1000 A	126 mm	122 mm

07.11.06 Fire barrier

KEM34S82xxLMF, KEM34S83xxLMF  
(160 A, 250 A, 400 A)



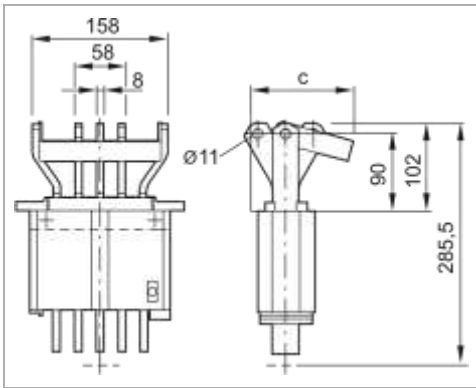
KEM39S82xxLMF, KEM39S83xxLMF  
(630 A, 800 A, 1000 A)



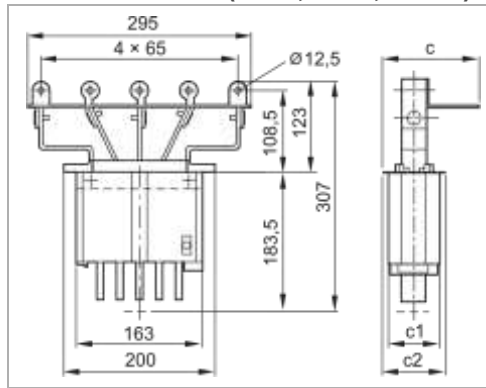


**07.11.07 Distribution board feeding units**

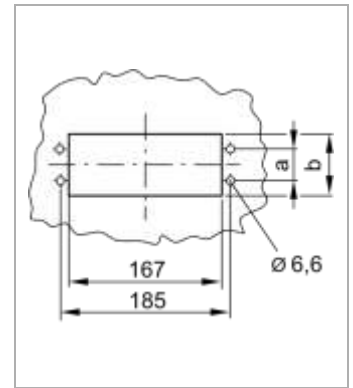
KEM32S03N1LMF (160 A, 250 A)



KEM34S03N1LMF (160 A, 250 A, 400 A),  
KEM39S03N1LMF (630 A, 800 A, 1000 A)



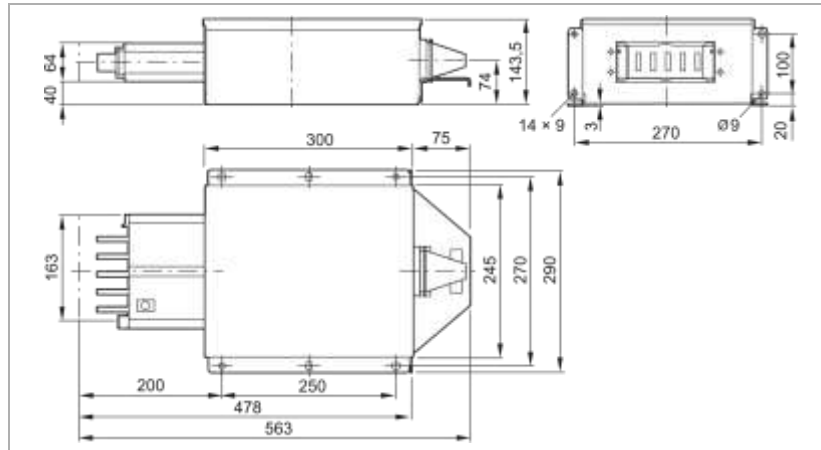
Housing cut-out



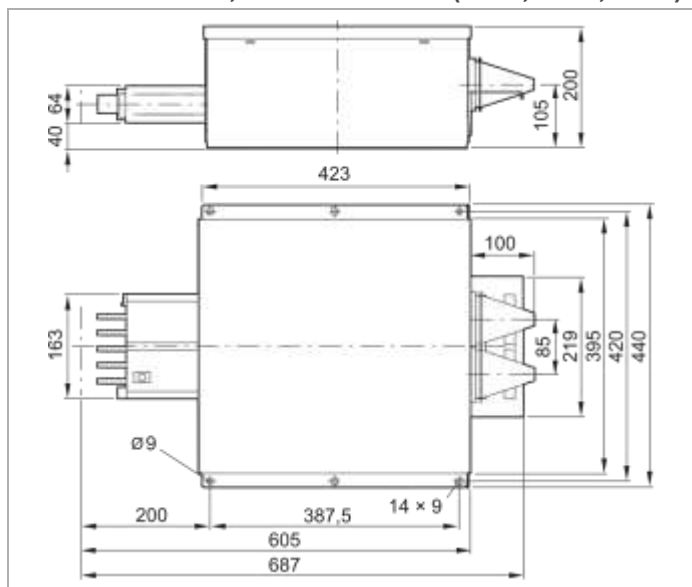
Reference	a	b	c	c1	c2
KEM32S03N1LMF	34 mm	68 mm	121 mm	64 mm	84 mm
KEM34S03N1LMF	34 mm	68 mm	121 mm	64 mm	84 mm
KEM39S03N1LMF	92 mm	126 mm	155.5 mm	122 mm	142 mm

**07.11.08 Cable end feeders**

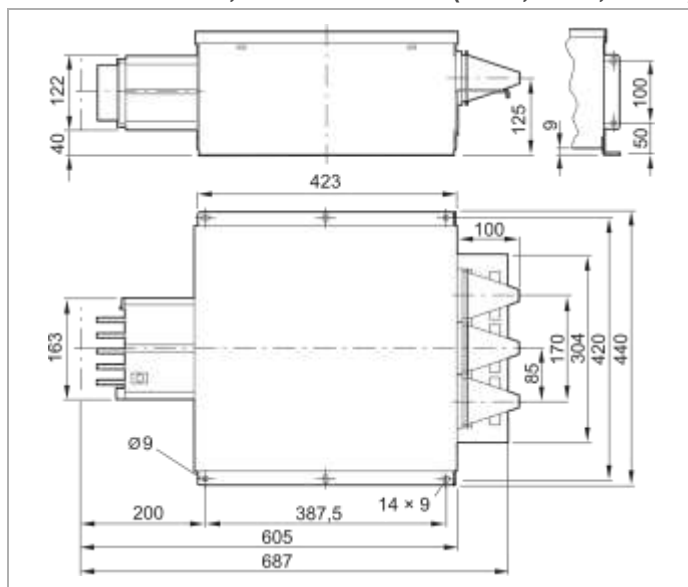
KEM32S50Z0LMF, KEM32S51Z0LMF (160 A, 250 A)



KEM34S50Z0LMF, KEM34S51Z0LMF (160 A, 250 A, 400 A)

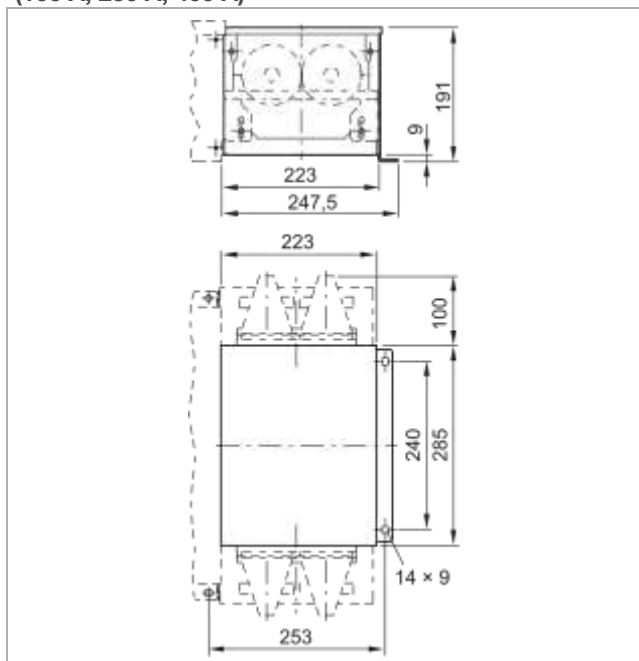


KEM39S50Z0LMF, KEM39S51Z0LMF (630 A, 800 A, 1000 A)

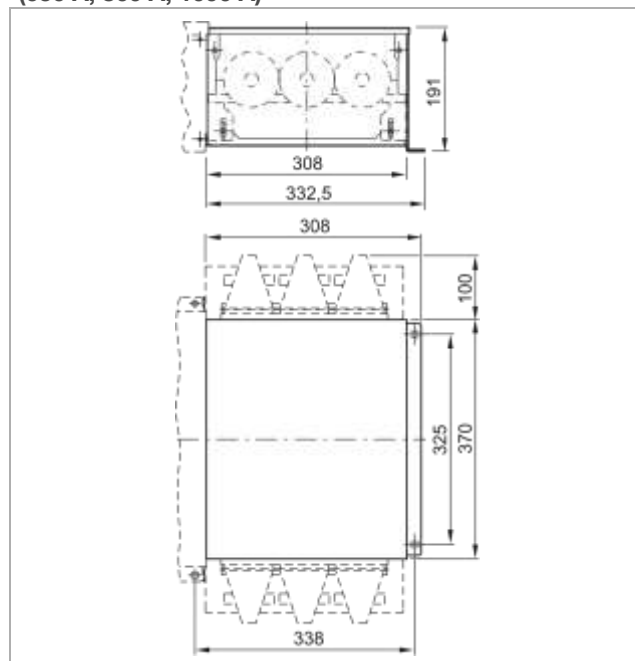


### 07.11.09 Cable end feeders compartments

KEM34S52Z0LMF, KEM34S53Z0LMF  
(160 A, 250 A, 400 A)

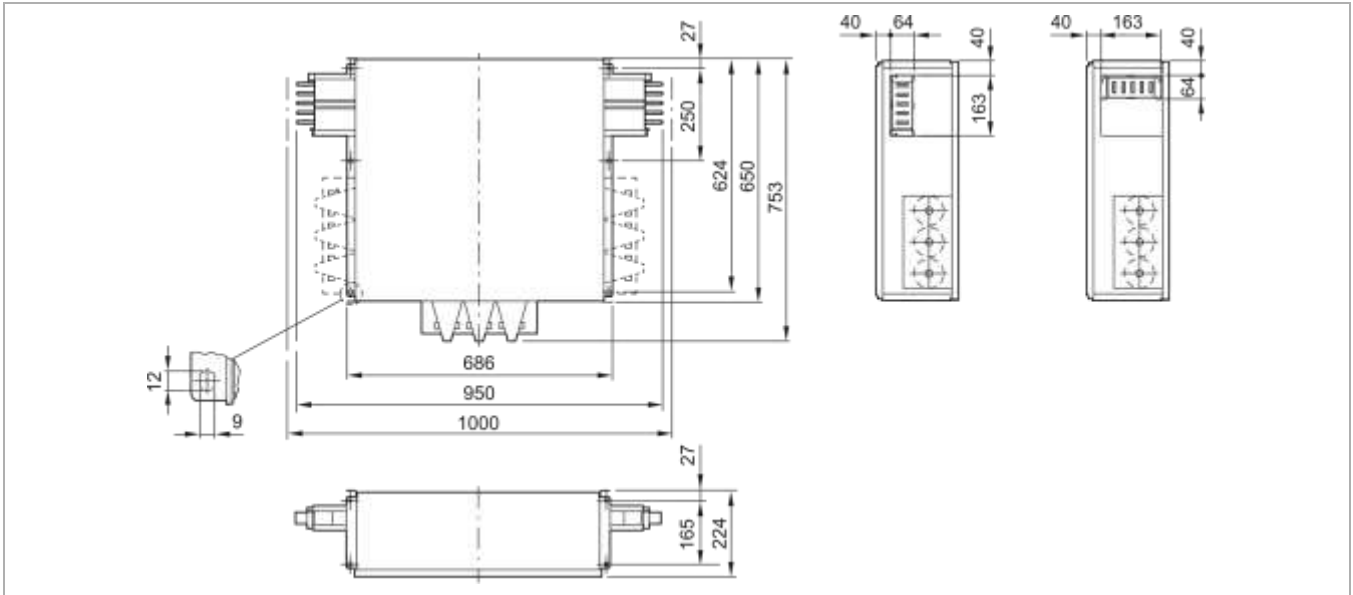


KEM39S52Z0LMF, KEM39S53Z0LMF  
(630 A, 800 A, 1000 A)

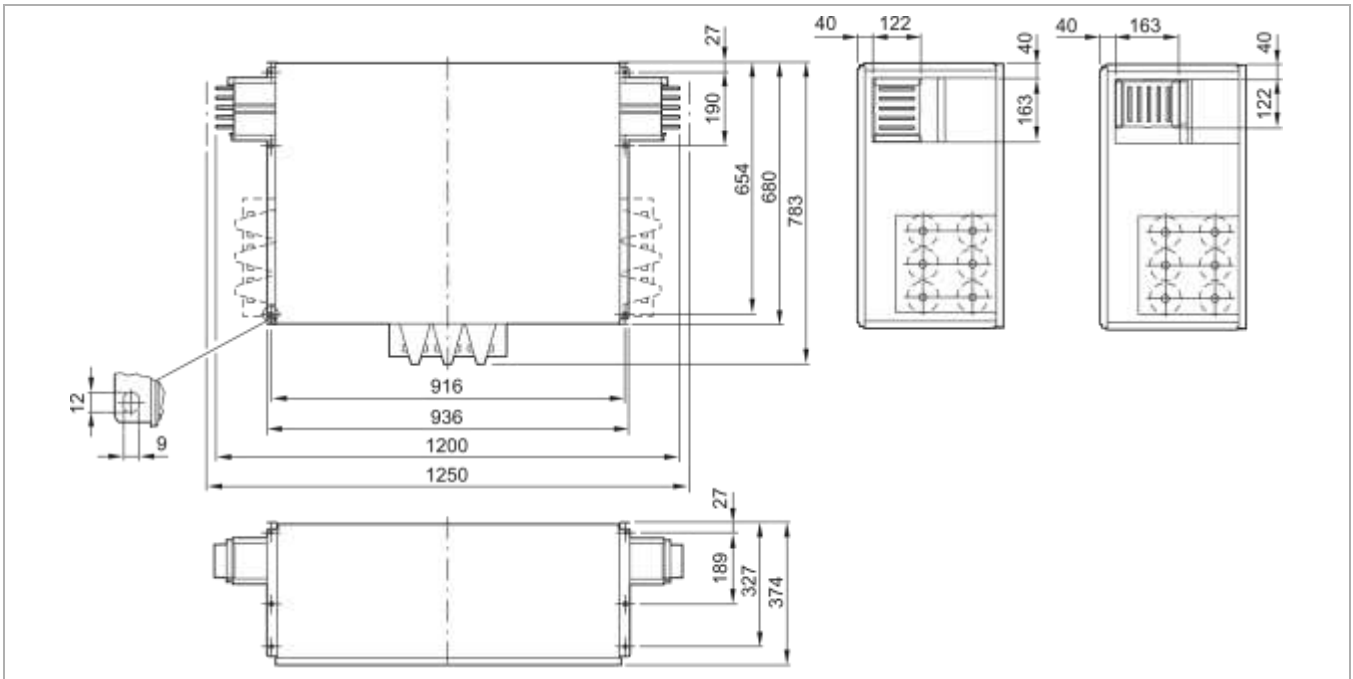


**07.11.10 Centre feeds**

KEM34S56Z0LMF, KEM34S58Z0LMF (160 A, 250 A, 400 A)



KEM39S56Z0LMF, KEM39S58Z0LMF (630 A, 800 A, 1000 A)



### 07.11.11 Tap-off boxes, size 1

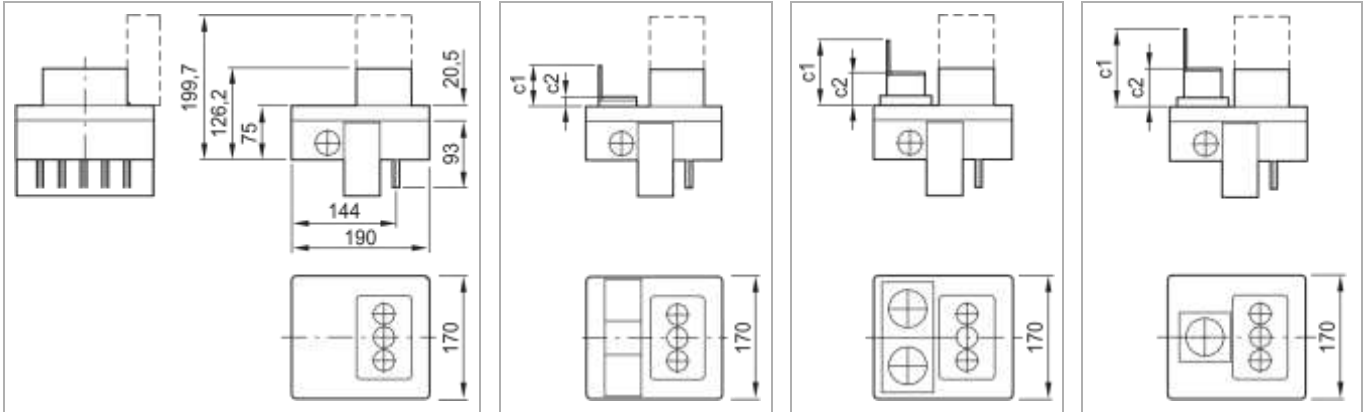
KEB771A1, KEB771D1,  
KEB771E1, KEB771M1

KEB771G1,  
KEB771J1

KEB771B1,  
KEB771F1

KEB771C1, KEB771H1,  
KEB771K1

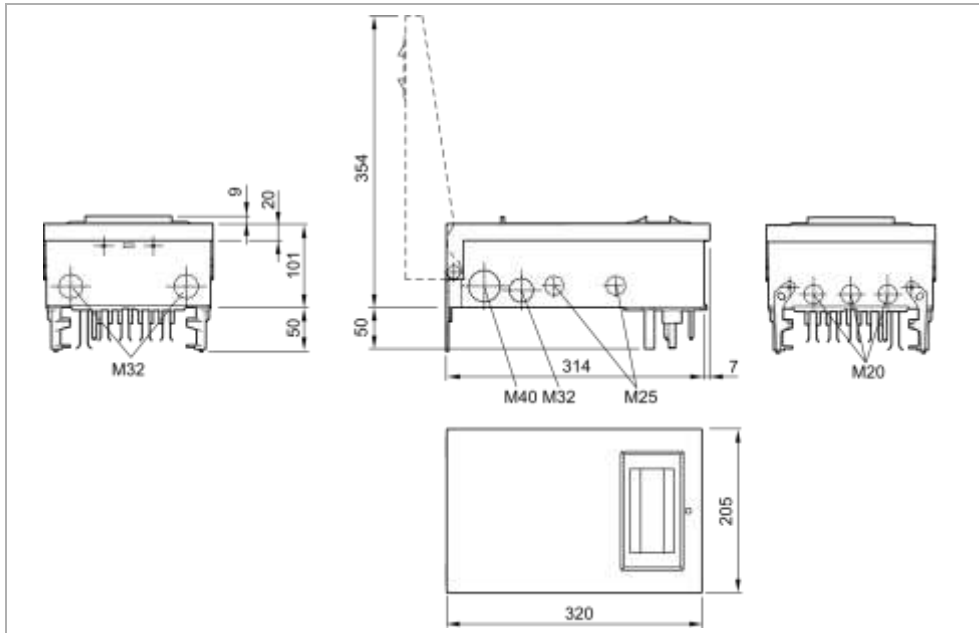
(Rated currents for the technical data (see page 141)).



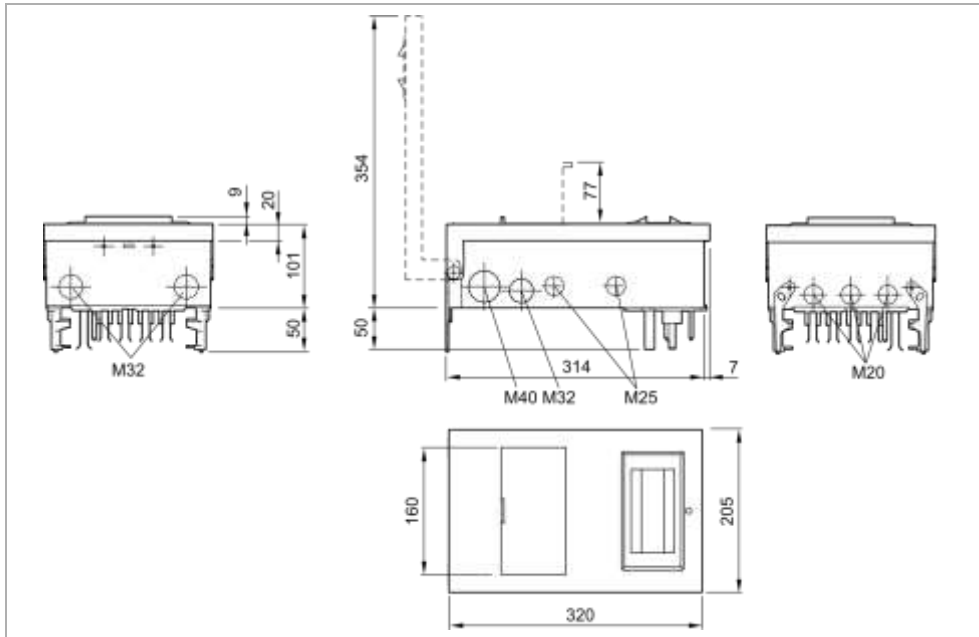
Reference	c1	c2
KEB771G1, KEB771J1	71 mm	13 mm
KEB771B1, KEB771F1	88 mm	44 mm
KEB771C1, KEB771H1, KEB771K1	106 mm	52 mm

### 07.11.12 Tap-off boxes, size 2

KEB772A1, KEB742M1 (Rated currents for the technical data (see page 142)).



**KEB772C1, KEB742N1 (Rated currents for the technical data (see page 142)).**

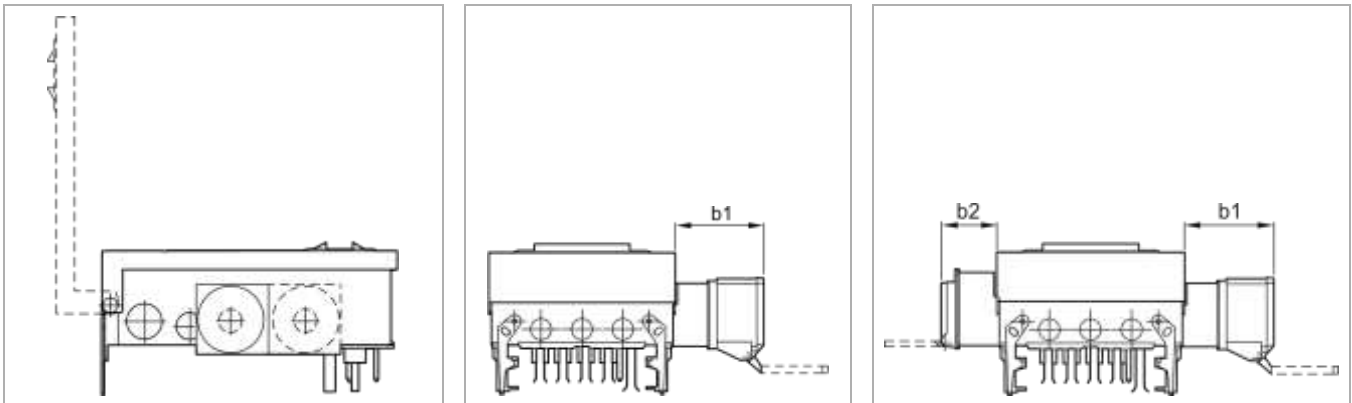


**KEB772F1, KEB772L1, KEB772G1**

**KEB772F1, KEB772L1**

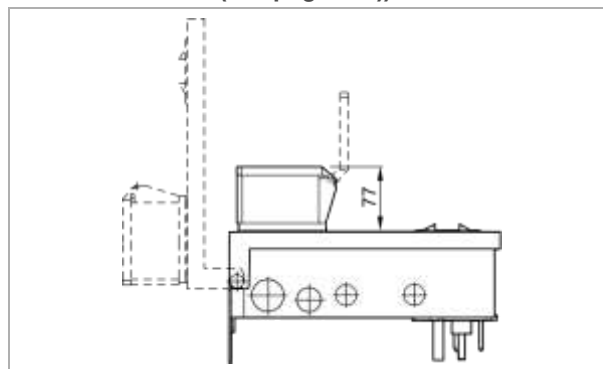
**KEB772G1**

(Rated currents for the technical data (see page 142)).



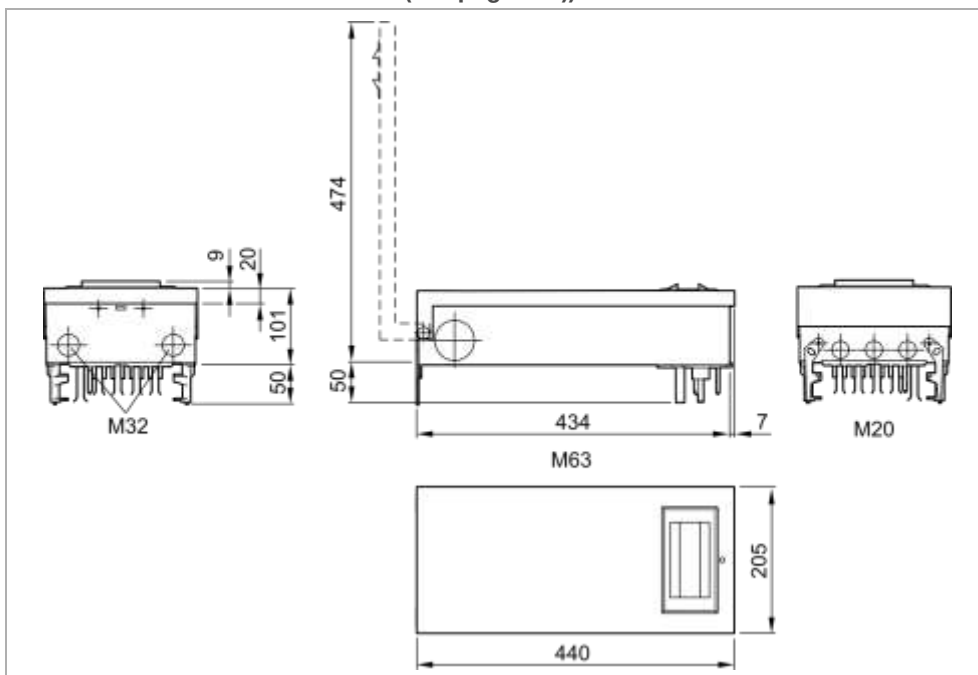
Reference	b1	b2
KEB772F1, KEB772L1	98 mm	-
KEB772G1	86 mm	54 mm

**KEB772B1 (Rated currents for the technical data (see page 142)).**

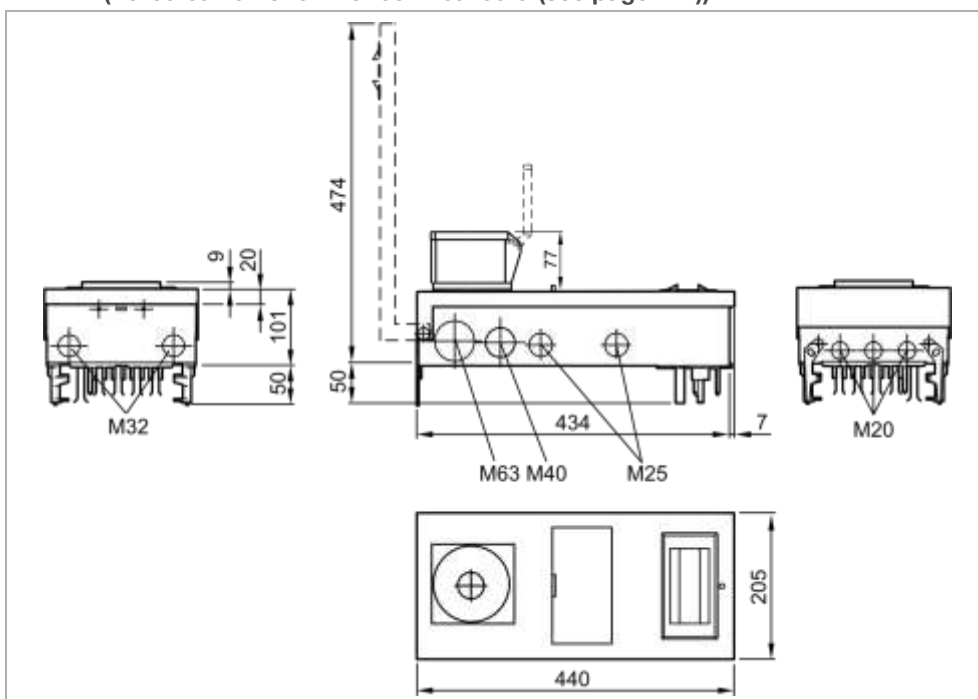


### 07.11.13 Tap-off boxes, size 3

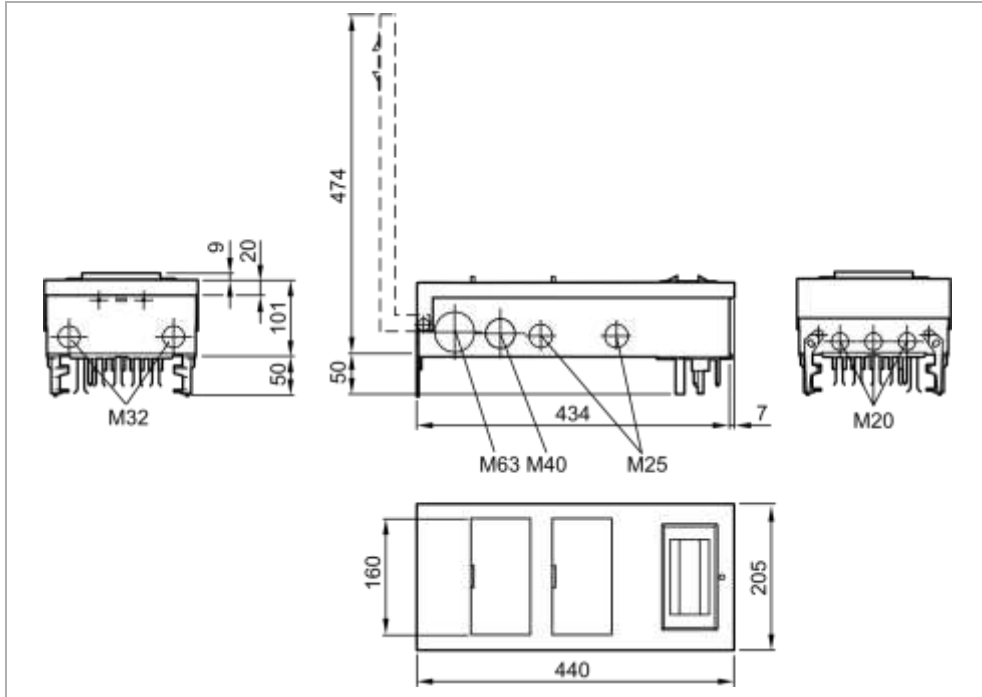
KEB773E1 (Rated currents for the technical data (see page 142)).



KEB772D1, KEB772E1 (Rated currents for the technical data (see page 142)).

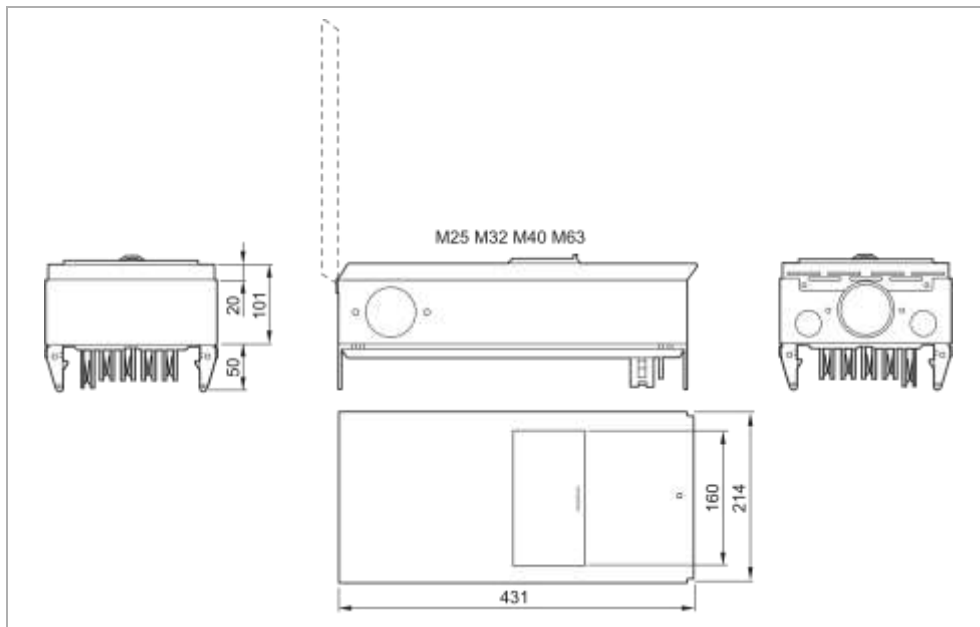


KEB743M1 (Rated currents for the technical data (see page 142)).

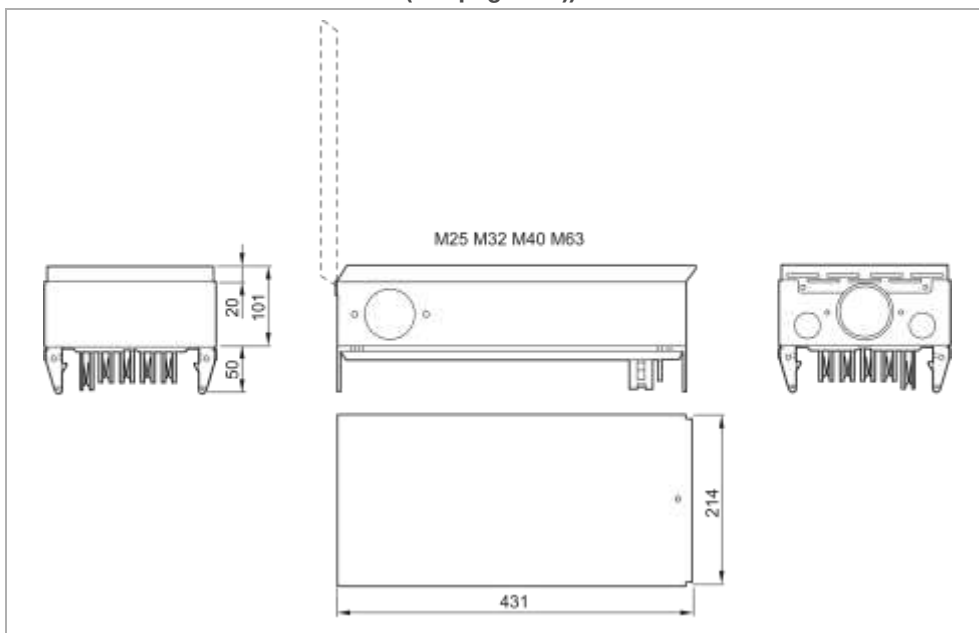


### 07.11.14 Tap-off boxes, size 03

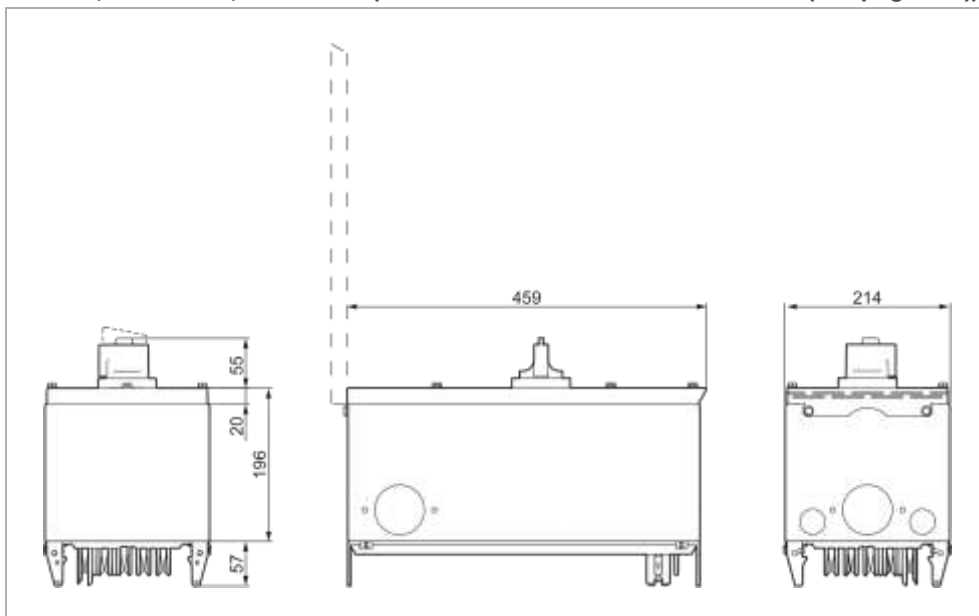
KEB773F1, KEB753G1, KEB733N1 (Rated currents for the technical data (see page 142)).



KEB733P1 (Rated currents for the technical data (see page 142)).



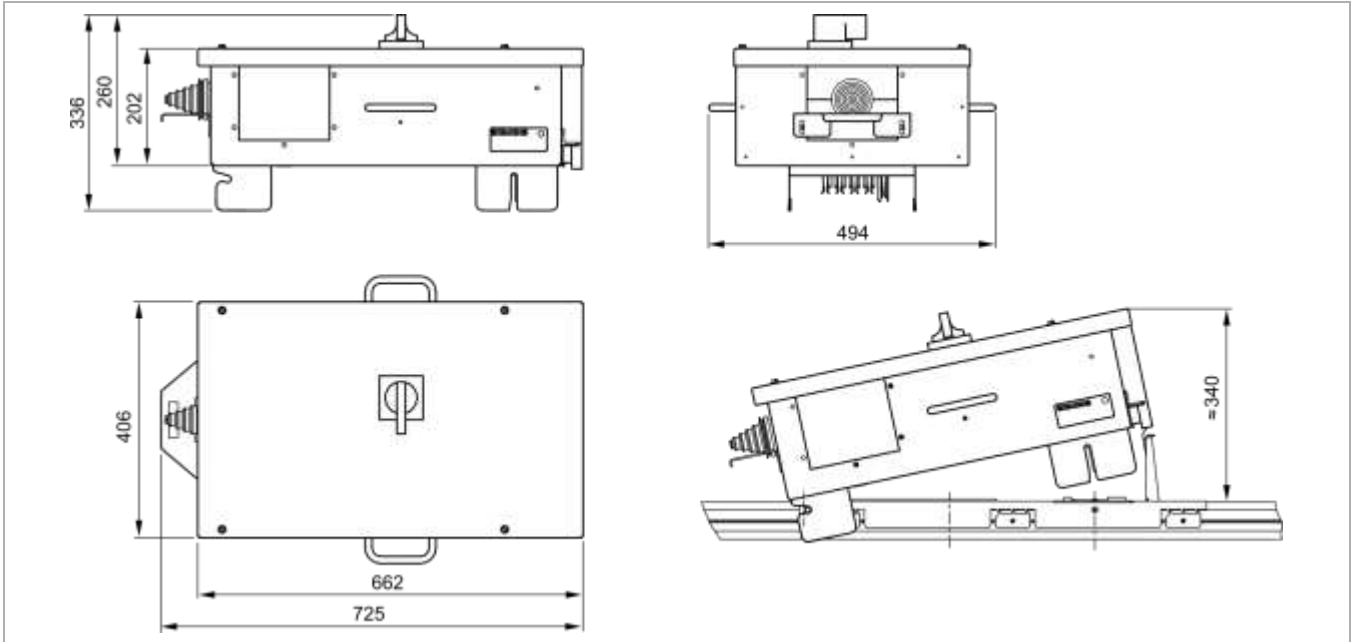
KEB773A1, KEB773B1, KEB773C1, KEB753D1 (Rated currents for the technical data (see page 142)).



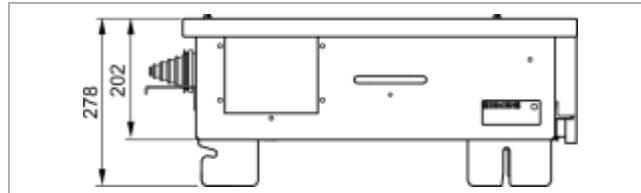


**07.11.15 Tap-off boxes, size 04**

KEB774A1, KEB754B1, KEB774C1, KEB754D1 (with mounting plate, see bottom right)  
(Rated currents for the technical data (see page 143)).

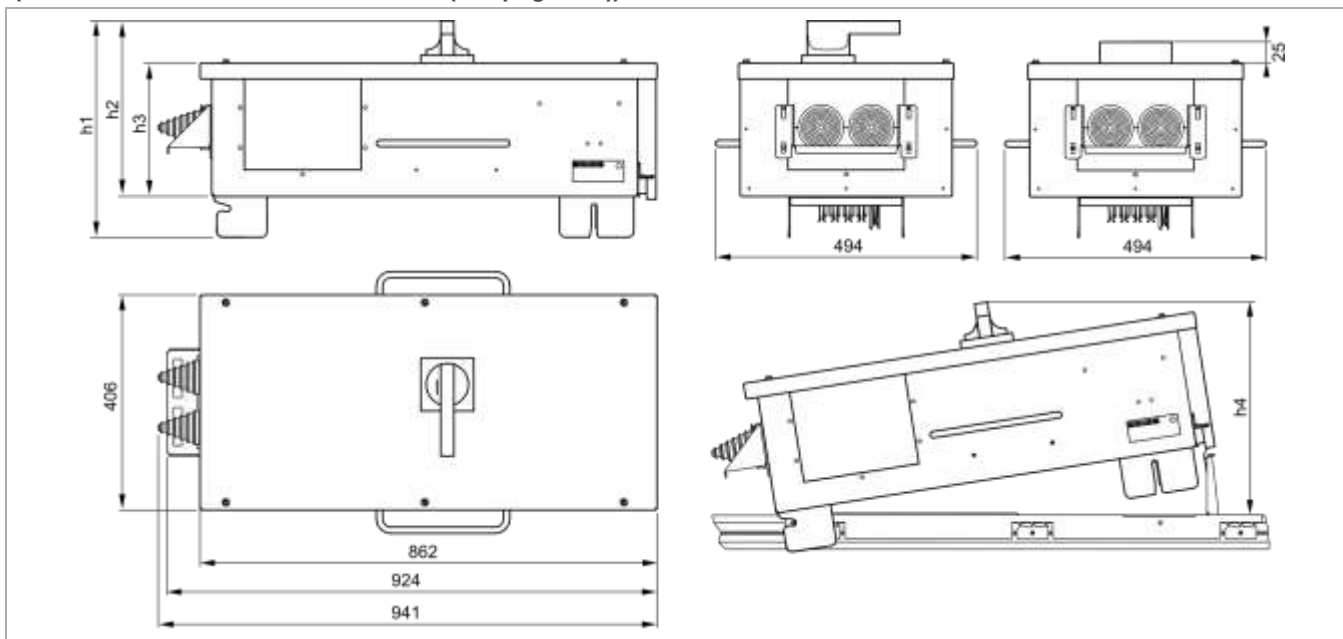


KEB734M1, KEB734N1, KEB734P1 (with mounting plate)  
(Rated currents for the technical data (see page 143)).



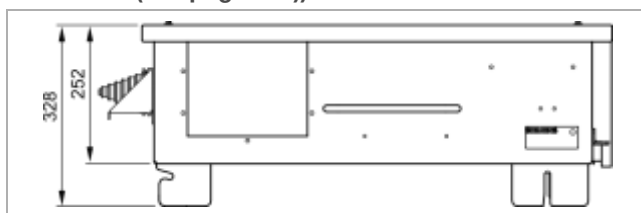
07.11.16 Tap-off boxes, size 05

KEB775A1, KEB755B1, KEB775C1, KEB755D1, KEB776C1, KEB756D1 (with mounting plate, see bottom right)  
(Rated currents for the technical data (see page 143)).



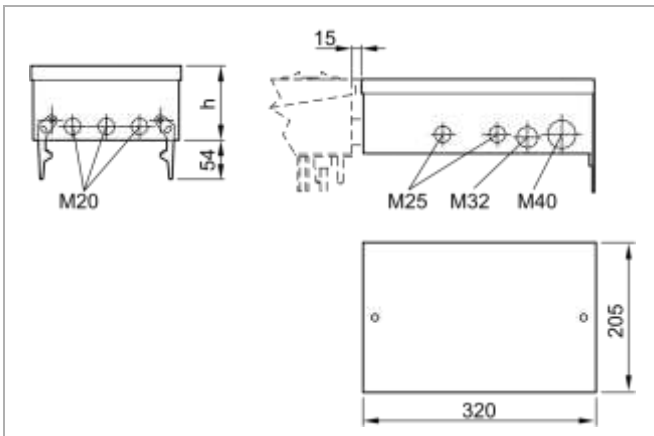
h1	h2	h3	h4
Approx. 392 mm	Approx. 307 mm	Approx. 252 mm	Approx. 400 mm

KEB735M1, KEB735N1, KEB735P1 (with mounting plate)  
(Rated currents for the technical data (see page 143)).

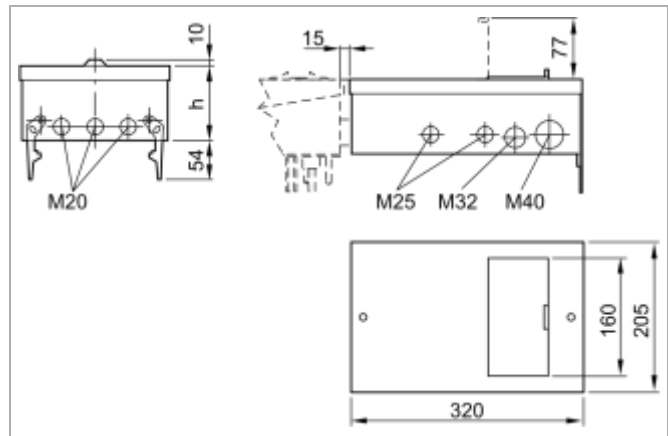


**07.11.17 Expansion tap-off boxes**

**KEB740A1**



**KEB740B1**



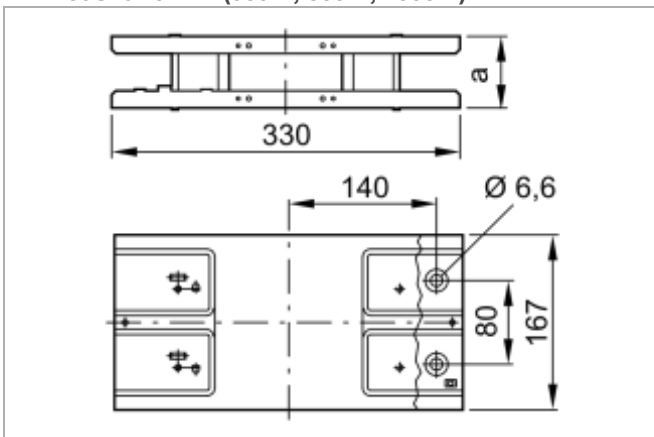
Reference	h
KEB740A1	151 mm
KEB740B1	101 mm

**07.11.18 Accessories**

**Joint blocks**

KEM34S29R0LMF (160 A, 250 A, 400 A)

KEM39S29R0LMF (630 A, 800 A, 1000 A)

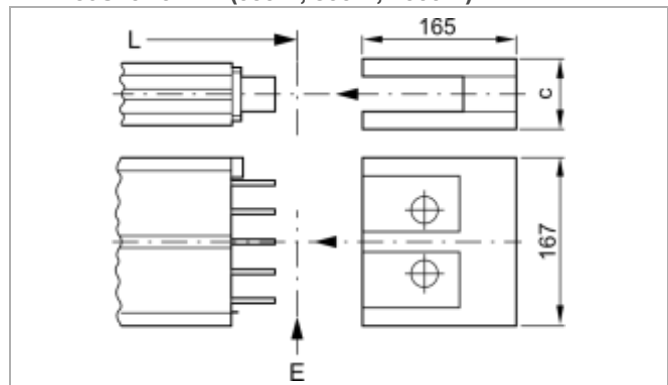


Reference	a
KEM34S29R0LMF	68 mm
KEM39S29R0LMF	126 mm

**End flanges**

KEM34S10R0LMF (160 A, 250 A, 400 A)

KEM39S10R0LMF (630 A, 800 A, 1000 A)

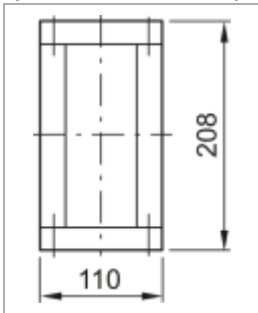


L = Length of busbar element  
E = End of end flange = Centre of joint block

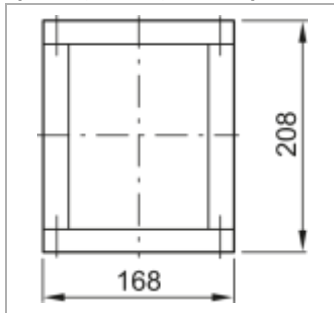
Reference	c
KEM34S10R0LMF	68 mm
KEM39S10R0LMF	126 mm

**Protective sleeve**

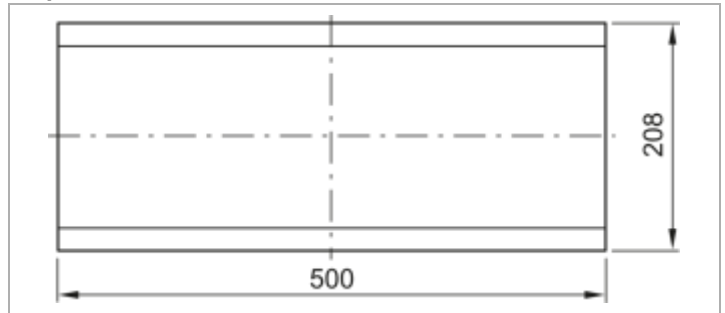
**KEM34S27R0LMF**  
(160 A, 250 A, 400 A)



**KEM39S27R0LMF**  
(630 A, 800 A, 1000 A)



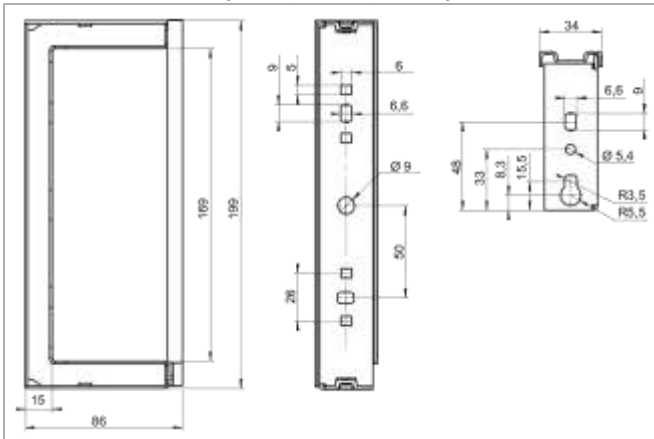
**Top view**



**07.11.19 Additional equipment for fastening**

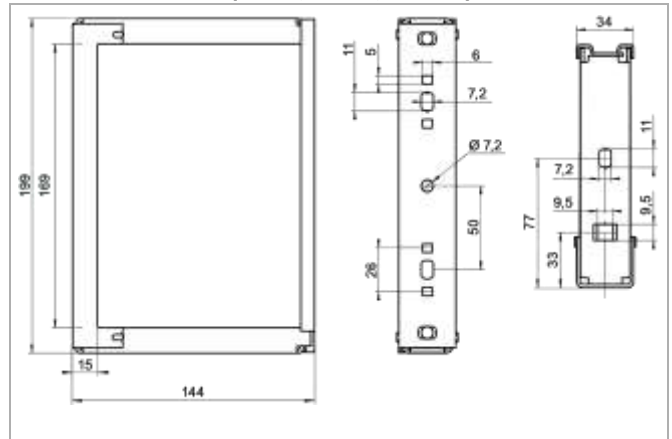
**Fixing bracket**

**KEM34S20R0LMF** (160 A, 250 A, 400 A)



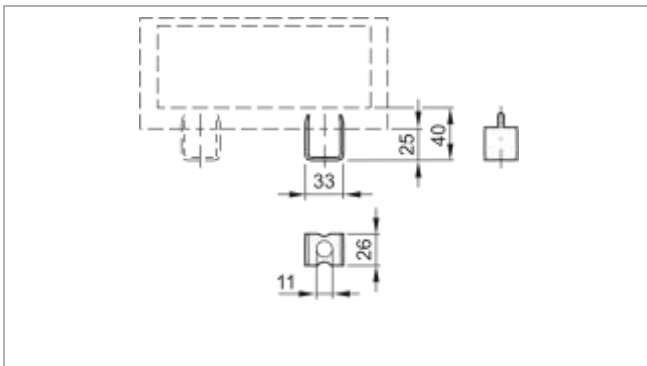
**Fixing bracket**

**KEM39S20R0LMF** (630 A, 800 A, 1000 A)



**Spacer**

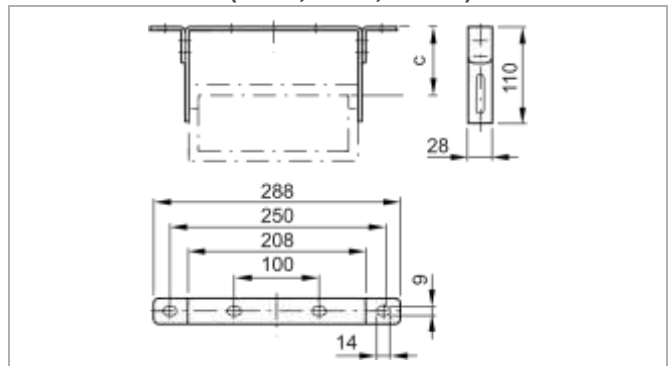
**KEM31S21R0LMF**



**Spacer bracket**

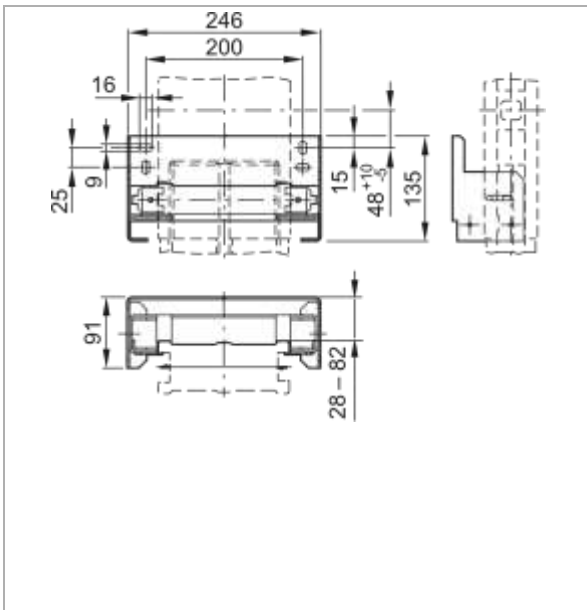
**KEM31S64R0LMF** (160 A, 250 A, 400 A)

**KEM39S20R0LMF** (630 A, 800 A, 1000 A)

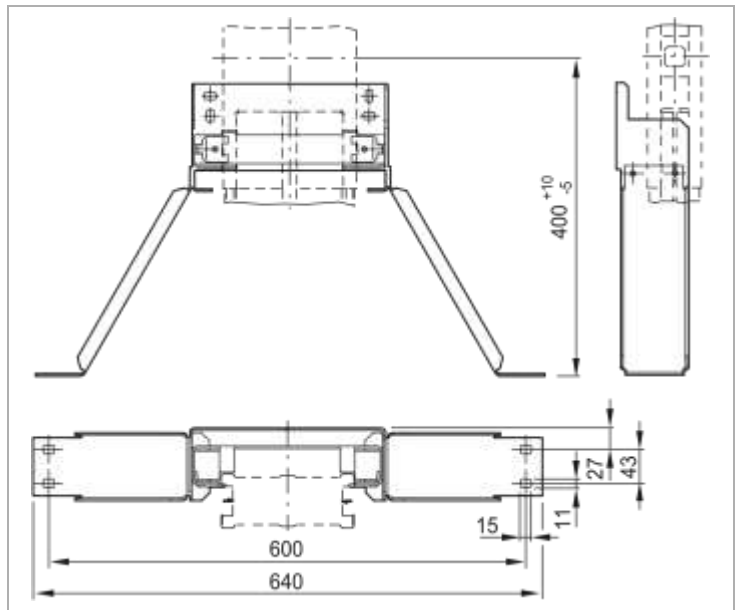


Reference	c
KEM31S64R0LMF	30 to 82 mm
KEM39S20R0LMF	50 to 82 mm

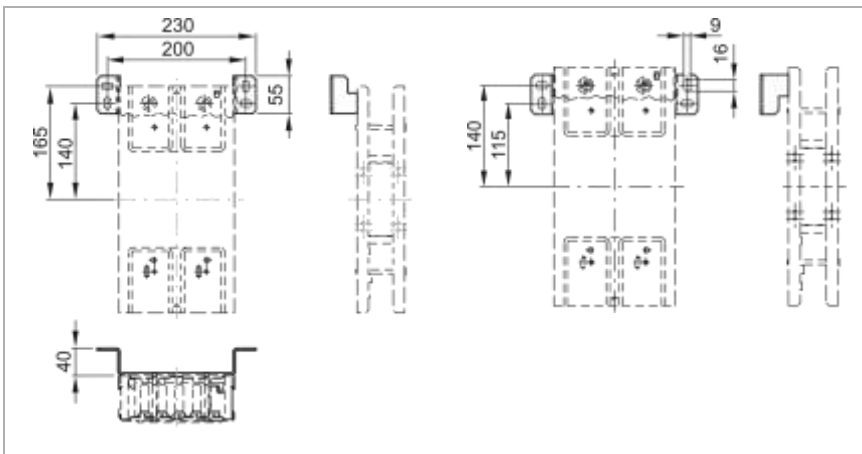
**Wall fixing**  
**KEM31S23R0LMF**



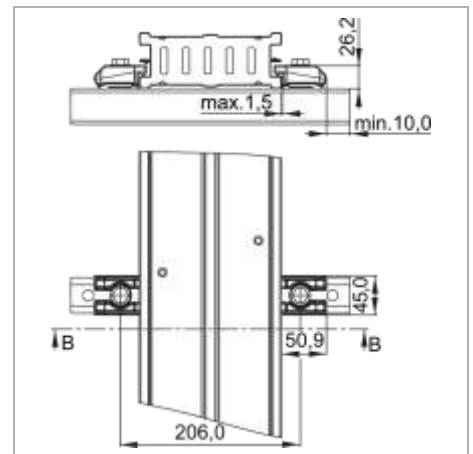
**Ceiling mounting**  
**KEM31S24R0LMF**



**Fixing bracket**  
**KEM31S26R0LMF**



**Fastening elements for clamping on mounting rails**  
**KEM31S25R0LMF**



# Fire protection



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Overview	126
Position and minimum dimensions	128
Minimum distances to openings and walls	131
Fire barrier for vertical installation	132
Installation instructions	133

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## 08.01 Overview

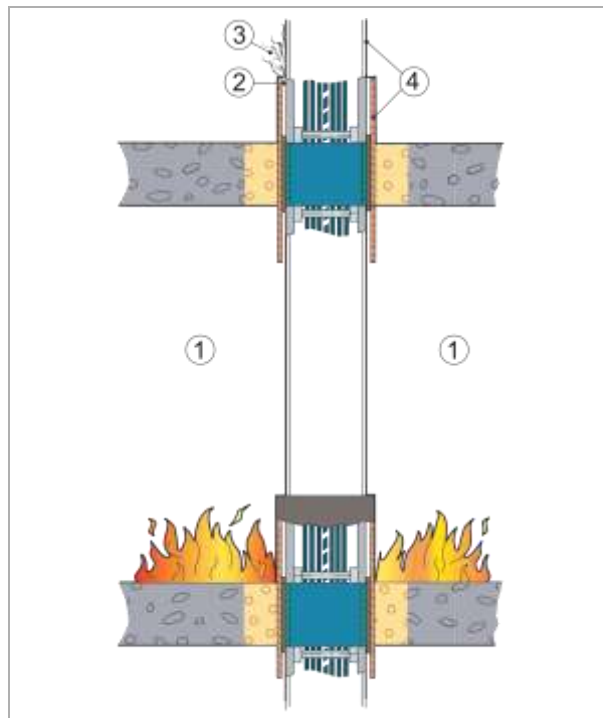
### 08.01.01 Requirements

With regard to the condition of physical structures, the building regulations of the federal states stipulate that "...the development and spread of fire and smoke be prevented and that effective fire-fighting operations and the rescue of people and animals are possible in the event of a fire". Neither fire nor fumes may pass from one floor or fire compartment to another.

The following elements of the unibar M system can be configured with fire barrier as an ordering option and be supplied ex works. Retrofitting is not possible.

- Straight length elements in standard planning lengths
- Straight length elements with planning length from a minimum length of 0.86 m
- L-Elements from specific minimum leg lengths, see sketches below.
- Z-Elements on request. Please contact your Hager partner.

Depending on the version, the fire resistance rating corresponds to S90 or S120 in accordance with DIN 4102 Part 9. The requirements for verifying the fire resistance duration of 120 min. are fulfilled according to ISO 834 in accordance with IEC/EN 60439-2. The conditions required for a busbar trunking system based on DIN 4102 are shown in the following figure.



Conditions required for a busbar trunking system

- ① Fire room: Firing according to the standard time-temperature curve DIN 4102, Sheet 2 (max. 986 °C)
- ② Permitted temperature increase of the air escaping: 140 °C max.
- ③ No flammable gases may escape, or smoke that would hinder rescue work.
- ④ Permitted temperature increase at components: 180 °C max.

### 08.01.02 Project planning

The following points must be taken into account during project planning and installation of straight length elements and change of direction elements with fire barrier

- Different minimum and maximum dimensions apply when positioning the fire barrier on the legs. They are shown in the sketches below.

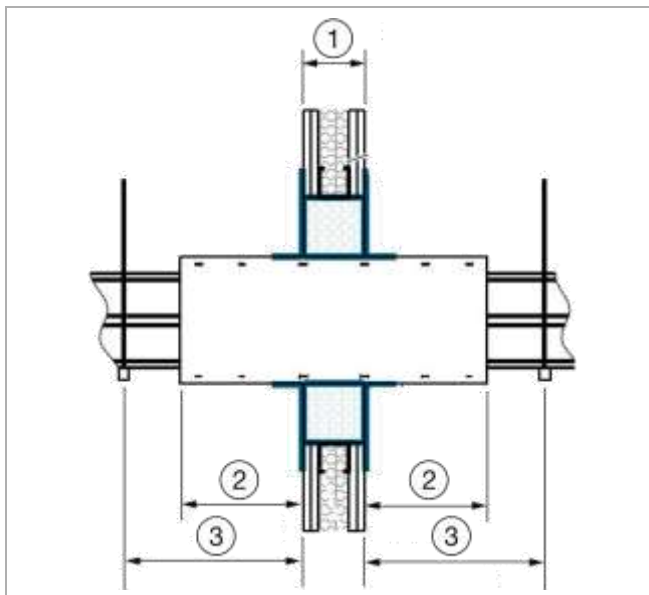


- The straight length elements and change of direction elements have the same fire barrier with a length of 0.5 m.
- The fire barrier's inner fire protection is centred in relation to the outer fire barrier.
- The fire barrier does not have to be centred in relation to the firewall/fire ceiling. However, the minimum overhangs shown in the sketches below must be observed.
- There are no tap-off points in the fire barrier area for straight length elements.
- Dimensions BX and BY must be specified, they are determined according to the sketches in the following section on fire protection positions:
  - For BX, the relevant measurement is "fictitious centre of the joint block (on the side without the joint block) to the centre of the fire barrier".
  - For BY, the measurement is "centre of the joint block (on the side with the joint block) to the centre of the fire barrier".
- The wall thickness or ceiling thickness do not need to be specified.
- The relevant unibar M elements must be installed by an approved company specializing in fire protection technology.
- In Germany, the general type certification with no. Z-19.53-2484 is required.

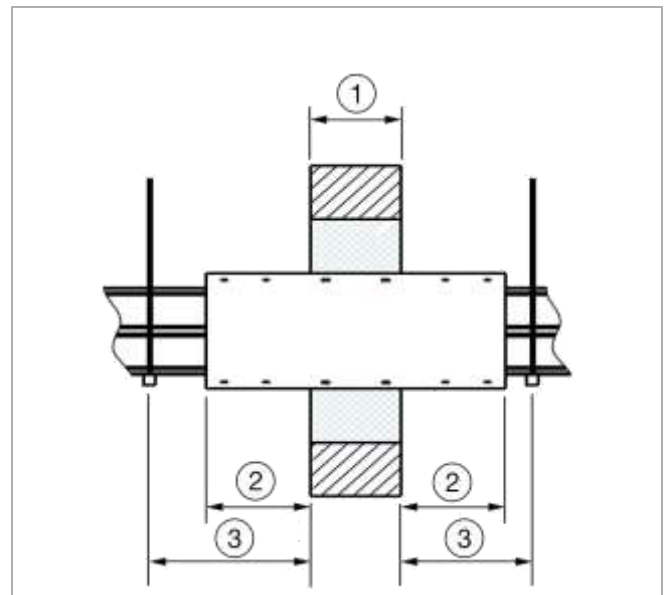
**08.01.03 Permitted installation dimensions**

Sample illustrations for permitted installation dimensions and required overhangs of fire barrier.

**Wall openings**



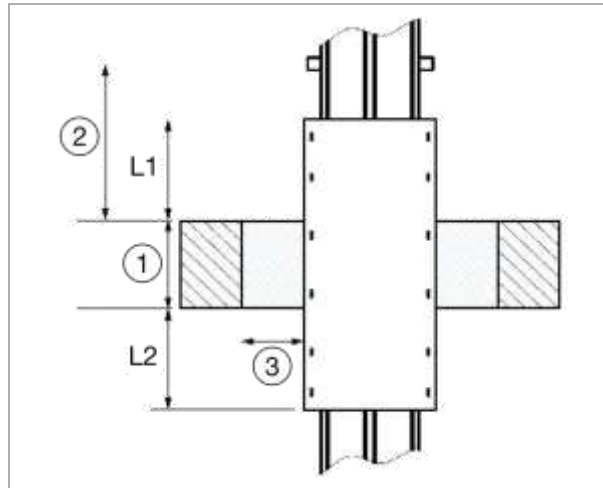
Light partition wall



Solid wall

		Light partition wall	Solid wall
①	Wall thickness	≥ 100 mm	≥ 150 mm
②	Minimum overhang of fire barrier (both sides)	≥ 100 mm	≥ 60 mm
③	Maximum distance to the next attachment point (both sides)	≤ 600 mm	≤ 600 mm

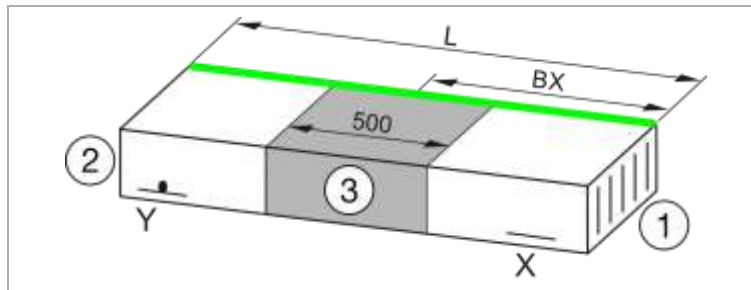
**Ceiling openings (solid ceilings)**



		<b>EI90</b>	<b>EI120</b>
①	Ceiling thickness of solid ceiling	≥ 150 mm	≥ 150 mm
②	Maximum distance to the next attachment point above the fire protection ceiling	≤ 600 mm	≤ 600 mm
③	Maximum distance between fire barrier and ceiling opening	≤ 50 mm	≤ 50 mm
L1	Minimum overhang of fire barrier above the fire protection ceiling	≥ 50 mm	≥ 60 mm
L2	Minimum overhang of fire barrier below the fire protection ceiling	≥ 50 mm	≥ 60 mm

**08.02 Position and minimum dimensions**

**08.02.01 Fire protection position on straight length elements**



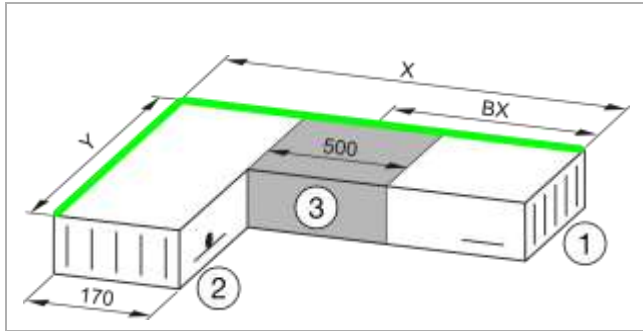
- ① Side with the open bar end (without the joint block)
- ② Side with the joint block
- ③ Fire barrier area

<b>Dimension</b>	<b>Description</b>	<b>Min.</b>	<b>Max.</b>
L	Length from the fictitious centre of the joint block (on the side without the joint block) to the centre of the joint block (on the side with the joint block)	860 mm	3250 mm
BX	Length from the fictitious centre of the joint block (on the side without the joint block) to the centre of the fire barrier	420 mm	2810 mm

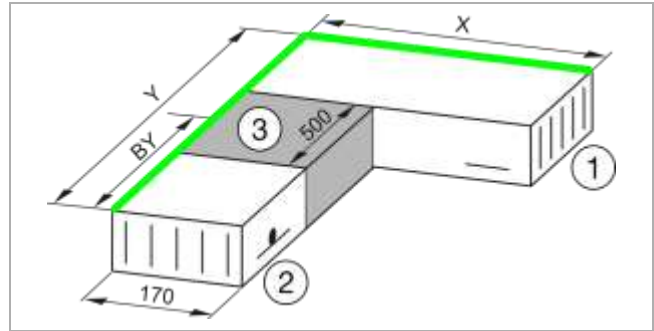
**08.02.02 Fire protection position on L-Elements**

Different minimum dimensions apply to the positioning of fire protection on the legs of change of direction elements. This is based on the different run routing and the clearance from the firewall to the inner edge of the trunking unit.

**08.02.03 Fire protection position on horizontal L-Elements**



Fire barrier on X leg



Fire barrier on Y leg

- ① Side with the open bar end (without the joint block)
- ② Side with the joint block
- ③ Fire barrier area

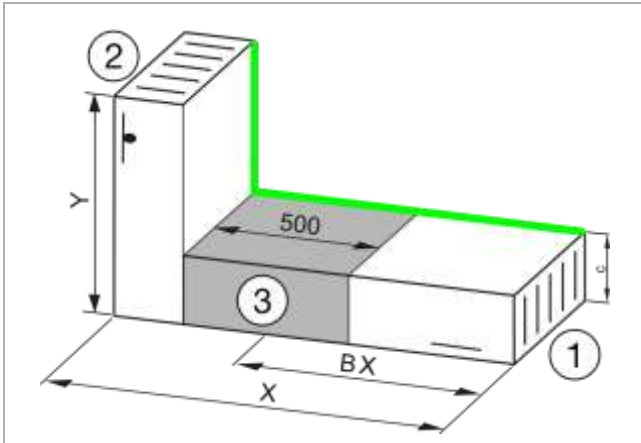
**Fire barrier on X leg**

Dimension	Description	Min.	Max.
X	Length from the fictitious centre of the joint block (on the side without the joint block) to the outer edge	860 mm	1250 mm
BX	Length from the fictitious centre of the joint block (on the side without the joint block) to the centre of the fire barrier	420 mm	810 mm

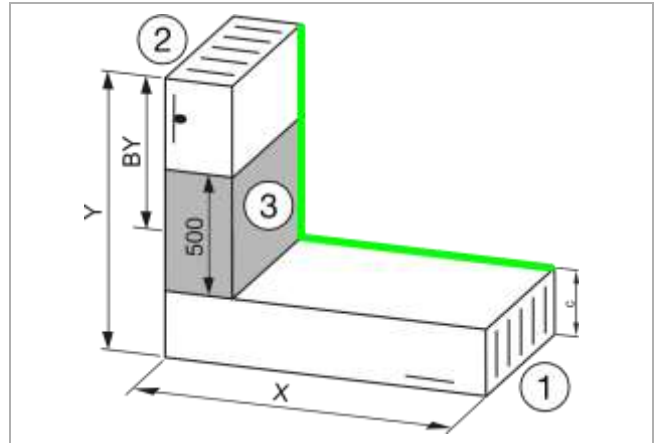
**Fire barrier on Y leg**

Dimension	Description	Min.	Max.
Y	Length from the centre of the joint block (on the side with the joint block) to the outer edge	860 mm	1250 mm
BY	Length from the centre of the joint block (on the side with the joint block) to the centre of the fire barrier	440 mm	830 mm

**08.02.04 Fire protection position on vertical L-Elements**



Fire barrier on X leg



Fire barrier on Y leg

- ① Side with the open bar end (without the joint block)
- ② Side with the joint block
- ③ Fire barrier area

**Fire barrier on X leg**

The dimension "c" depends on the rated current: 64 mm for 160 A to 400 A, 122 mm from 630 A to 1000 A.

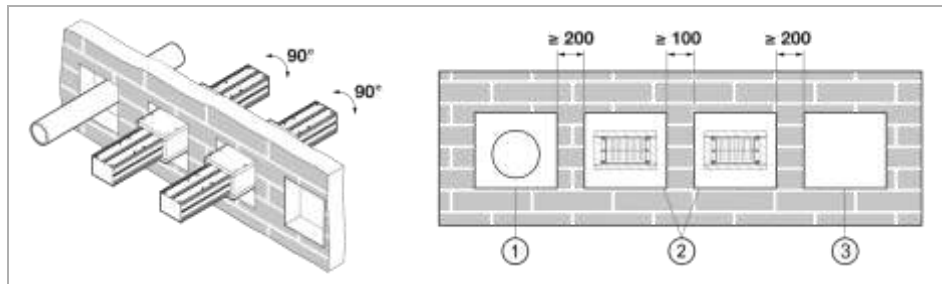
Dimension	Description	c	Min.	Max.
X	Length from the fictitious centre of the joint block (on the side without the joint block) to the outer edge	64 mm	760 mm	1250 mm
		122 mm	810 mm	1250 mm
BX	Length from the fictitious centre of the joint block (on the side without the joint block) to the centre of the fire barrier	64 mm	420 mm	910 mm
		122 mm	420 mm	860 mm

**Fire barrier on Y leg**

Dimension	Description	c	Min.	Max.
Y	Length from the centre of the joint block (on the side with the joint block) to the outer edge	64 mm	760 mm	1250 mm
		122 mm	810 mm	1250 mm
BY	Length from the centre of the joint block (on the side with the joint block) to the centre of the fire barrier	64 mm	440 mm	930 mm
		122 mm	440 mm	870 mm

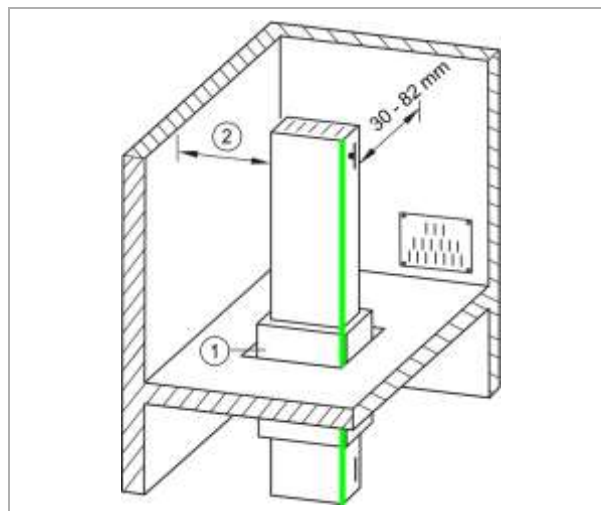
### 08.03 Minimum distances to openings and walls

#### Minimum distances between wall openings



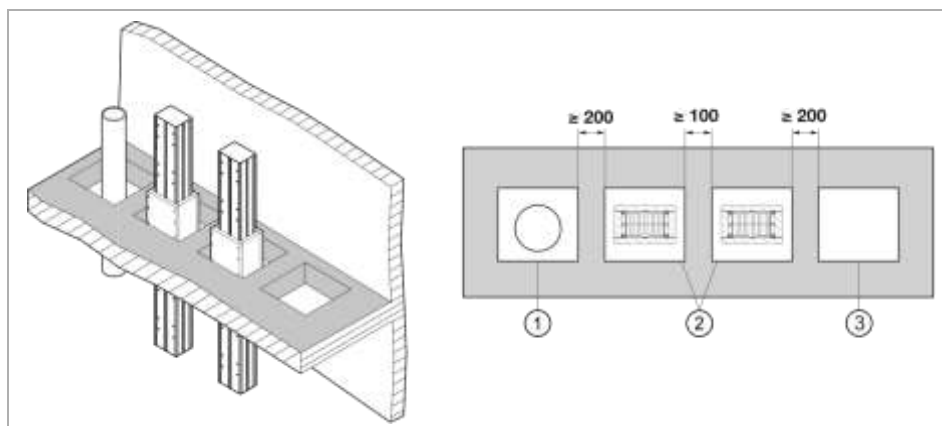
- ① Wall opening for other installed components
- ② Wall opening for unibar M busbar element
- ③ Empty bushing

#### Minimum distances of busbar elements to walls for ceiling openings



- ① Fire barrier
- ② Minimum distance at the side between busbar element and wall (see page 92)

#### Minimum distances between ceiling openings

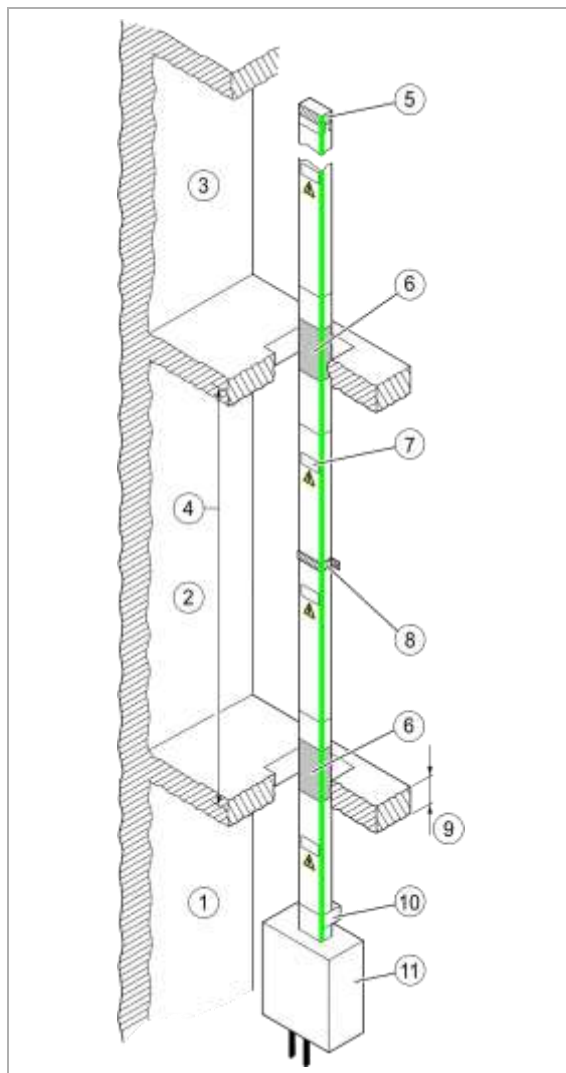


- ① Ceiling opening for other installed components
- ② Ceiling opening for unibar M busbar element
- ③ Empty bushing

## 08.04 Fire barrier for vertical installation

### Fire barrier for vertical installation

The following diagram shows an example of vertical route planning. The busbar elements in the area of the ceiling openings must be configured and ordered with a fire barrier.



Example of a vertical bar run with fire barrier

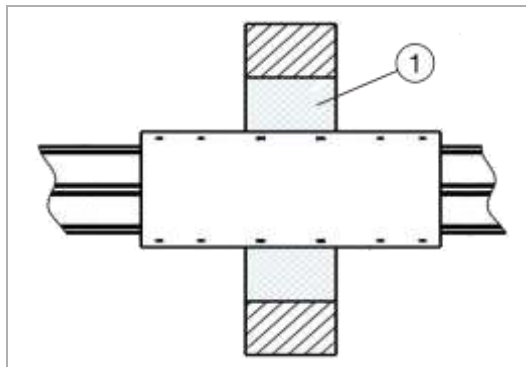
- ① 1st floor
- ② 2nd floor
- ③ 3rd floor
- ④ Floor height from centre of the ceiling to centre of the ceiling
- ⑤ End flange (end of bar run)
- ⑥ Fire barrier areas
- ⑦ Tap-off point
- ⑧ Fastening with spacer bracket KEM31S64R0LMF and fixing bracket KEM3xS20R0LMF
- ⑨ Ceiling thickness
- ⑩ Fastening and weight support with wall fixing KEM31S23R0LMF
- ⑪ Cable end feeders

## 08.05 Installation instructions

- Please refer to installation manual 6LE008165A for detailed information on installing busbar elements with fire barrier.

### Always observe the following points:

- Only one busbar element can be routed through each wall opening or ceiling opening.
- The distance between two bushings of unibar M busbar elements must be at least 100 mm (see section on minimum distances to openings and walls also).
- The distance between bushings of unibar M busbar elements and bushings of other installed components or other openings must be at least 200 mm (see section on minimum distances to openings and walls also).
- The busbar run must be supported with a fixing bracket at a distance of approx. 500 mm before and after the wall or ceiling for horizontal installation.
- The opening ① between the fire barrier and wall or ceiling must be filled with mineral mortar or fire protection compound. Please refer to installation manual 6LE008165A for the permitted versions and materials, as well as the assembly steps.
- The mortar or fire protection compound must comply with applicable regulations for creating the fire resistance rating of the wall or ceiling (e.g. DIN 1045 and DIN 1053 Part 1).
- The mortar and fire protection compound must be provided on site. Installation must comply with the standards and regulations applicable locally.
- The requirements of the local building authorities must be observed during installation.



Opening ① between fire barrier and wall or ceiling

# Technical data





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## 09.01 unibar M system data

Type	KEM3...
Standards and regulations	IEC/EN 61439-1 and -6
Rated insulation voltage $U_i$	690 V AC
Rated operating voltage $U_e$	690 V AC
Frequency	50 Hz
<b>Rated current <math>I_{nA}</math></b>	<b>160 A to 1000 A</b>
<b>Climate resistance</b>	
– Moist heat, constant, as per IEC 60068-2-78	40 °C/93 %/RH/56d
– Moist heat, cyclical, as per IEC 60068-2-30	56 x (25 °C to 40 °C/3 h; 40 °C/9 h; 40 °C to 25 °C/3 to 6 h; 25 °C/6 h) 95 % RH
– Cold according to IEC 60068-2-1	-45 °C, 16 h
– Temperature change according to IEC 60068-2-14	-45 °C to 55 °C; 5 cycles (1 °C/min.); min. hold time 30 min.
– Salt mist testing according to IEC 60068-2-52	Severity level 3
– Ice formation according to IEC 60068-2-61	Composite test from moist heat, cycl. [56 x (25 °C to 40 °C/3 h; 40 °C/9 h; 40 °C to 25 °C/3 to 6 h; 25 °C/6 h)/95 %RH] + cold [-45 °C, 16 h]
Ambient temperature: min./max./24-hour average	-5/+40/+35 °C
<b>Environmental classes</b> (derived from testing the climate resistance)	
– Climatic	1K5 (Storage) = 3K7L (Operation without solar radiation); 2K2 (Transport)
– Chemically active	Salt mist, other harmful substances.
– Biological	1C2 (Storage) = 3C2 (Operation) = 2C2 (Transport)
– Mechanically active	Covered by IP protection types and packaging type. 1B2 (Storage) = 3B2 (Operation) = 2B2 (Transport) Covered by IP protection types and packaging type. 1S2 (Storage) = 3S2 (Operation); 2S2 (Transport)
<b>Protection type according to IEC/EN 60529 (model 2)</b>	
– Straight length elements, L-Elements, Z-Elements	IP55
– T-Elements, flexible direction change elements	IP52
– Cable feeders	IP54
– Tap-off boxes	IP54 as standard. IP55 with additional equipment (possible for all tap-off boxes without transparent flap).
<b>Material</b>	
– Busbar elements, cable feeders, tap-off boxes in sizes 2 to 05	Galvanised, painted sheet steel, light grey (RAL 7035)
– Size 1 tap-off boxes	Plastic (insulating material), light grey (RAL 7035)
– Busbars	Nickel-plated and tin-plated aluminium bars
<b>Installation positions</b>	
– Horizontal routing	– Housing in flat position, conductor upright position – Housing in upright position, conductor flat position
– Vertical routing	Housing vertical
<b>Weights</b>	See selection and ordering data

## 09.02 Busbar elements

Type		KEM31S...	KEM32S...	KEM34S...
<b>Conducting paths</b>				
Rated insulation voltage $U_i$		690 V AC		
Rated operating voltage $U_e$		690 V AC		
Frequency		50 to 60 Hz		
Rated current				
– Rated current $I_n$ Three-phase current		160 A	250 A	400 A
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold bar)				
– Equivalent resistance $R_{20}$		0.527 mΩ/m	0.315 mΩ/m	0.176 mΩ/m
– Positive reactance $X_{20}$		0.151 mΩ/m	0.112 mΩ/m	0.089 mΩ/m
– Impedance $Z_{20}$		0.548 mΩ/m	0.335 mΩ/m	0.197 mΩ/m
Impedance per unit length of conducting paths with 50 Hz and ambient temperature of 20 °C (bar under warm operating conditions)				
– Equivalent resistance $R_1$		0.780 mΩ/m	0.467 mΩ/m	0.260 mΩ/m
– Positive reactance $X_1$		0.151 mΩ/m	0.112 mΩ/m	0.089 mΩ/m
– Impedance $Z_1$		0.794 mΩ/m	0.480 mΩ/m	0.275 mΩ/m
Impedance per unit length of conducting paths in the event of a fault				
AC resistance per unit length $R_F$		1.058 mΩ/m	0.634 mΩ/m	0.341 mΩ/m
Positive reactance per unit length $X_F$		0.299 mΩ/m	0.220 mΩ/m	0.193 mΩ/m
Impedance per unit length $Z_F$		1.099 mΩ/m	0.671 mΩ/m	0.392 mΩ/m
Zero sequence impedance according to IEC/EN 60909 (VDE 0102)	Phase to N			
	$R_0$	2.166 mΩ/m	1.329 mΩ/m	0.789 mΩ/m
	$X_0$	0.918 mΩ/m	0.753 mΩ/m	0.639 mΩ/m
	$Z_0$	2.353 mΩ/m	1.527 mΩ/m	1.015 mΩ/m
	Phase to PE			
	$R_0$	2.166 mΩ/m	1.329 mΩ/m	0.786 mΩ/m
	$X_0$	0.897 mΩ/m	0.735 mΩ/m	0.624 mΩ/m
	$Z_0$	2.344 mΩ/m	1.519 mΩ/m	1.004 mΩ/m
Short-circuit resistance				
– Rated surge withstand current $I_{pk}$		17 kA	32 kA	40 kA
– Rated short-time withstand current $I_{cw}$ (t = 1 s)		5.5 kA	10 kA	16 kA
– Rated short-time withstand current $I_{cw}$ (t = 0.1 s)		12 kA	22 kA	28 kA
Number of conductors		5	5	5
Conductor cross-section	L1, L2, L3	63 mm <sup>2</sup>	108 mm <sup>2</sup>	205 mm <sup>2</sup>
	N	63 mm <sup>2</sup>	108 mm <sup>2</sup>	205 mm <sup>2</sup>
	PE	63 mm <sup>2</sup>	108 mm <sup>2</sup>	205 mm <sup>2</sup>
Conductor material		Al	Al	Al
Max. distance between mounting points of busbar elements at normal mechanical stress				
– Housing in upright position, conductor flat position		4 m	4 m	4 m
– Housing in upright position, conductor flat position, with spacer bracket KEM31S64R0LMF		4 m	4 m	4 m
– Housing in flat position, conductor upright position		3.5 m	3.5 m	3.5 m
Fire load (for busbar elements with tap-off points)		1.32 kWh/m	1.32 kWh/m	1.32 kWh/m

See the page after next for comments.

Type		KEM36S...	KEM38S...	KEM39S...	
<b>Conducting paths</b>					
Rated insulation voltage $U_i$		690 V AC			
Rated operating voltage $U_e$		690 V AC			
Frequency		50 to 60 Hz			
Rated current					
– Rated current $I_n$ Three-phase current		630 A	800 A	1000 A	
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold bar)					
– Equivalent resistance $R_{20}$		0.093 mΩ/m	0.076 mΩ/m	0.048 mΩ/m	
– Positive reactance $X_{20}$		0.041 mΩ/m	0.039 mΩ/m	0.055 mΩ/m	
– Impedance $Z_{20}$		0.101 mΩ/m	0.085 mΩ/m	0.073 mΩ/m	
Impedance per unit length of conducting paths with 50 Hz and ambient temperature of 20 °C (bar under warm operating conditions)					
– Equivalent resistance $R_1$		0.137 mΩ/m	0.112 mΩ/m	0.072 mΩ/m	
– Positive reactance $X_1$		0.041 mΩ/m	0.039 mΩ/m	0.055 mΩ/m	
– Impedance $Z_1$		0.143 mΩ/m	0.119 mΩ/m	0.090 mΩ/m	
Impedance per unit length of conducting paths in the event of a fault					
AC resistance per unit length $R_F$		0.187 mΩ/m	0.153 mΩ/m	0.105 mΩ/m	
Positive reactance per unit length $X_F$		0.079 mΩ/m	0.076 mΩ/m	0.069 mΩ/m	
Impedance per unit length $Z_F$		0.203 mΩ/m	0.171 mΩ/m	0.125 mΩ/m	
Zero sequence impedance according to IEC/EN 60909 (VDE 0102)	Phase to N	$R_0$	0.414 mΩ/m	0.348 mΩ/m	0.252 mΩ/m
		$X_0$	0.321 mΩ/m	0.300 mΩ/m	0.276 mΩ/m
		$Z_0$	0.524 mΩ/m	0.459 mΩ/m	0.374 mΩ/m
	Phase to PE	$R_0$	0.411 mΩ/m	0.345 mΩ/m	0.252 mΩ/m
		$X_0$	0.315 mΩ/m	0.297 mΩ/m	0.276 mΩ/m
		$Z_0$	0.518 mΩ/m	0.455 mΩ/m	0.374 mΩ/m
Short-circuit resistance					
– Rated surge withstand current $I_{pk}$		64 kA	84 kA	90 kA	
– Rated short-time withstand current $I_{cw}$ (t = 1 s)		26 kA	32 kA	34 kA	
– Rated short-time withstand current $I_{cw}$ (t = 0.1 s)		45 kA	59 kA	63 kA	
Number of conductors		5	5	5	
Conductor cross-section	L1, L2, L3	381 mm <sup>2</sup>	446 mm <sup>2</sup>	699 mm <sup>2</sup>	
	N	381 mm <sup>2</sup>	446 mm <sup>2</sup>	699 mm <sup>2</sup>	
	PE	381 mm <sup>2</sup>	446 mm <sup>2</sup>	699 mm <sup>2</sup>	
Conductor material		Al	Al	Al	
Max. distance between mounting points of busbar elements at normal mechanical stress					
– Housing in upright position, conductor flat position		3.5 m	3.5 m	3 m	
– Housing in upright position, conductor flat position, with spacer bracket KEM31S64R0LMF		1.75 m	1.75 m	1.75 m	
– Housing in flat position, conductor upright position		3 m	3 m	2.5 m	
Fire load (for busbar elements with tap-off points)		2 kWh/m	2 kWh/m	2 kWh/m	

See the next page for comments.

### Comments on busbar elements

- Equivalent copper cross-section of housing exterior profile:
  - 64 mm<sup>2</sup> for size 1 up to 400 A
  - 77 mm<sup>2</sup> for size 2 from 630 A up to 1000 A.
- This housing cross-section does not apply to the two joint block covers at the connection point.
- The complete housing consists of two housing halves and joint block cover at the connection point. These items form part of the protective measures. The influence of the housing is taken into account in the measurements of the fault loops for the impedance in the event of a fault (Z<sub>f</sub>), and for the impedance (Z<sub>20</sub>) according to the currently valid technical specifications.

## 09.03 Feeding units

### Terminal cross-section (geometric)

Terminal cross-sections relate to copper cables. Cross-sections and diameters for Al cables on request.

Reference	L1, L2, L3		N		PE		Bolts <sup>[1]</sup>
	min. mm <sup>2</sup>	max. mm <sup>2</sup>	min. mm <sup>2</sup>	max. mm <sup>2</sup>	min. mm <sup>2</sup>	max. mm <sup>2</sup>	
KEM32S51Z0LMF	(1-3) × 6	1 × 150, 2 × 70	(1-3) × 6	1 × 150, 2 × 70	(1-3) × 6	1 × 150, 2 × 70	M10
KEM34S51Z0LMF	(1-3) × 10 <sup>[2]</sup>	1 × 240, 2 × 120	(1-3) × 10 <sup>[2]</sup>	1 × 240, 2 × 120	(1-3) × 10 <sup>[2]</sup>	1 × 240, 2 × 120	M12
KEM34S52Z0LMF							
KEM34S53Z0LMF							
KEM39S51Z0LMF	(1-3) × 10 <sup>[2]</sup>	3 × 240	(1-3) × 10 <sup>[2]</sup>	3 × 240	(1-3) × 10 <sup>[2]</sup>	2 × 240, 3 × 185	
KEM39S52Z0LMF							
KEM39S53Z0LMF							
KEM34S56Z0LMF	(1-3) × 10 <sup>[2]</sup>	2 × 240, 3 × 185	(1-3) × 10 <sup>[2]</sup>	2 × 240, 3 × 185	(1-3) × 10 <sup>[2]</sup>	2 × 240, 3 × 185	
KEM34S58Z0LMF							
KEM39S56Z0LMF	(1-5) × 10 <sup>[2]</sup>	(1-5) × 300	(1-5) × 10 <sup>[2]</sup>	(1-5) × 300	(1-5) × 10 <sup>[2]</sup>	(1-5) × 300	
KEM39S58Z0LMF							

[1] Size of terminal screws, bolts for L1, L2, L3, PE, N

[2] Minimum possible cable cross-section for cable lugs.

### Cable and wiring entries

Reference	KEM32S51Z0LMF	KEM34S51Z0LMF KEM34S52Z0LMF KEM34S53Z0LMF	KEM39S51Z0LMF KEM39S52Z0LMF KEM39S53Z0LMF KEM34S56Z0LMF KEM34S58Z0LMF	KEM39S56Z0LMF KEM39S58Z0LMF
No. of cable grommets	1 x	2 x	3 x	6 x
For cable diameters	14 to 54 mm	14 to 68 mm	14 to 68 mm	14 to 68 mm

### Cable entry plate for single-conductor system (cable entry plates undrilled)

Reference	KEM32S51Z0LMF	KEM34S51Z0LMF KEM34S52Z0LMF KEM34S53Z0LMF	KEM39S51Z0LMF KEM39S52Z0LMF KEM39S53Z0LMF
Cable entry plate	KEM32S55R0LMF	KEM34S55R0LMF	KEM39S55R0LMF
Max. number of cable entries	10 × M32, 5 × M40	10 × M40	15 × M40, 6 × M50 and 4 × M40

Use plastic cable glands with strain relief (not included in the scope of delivery).

### Cable entry plate for single-conductor system for centre feeds (cable entry plates undrilled)

Reference	KEM34S56Z0LMF KEM34S58Z0LMF	KEM39S56Z0LMF KEM39S58Z0LMF
Cable entry plate	KEM34S57R0LMF	KEM39S57R0LMF
Max. number of cable entries	12 × M40 and 3 × M32, 6 × M50 and 4 × M40	31 × M40, 16 × M50 and 4 × M40

Use plastic cable glands with strain relief (not included in the scope of delivery).

## 09.04 Tap-off boxes

### 09.04.01 Rated currents and rated voltages

Type	KEB7...					
Rated current $I_n$	25 A	63 A	125 A	250 A	400 A	630 A
Switching capacity of contact system	AC-22B	--	--	--	--	--
Switching capacity of the built-in switch-disconnector according to IEC/EN 60947-3 at 400 V	--	AC-22B	AC-21B	--	--	--

#### Important project planning instructions

- Not every tap-off box has a rated voltage of 690 V and short-circuit resistance corresponding to the system size.
- The tap-off boxes used must match the values required in the system in relation to their short-circuit resistance and rated voltage. A network calculation must be carried out for each project for this purpose.
- A tap-off box with suitable components built in must be selected if the tap-off box does not comply with the rated voltage. For higher short-circuit currents, these components must then be limited by upstream protective devices (e.g. circuit breaker).

### 09.04.02 Rating factors

#### Rating factors for size 1 tap-off boxes

Product	U <sub>n</sub> [V]	I <sub>th</sub> [A]	Configuration	I <sub>nc</sub> <sup>[1]</sup> [A]								I <sub>cc</sub> <sup>[2]</sup> [kA]					
				L1	L2	PE	L3	L1	L2	PE	L3						
KEB771A1	35	16 <sup>[4]</sup>	1 x LD047	12.6	13.5	14.2	13.5					50	50				
KEB771B1	35	16 <sup>[4]</sup>	2 x LD042										50	50			
			1 x ➡	-	15.2	-	15.2	-	15.2	-	15.2	-			15.2		
			2 x ➡	14.5	14.5	15.2	15.2	15.2	15.2	15	15						
KEB771C1	35	16 <sup>[4]</sup>	1 x LD047	12.5	13.9	13.9	13					50	50				
KEB771D1	35	16	1 x NCN316	11	13.5	13.2	12.4					10	10				
KEB771E1	35	16	1 x NCN416	11	13.5	13.2	12.5					10	10				
KEB771F1	35	16	2 x NBN116										10	10			
			1 x ➡	-	15.8	-	16	-	16	-	16	-			16		
			2 x ➡	14.3	14.3	16	16	15.9	15.9	15.9	15.9						
KEB771G1	35	16	2 x Schuko (1 x ADA516D)										10	10			
			1 x ➡	-	13.5	-	14.7	-	15.4	-	14.5						
			2 x ➡	6.8	6.8	7.4	7.4	7.7	7.7	7.7	7.7						
KEB771H1	35	16	1 x NCN316	12.1	14	14.5	13.5					10	10				
KEB771J1	35	16	3 x NBN116										10	10			
			1 x ➡	-	-	15.8	-	-	16	-	-	16			-	-	16
			2 x ➡	-	14.1	14.1	-	15.6	15.6	-	15.8	15.8			-	15.1	15.1
			3 x ➡	11.2	11.2	11.2	13.8	13.8	13.8	13.7	13.7	13.7			13.4	13.4	13.4
KEB771K1	35	16	1 x ADA566D	13.1	14.4	14.9	14.2					10	10				

<sup>[1]</sup> Rated current

<sup>[2]</sup> Rated conditional short-circuit current for U<sub>e</sub> = 230/400 V AC, 50 Hz

<sup>[3]</sup> Ambient temperature during testing according to 61439-6 Section 10.10.2.

<sup>[4]</sup> Fuse link used during testing according to 61439-6 Section 10.10.2.

Rating factors for size 2 tap-off boxes

				$I_{nc}^{[1]}$ [A]										$I_{cc}^{[2]}$ [kA]				
														L1	PE			
														L2	L3			
KEB772L1	35	16	1 x ADX466D	16												10	10	
KEB772A1	35	63 <sup>[4]</sup>	1 x LD046	43												50	50	
KEB772B1	35	63 <sup>[4]</sup>	1 x LD046	42.5												50	50	
KEB772C1	35	63 <sup>[4]</sup>	1 x L73M	42.5												50	50	
KEB772F1	35	32	1 x NCN332	28												10	10	
KEB772G1	35	16	1 x NCN316, 2 x NCN116										10	10				
			1 x →	NCN316	-	-	15.7	-	-	16	-	-			16	-	-	16
			1 x →	NCN116	16	-	-	16	-	-	16	-			-	16	-	-
			2 x →	NCN116	16	16	-	16	16	-	16	16			-	16	16	-
			2 x →	NCN116 NCN316	14.7	-	14.7	15.8	-	15.8	14.9	-			14.9	15.1	-	15.1
3 x →	NCN116 NCN316	13.7	13.7	13.7	14.7	14.7	14.7	13.9	13.9	13.9	14.1	14.1	14.1					

[1] Rated current (for MCCB: value of the overload release)  
 [2] Rated conditional short-circuit current for  $U_e = 230/400$  V AC, 50 Hz  
 [3] Ambient temperature during testing according to 61439-6 Section 10.10.2.  
 [4] Fuse link used during testing according to 61439-6 Section 10.10.2.


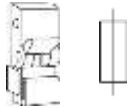
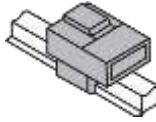
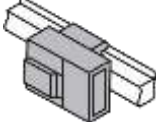
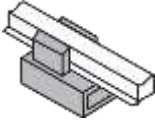
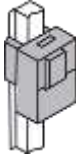
Rating factors for sizes 3 and 03 tap-off boxes

				$I_{nc}^{[1]}$ [A]										$I_{cc}^{[2]}$ [kA]			
														L1	PE		
														L2	L3		
KEB773E1	35	125 <sup>[4]</sup>	1 x NH00	120												80	48
KEB773A1	35	125 <sup>[4]</sup>	1 x HFD312	77												100	60
KEB773B1	35	125 <sup>[4]</sup>	1 x HFD412	77												100	60
KEB773C1	40	160 <sup>[4]</sup>	1 x HNS160JC	123												40	24
KEB753D1	40	160 <sup>[4]</sup>	1 x HNS161JC	123												40	24
KEB773F1	35	125	1 x HMC399	80												15	9
KEB753G1	35	125	1 x HMC499	80												15	9
KEB772D1	35	63	1 x NCN363	43												10	10
KEB772E1	35	63	1 x NCN463	43												10	10

[1] Rated current (for MCCB: value of the overload release)  
 [2] Rated conditional short-circuit current for  $U_e = 230/400$  V AC, 50 Hz  
 [3] Ambient temperature during testing according to 61439-6 Section 10.10.2.  
 [4] Fuse link used during testing according to 61439-6 Section 10.10.2.

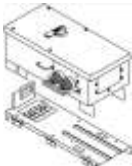
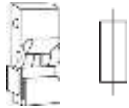
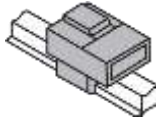
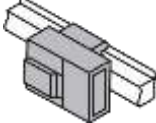
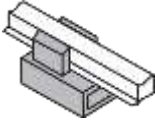
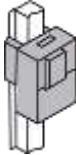


**Rating factors for size 04 tap-off boxes**

		$[\text{°C}]^{[3]}$	$I_{th} [\text{A}]$		$I_{nc}^{[1]} [\text{A}]$				$I_{cc}^{[2]} [\text{kA}]$	
									L1	PE
KEB774A1	35	250 <sup>[4]</sup>	1 x HFD325	210	220	203	240	100	60	
KEB754B1	35	250 <sup>[4]</sup>	1 x HFD425	210	220	210	240	100	60	
KEB774C1	40	250 <sup>[5]</sup>	1 x HNT250JR	220	211	228	229	40	24	
KEB754D1	40	250 <sup>[5]</sup>	1 x HNT251JR	220	211	228	229	40	24	
KEB734M1	40	250 <sup>[5]</sup>	1 x H3+ P250	220 <sup>[5]</sup>	211 <sup>[5]</sup>	228 <sup>[5]</sup>	229 <sup>[5]</sup>	40 <sup>[6]</sup>	24 <sup>[6]</sup>	
KEB734N1	40	250 <sup>[5]</sup>	1 x H3+ P250	220 <sup>[5]</sup>	211 <sup>[5]</sup>	228 <sup>[5]</sup>	229 <sup>[5]</sup>	40 <sup>[6]</sup>	24 <sup>[6]</sup>	
KEB734P1				max. 250 A <sup>[7]</sup>						

- [1] Rated current (for MCCB: value of the overload release)  
 [2] Rated conditional short-circuit current for  $U_e = 230/400 \text{ V AC}, 50 \text{ Hz}$   
 [3] Ambient temperature during testing according to 61439-6 Section 10.10.2.  
 [4] Fuse link used during testing according to 61439-6 Section 10.10.2.  
 [5] MCCB used during testing according to 61439-6 Section 10.10.2.  
 [6] Intended for H3+ P250 MCCB  
 [7] Additional information on request

**Rating factors for size 05 tap-off boxes**

		$[\text{°C}]^{[3]}$	$I_{th} [\text{A}]$		$I_{nc}^{[1]} [\text{A}]$				$I_{cc}^{[2]} [\text{kA}]$	
									L1	PE
KEB775A1	35	400 <sup>[4]</sup>	1 x HFD340	300	300	320	320	100	60	
KEB755B1	35	400 <sup>[4]</sup>	1 x HFD440	300	300	320	320	100	60	
KEB775C1	40	400 <sup>[5]</sup>	1 x HNW400JR	345	335	365	365	40	24	
KEB755D1	40	400 <sup>[5]</sup>	1 x HNW401JR	345	335	365	365	40	24	
KEB735M1	40	400 <sup>[5]</sup>	1 x H3+ P400	345 <sup>[5]</sup>	335 <sup>[5]</sup>	365 <sup>[5]</sup>	365 <sup>[5]</sup>	40 <sup>[6]</sup>	24 <sup>[6]</sup>	
KEB735N1	40	400 <sup>[5]</sup>	1 x H3+ P400	345 <sup>[5]</sup>	335 <sup>[5]</sup>	365 <sup>[5]</sup>	365 <sup>[5]</sup>	40 <sup>[6]</sup>	24 <sup>[6]</sup>	
KEB735P1				max. 250 A <sup>[7]</sup>						
KEB776C1	40	630 <sup>[5]</sup>	1 x HNW630JR	430	405	420	430	40	24	
KEB756D1	40	630 <sup>[5]</sup>	1 x HNW631JR	430	405	420	430	40	24	

- [1] Rated current (for MCCB: value of the overload release)  
 [2] Rated conditional short-circuit current for  $U_e = 230/400 \text{ V AC}, 50 \text{ Hz}$   
 [3] Ambient temperature during testing according to 61439-6 Section 10.10.2.  
 [4] Fuse link used during testing according to 61439-6 Section 10.10.2.  
 [5] MCCB used during testing according to 61439-6 Section 10.10.2.  
 [6] Intended for H3+ P400 MCCB  
 [7] Additional information on request

**Terminal cross-section (geometric)**

Terminal cross-sections relate to copper cables. Cross-sections and diameters for Al cables on request.

Reference	L1, L2, L3		N		PE		Size of terminal screws, bolts L1, L2, L3, PE, N
	min. mm <sup>2</sup>	max. mm <sup>2</sup>	min. mm <sup>2</sup>	max. mm <sup>2</sup>	min. mm <sup>2</sup>	max. mm <sup>2</sup>	
KEB771A1	1.5 (s, f, m)	35 (f, m)	1 (s, f, m)	6 (s, m)	1 (s, f, m)	6 (s, m)	-
KEB771D1	1 (s, f, m)	16 (s, f, m)	1 (s, f, m)	6 (s, m)	1 (s, f, m)	6 (s, m)	-
KEB771E1	1 (s, f, m)	16 (s, f, m)	1 (s, m)	16 (s, f, m)	1 (s, f, m)	6 (s, m)	-
KEB772A1	1.5 (f, m)	35 (f, m)	1 (s, f, m)	16 (s, m)	1 (s, f, m)	16 (s, m)	-
KEB772C1	1.5 (f, m)	35 (f, m)	1 (s, f, m)	16 (s, m)	1 (s, f, m)	16 (s, m)	-
KEB773A1/ KEB773B1	10 (s, m)	95 (m)	2.5 (s, m)	35 (m)	2.5 (s, m)	35 (m)	M8
KEB773C1/ KEB773D1	6 (s, m)	70 (m)	2.5 (s, m)	35 (m)	2.5 (s, m)	35 (m)	-
KEB773E1	16	70	16	70	10	70	M8
KEB773F1/ KEB753G1	1 (s, f, m)	50 (s, f, m)	-	-	-	-	-
KEB772D1/ KEB772E1	1 (s, f, m)	25 (s, f, m)	-	-	-	-	-
KEB774A1/ KEB774B1	10	240	6	150	6	150	M10
KEB774C1/ KEB774D1	35	150 (m)	6 (s, m)	150	6	150	M8
KEB775A1/ KEB775B1	10	240	10	2 x 120	10	2 x 120	M10
KEB775C1/ KEB775D1	35	300	10	2 x 120	10	2 x 120	M10
KEB776C1/ KEB776D1	10	300	10	2 x 240	10	2 x 240	M12

s = single-wire, m = multi-wire, f = fine-wire with wire end ferrules

**Cable and wiring entries**

Type	Size 1	Size 2	Size 3	Size 4	Size 5
Cable grommets	M25 <sup>[1]</sup>	-	-	KT3 <sup>[2]</sup>	2 x KT4 <sup>[2]</sup>
Cable glands <sup>[3]</sup>	-	M25, M32, M40	M25, M63	-	-
For cable diameters <sup>[4]</sup>	11 to 16 mm	11 to 27 mm	11 to 42 mm	14 to 54 mm	14 to 68 mm

**Min./max. cable entry capacity for multi-conductor cables for NYY and NYCWY**

- NYY...	5 x 1.5 mm <sup>2</sup> to 5 x 4 mm <sup>2</sup>	5 x 1.5 mm <sup>2</sup> to 5 x 16 mm <sup>2</sup>	5 x 1.5 mm <sup>2</sup> to 5 x 25 mm <sup>2</sup>	-	-
- NYCWY... <sup>[5]</sup>	4 x 1.5 mm <sup>2</sup> to 4 x 2.5 mm <sup>2</sup>	4 x 1.5 mm <sup>2</sup> to 4 x 16 mm <sup>2</sup>	4 x 1.5 mm <sup>2</sup> to 4 x 70 mm <sup>2</sup>	5 x 1.5 mm <sup>2</sup> to 4 x 150 mm <sup>2</sup>	2 x 5 x 1.5 mm <sup>2</sup> to 2 x 4 x 150 mm <sup>2</sup>

**Cable entry plate for single-conductor cable (attached plates, undrilled)**

- Max. number of cable entries				10 x M40	10 x M32, 5 x M40
--------------------------------	--	--	--	----------	----------------------

<sup>[1]</sup> Strain relief in tap-off box.

<sup>[2]</sup> With strain relief.

<sup>[3]</sup> For cable glands: Use plastic cable glands with strain relief (not included in the scope of delivery).

<sup>[4]</sup> Diameter values relate to Cu cables. Cross-sections and diameters for Al cables on request.

<sup>[5]</sup> Fifth conductor: concentric conductor.

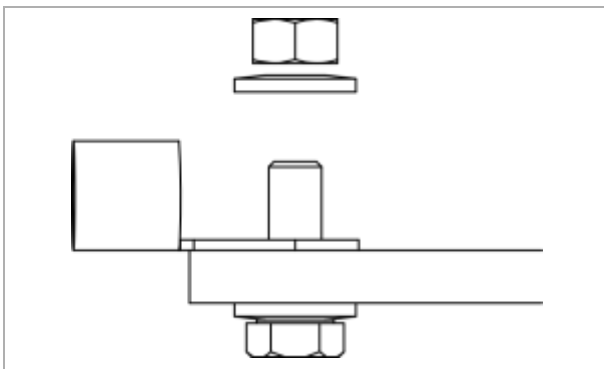
**Connection of aluminium cables in tap-off boxes and cable feeders**

Special conditions apply to the connection of aluminium cables.

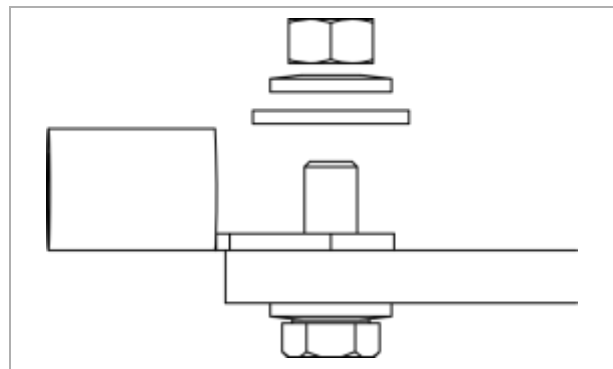
**Cable lug connection set**

- The connection set supplied as standard can be used if special aluminium cable lugs or copper cable lugs are used.
- When using aluminium cable lugs with copper insert, the connection set supplied as standard can be used if the diameter of the copper insert is at least equal to or larger than the outer diameter of the spring washer supplied.
- When using aluminium cable lugs without copper insert, the supplied connection set must be supplemented with an additional "oversized" washer (corresponding to ISO 7093) per cable lug (see diagram on the right). It may be necessary in this case to replace the bolt supplied with a longer bolt.
- The aluminium cable lug used must be tin-plated.

**Example: Cable lug connection on connection flap**



Copper cable lug connection with standard connection set



Connection of aluminium cable lug with additional washer according to ISO 7093

**Cable introduction into tap-off boxes and cable feeders**

Due to the numerous manufacturers of aluminium cables and aluminium cable lugs available on the market (with different dimensions in some cases), the customer must check to what extent cables and cable lugs can be introduced and connected in the tap-off boxes or cable feeders.

Particular attention must be paid in this case to the manufacturer's instructions on the cables' bending radii. Cable introduction from the face end is recommended.

Particular attention must be paid to ensure clearances and creepage distances are observed at the connection flaps. Additional measures may be required (e.g. interphase barriers, insulation of cable lugs etc.).

## 09.05 Fire loads

Description	Reference	Fire load
Straight length elements in standard lengths, with tap-off points on both sides	KEM31S00ZxLMF	1.32 kWh/m
	KEM32S00ZxLMF	1.32 kWh/m
	KEM34S00ZxLMF	1.32 kWh/m
	KEM36S00ZxLMF	2.00 kWh/m
	KEM38S00ZxLMF	2.00 kWh/m
	KEM39S00ZxLMF	2.00 kWh/m
Straight length elements in standard lengths, without tap-off points	KEM34S00NxLMF	0.60 kWh/m
	KEM36S00NxLMF	0.67 kWh/m
	KEM38S00NxLMF	0.67 kWh/m
	KEM39S00NxLMF	0.67 kWh/m
Straight length elements in lengths to order, with tap-off points on both sides	KEM31S00SxLMF	1.32 kWh/m
	KEM32S00SxLMF	1.32 kWh/m
	KEM34S00SxLMF	1.32 kWh/m
	KEM36S00SxLMF	2.00 kWh/m
	KEM38S00SxLMF	2.00 kWh/m
	KEM39S00SxLMF	2.00 kWh/m
Straight length elements in lengths to order, without tap-off points	KEM34S00PxLMF	0.60 kWh/m
	KEM36S00PxLMF	0.67 kWh/m
	KEM38S00PxLMF	0.67 kWh/m
	KEM39S00PxLMF	0.67 kWh/m
Vertical L-Elements (knee), downwards (90° or configurable angle)	KEM34S02xxLMF	1.27 kWh/m
	KEM39S02xxLMF	1.27 kWh/m
Vertical L-Elements (knee), upwards (90° or configurable angle)	KEM34S05xxLMF	1.27 kWh/m
	KEM39S05xxLMF	1.27 kWh/m
Horizontal L-Elements (angle), to the right (90° or configurable angle)	KEM34S01xxLMF	1.27 kWh/m
	KEM39S01xxLMF	1.27 kWh/m
Horizontal L-Elements (angle), to the left (90° or configurable angle)	KEM34S04xxLMF	1.27 kWh/m
	KEM39S04xxLMF	1.27 kWh/m
Vertical Z-Elements (Z knee) first 90° downwards, then 90° upwards	KEM34S42x4LMF	1.88 kWh/m
	KEM39S42x4LMF	1.88 kWh/m
Vertical Z-Elements (Z knee), first 90° upwards, then 90° downwards	KEM34S43x4LMF	1.88 kWh/m
	KEM39S43x4LMF	1.88 kWh/m
Horizontal Z-Elements (Z angle), first 90° to the right, then 90° to the left	KEM34S40x4LMF	1.88 kWh/m
	KEM39S40x4LMF	1.88 kWh/m
Horizontal Z-Elements (Z angle), first 90° to the left, then 90° to the right	KEM34S41x4LMF	1.88 kWh/m
	KEM39S41x4LMF	1.88 kWh/m
Vertical T-Element, 90° downwards	KEM34S60N1LMF	2.00 kWh/m
	KEM39S60N1LMF	2.00 kWh/m
Vertical T-Element, 90° upwards	KEM34S61N1LMF	2.00 kWh/m
	KEM39S61N1LMF	2.00 kWh/m
Horizontal T-Element, 90° to the right	KEM34S63N1LMF	2.00 kWh/m
	KEM39S63N1LMF	2.00 kWh/m

Description	Reference	Fire load
Horizontal T-Element, 90° to the left	KEM34S62N1LMF	2.00 kWh/m
	KEM39S62N1LMF	2.00 kWh/m
Cable compartment for multi-conductor cable entry	KEM34S59R0LMF	2.67 kWh/m
	KEM39S59R0LMF	2.67 kWh/m
Cable end feeder	KEM32S50Z0LMF	3.20 kWh/m
	KEM34S50Z0LMF	3.50 kWh/m
	KEM39S50Z0LMF	3.80 kWh/m
Distribution board feeding unit	KEM32S03N1LMF	3.00 kWh/m
	KEM34S03N1LMF	3.20 kWh/m
	KEM39S03N1LMF	3.60 kWh/m
Centre feed	KEM34S56Z0LMF	3.90 kWh/m
	KEM39S56Z0LMF	8.10 kWh/m
Expansion tap-off box, freely assignable, no device installation unit	KEB740A1	0.40 kWh/m
	KEB740B1	1.50 kWh/m
Joint block	KEM34S29R0LMF	1.64 kWh/m
	KEM39S29R0LMF	2.46 kWh/m
End flange	KEM34S10R0LMF	– kWh/m
	KEM39S10R0LMF	– kWh/m
Fixing bracket	KEM34S20R0LMF	– kWh/m
	KEM39S20R0LMF	– kWh/m
Sealing set IP55 for tap-off boxes	KEB73xS1 KEB733R1	– kWh/m
Schuko socket	KEM31S90R0LMF	0.10 kWh/m
CEE 16 A socket, 3-pole	KEM31S91R0LMF	0.20 kWh/m
CEE 16 A socket, 5-pole	KEM31S92R0LMF	0.20 kWh/m
CEE 32 A socket, 5-pole	KEM31S93R0LMF	0.30 kWh/m
Adapter housing for sockets	KEM31S67R0LMF	– kWh/m
Adapter plate without socket cut-out	KEM31S66R0LMF	– kWh/m
Adapter plate with socket cut-out	KEM31S66R0LMF	– kWh/m

# Appendix



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CE declaration of conformity	150
Comments for contract specifications	151
Abbreviations	152

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## 10.01 CE declaration of conformity

**EU-KONFORMITÄTSERKLÄRUNG Nr. 23.2923.03.23**  
EU DECLARATION OF CONFORMITY No.

---

**Wir / we** Hager Electro GmbH & Co. KG  
Zum Gunterstal  
66440 Blieskastel - GERMANY

bestätigen, dass das (die) Produkt(e) / declare that the product(s)  
**Bezeichnung / Designation** Schienenverteilersystem  
 Busbartrunking system  
 unibar M

**Bestell-Nummer(n) / Type reference(s)** KEM...  
 KEB...  
 siehe ab Seite 2  
 see page 2 onwards

**Handelsmarke / Trademark** Hager

die einschlägigen Harmonisierungsrechtsvorschriften der Union erfüllt (erfüllen):  
 is (are) in conformity with the relevant Union harmonization legislation:

- Niederspannungsrichtlinie (NSR) Nr. 2014/35/EU - Low Voltage Directive (LVD) N° 2014/35/EU
- Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe Nr. 2011/65/EU geändert durch (EU) 2015/863 - Directive on the Restriction of the use of certain Hazardous Substances (RoHS) N° 2011/65/EU amended by N° (EU) 2015/863
- Elektromagnetische Verträglichkeit Richtlinie (EMV) Nr. 2014/30/EU - Electromagnetic Compatibility Directive (EMC) N° 2014/30/EU

.....  
 .....

**Norm(en) und / oder das (die) maßgebliche(n) Dokument(e) / Standard(s) and/or relevant document(s)**  
 Norm Nr. + Bezeichnung Nr. mit jeweils Ausgabe-Datum / Standard number + relevant amendments together with the edition dates

IEC 61439-1:2011  
 IEC 61439-6:2012

EN 61439-1:2011  
 EN 61439-6:2012

DIN EN 61439-1 (VDE 0660-800-1):2012-06  
 DIN EN 61439-6 (VDE 0660-600-6):2013-06

EN 63000

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Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.  
 This declaration of conformity is issued under the sole responsibility of the manufacturer.

Im Namen von / On behalf of Hager Electro GmbH & Co. KG - Zum Gunterstal - 66440BLIESKASTEL - GERMANY

**Name des Unterzeichners / Name of signatory**  **Funktion des Unterzeichners / Function of signatory**  
 Certification Mandatee

**Ort und Datum der Ausstellung / Place and date of issue**  **Unterschrift / Signature**  
 xxxxxx

DMS032799 Version 20 1/9



## 10.02 Comments for contract specifications

Busbar Trunking System (see drawing in Appendix) as type tested low-voltage switchgear and controlgear assembly according to IEC/EN 61439-1 and -6.

The following specifications/features/descriptions are an integral part of the quotation and contract. They must be taken into account in the descriptions of the individual installations and equipment, even if they are not mentioned in any further detail.

Specification/Feature/Description	Quantity/Details	Unit
Rated current $I_N$ (Corresponds to the thermal rated current at +40 °C max. and +35 °C in 24-hour average for indoor installation)	*	A
Rated insulation voltage $U_i$ (max. 690 V AC)	*	V
Rated operating voltage	*	V
Mains frequency	*	Hz
Rated surge withstand current of the Busbar Trunking System (tested according to IEC/EN 61439-1)	*	kA
IP55 protection type for busbar elements and cable feeders	IP55 (Standard)	
Protection type for tap-off boxes (Standard IP54, IP55 with additional equipment in versions without a viewing window)	*	
5-conductor system L1, L2, L3, N, PE	(Standard)	
Busbars made of aluminium, nickel-plated and tin-plated, held by insulated bar supports	(Standard)	
Flexible direction change elements (with flexible copper conductors in insulating sheath) are permitted	*	
Asbestos-free fire barriers if the busbar system is routed through a wall or ceiling according to attached drawing. Fire resistance rating EI90 or EI120 according to EN 13501.	*	
Sprinkler-tested (with additional equipment)	(Standard)	
Halogen-free system	(Standard)	
Encapsulated busbar elements, made of sheet steel, galvanised and painted	(Standard)	
Colour light grey RAL 7035	(Standard)	
Connection of elements using joint block with integrated expansion compensation	(Standard)	
Tap-off points on straight length elements staggered every 0.5 m, 0.25 m on both sides	(Standard)	
Ready-to-connect delivery with all connecting components	*	
Ready-to-connect assembly with all connecting components	*	
Heat is dissipated by the housing. The temperature rise of the housing must not exceed 55 °C at the particular rated current, regardless of the installation position.	*	
Verification of a certified Quality Management System according to EN ISO 9001	(Standard)	
The qualifications must be verified for the entire system by means of certificates or declarations of conformity. – IEC/EN 61 439-1 and -6 – Fire protection, tested according to EN 1366-3 – Silicone- and halogen-free	(Standard)	

\* Information required

## 10.03 Abbreviations

<b>ACB</b>	Air circuit breaker
<b>cos <math>\phi</math></b>	Phase shift
<b>DBO</b>	Low-voltage switchgear and controlgear assemblies in accordance with DIN EN 61439-1/-3 (Distribution board intended to be operated by ordinary persons)
<b>DBO-SC</b>	Switchgear and controlgear assembly that can be operated by ordinary persons: Distribution unit/Distribution boards
<b>EMC</b>	Electromagnetic compatibility
<b>FE</b>	Functional earth
<b>Sz.</b>	Size
<b>h3+</b>	Moulded case circuit breakers (MCCB) of the h3+ series
<b>hw+</b>	Air circuit breaker (ACB) of the hw+ series
<b>IK</b>	Shock resistance grade, protection type
<b>I<sub>nc</sub></b>	Rated current
<b>IP</b>	IP degree of protection (Ingress Protection)
<b>LBS</b>	Fuse switch disconnecter
<b>CB</b>	Circuit breaker
<b>MI</b>	Installation manual
<b>MCCB</b>	Moulded case circuit breaker
<b>MU</b>	Module unit [mm]
<b>N</b>	Neutral conductor
<b>NH-</b>	Low-voltage high-power...
<b>PE</b>	Protective earth
<b>PSC</b>	Power switchgear and controlgear assembly according to DIN EN 61439-1/-2
<b>PSC-SC</b>	Switchgear and controlgear assembly, can only be operated by a qualified electrician/electrically instructed person (under the supervision of a qualified electrician), cannot be operated by non-professionals
<b>PZ...</b>	Pozidrive® (screwdriver type) ... (Size)
<b>RDF</b>	Rated diversity factor
<b>Roc</b>	RAL of choice
<b>SAB</b>	Panel builder, switchgear manufacturing
<b>SaS</b>	Busbar system
<b>SC</b>	Switchgear and controlgear assembly
<b>SK I/SK II</b>	Protection class I/II
<b>TTA</b>	Type-tested low-voltage switchgear and controlgear assembly
<b>U<sub>e</sub></b>	Rated operating voltage
<b>VDE</b>	Verband der Elektrotechnik, Elektronik und Informationstechnik e. V. (Association for Electrical, Electronic & Information Technologies)

**Important formula characters first mentioned in EN 61439-1/-6\***

<b>Abbreviation</b>	<b>Description</b>	<b>Standard section 61439-1/-6* (initial mention)</b>
CTI	Comparative tracking index	EN 61439-1, 3.6.16
ELV	Low voltage	EN 61439-1, 3.7.11
EMC	Electromagnetic compatibility	EN 61439-1, 3.8.13
$f_n$	Rated frequency	EN 61439-1, 3.8.12
$I_c$	Short-circuit current	EN 61439-1, 3.8.6
$I_{cc}$	Conditional short-circuit current	EN 61439-1, 3.8.10.4
$I_{cp}$	Prospective short-circuit current	EN 61439-1, 3.8.7
$I_{cw}$	Rated short-time withstand current	EN 61439-1, 3.8.9.3
$I_n$	Rated current	EN 61439-1, 3.8.10.1
$I_{nA}$	Rated current of a switchgear and controlgear assembly/BTS	EN 61439-1, 5.3.1, Supplement in EN 61439-6, 5.3.1
$I_{nc}$	Rated current of a circuit	EN 61439-1, 5.3.2, Supplement in EN 61439-6, 5.3.2
$I_{pk}$	Rated surge withstand current	EN 61439-1, 3.8.10.2
N	Neutral conductor	EN 61439-1, 3.7.5
PE	Protective conductor	EN 61439-1, 3.7.4
PEN	PE/N conductor, PEN conductor	EN 61439-1, 3.7.6
RDF	Rated diversity factor	EN 61439-1, 3.8.11/5.4 Replacement in EN 61439-6, 5.4
SCPD	Short-circuit protection device	EN 61439-1, 3.1.11
SPD	Surge arresters	EN 61439-1, 3.6.12
$U_e$	Rated operating voltage	EN 61439-1, 3.8.9.2
$U_i$	Rated insulation voltage	EN 61439-1, 3.8.9.3
$U_{imp}$	Rated impulse voltage Rated impulse withstand voltage	EN 61439-1, 3.8.9.4/5.2.4 Replacement of comment in EN 61439-6, 5.2.4
$U_n$	Rated voltage	EN 61439-1, 3.8.9.1
$k_{1A}$	Temperature factor of the BTS	EN 61439-6, 5.3.1
$k_{1c}$	Temperature factor of a circuit	EN 61439-6, 5.3.2
$k_{2c}$	Assembly factor of a circuit	EN 61439-6, 5.3.2
R, X, Z	Outer conductor and fault circuit characteristics	EN 61439-6, 5.101

\*According to the low-voltage directive and the EMC directive, EN 61439-1 does not provide a presumption of conformity without another part of the standard being applied:

To achieve a presumption of conformity for the unibar M Busbar Trunking System, at least EN 61439-1 and EN 61439-6 (Parts 1 and 6 of the standard EN 61439) must be applied.

# Glossary

## Busbar elements

Busbar trunking unit BTU.

Busbar trunking units/busbar elements can take various geometric shapes, such as

- Straight length elements
- L-Elements
- Z-Elements
- T-Elements

## Busbar trunking run/BTR

If a busbar trunking system BTS consists of connected busbar trunking units, this is referred to as a busbar trunking run.

## Busbar trunking system BTS

(BTS: busbar trunking system). According to EN 61439-6, a busbar trunking system BTS is used as a self-contained switchgear and controlgear assembly for distributing and controlling electrical energy

- for all types of loads,
- for industrial, commercial or similar applications.

According to EN 61439-6, a busbar trunking system BTS is a self-contained switchgear and controlgear assembly in the form of a conductor system. The conductor system contains busbars in a duct, a trough or a similar housing. The busbars are kept apart by insulating material.

The busbar trunking system BTS may consist of many mechanical and electrical resources including, for example:

- Busbar trunking units (busbar elements) without tap-off points,
- Busbar trunking units (busbar elements) with tap-off points,
- Change of direction elements
- Tap-off boxes.

As a self-contained switchgear and controlgear assembly, the busbar trunking system BTS is encased so that a defined degree of protection is achieved.

The EN 61439-6 standard must be applied to busbar trunking systems BTS

- with a maximum of 1000 V<sub>AC</sub> or 1500 V<sub>DC</sub>,
- with a rated current I<sub>NA</sub> > 63 A.

## Busbar trunking unit BTU

(BTU: busbar trunking unit). According to EN 61439-6, a busbar trunking unit BTU is a complete unit of a busbar trunking system BTS. The complete unit includes

- the busbars,
- the busbar supports,
- the insulation of the external housing,
- fastening parts and parts connecting to other units.

Busbar trunking units come in various geometric shapes, e.g. straight length elements, L-Elements or Z-Elements.

- BTU with tap-off points  
If a busbar trunking unit has been designed by the original manufacturer (Hager) so that tap-off boxes can be connected at defined points, this is referred to as a busbar trunking unit with tap-off facilities (tap-off points). The version of the Hager unibar M Busbar Trunking System with protection type IP55 provides various options for connecting tap-off boxes to busbar trunking units with tap-off points.
- BTU with fire barrier  
If an entire busbar trunking unit or a part of a busbar trunking unit is intended to prevent the propagation of fire between parts of a building for a certain time, this is referred to as a busbar trunking fire barrier unit.

### EN 61439

The EN 61439 standard series replaced the EN 60439 standard series. The EN 61439 series of standard aims to harmonise the rules and requirements for low-voltage switchgear and controlgear assemblies.

The valid part of the EN 61439 standard series is always the applicable part of the standard, e.g. EN 61439-6 for busbar trunking systems (busways) together with Part 1 of the standard (EN 61439-1).

### Connection between European standard and International standard

European standard	International standard	German standard	Classification of VDE specifications
EN 61439 (all parts)	IEC 61439 (all parts)	DIN EN 61439 (VDE 0660-600) (all parts)	VDE 0660-600 (all parts)

### Parts of EN 61439 standard

Part of European standard	Contents
EN 61439-1	Low-voltage switchgear and controlgear assemblies - Part 1: General rules
EN 61439-2	Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies (PSC)
EN 61439-3	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO)
EN 61439-4	Low-voltage switchgear and controlgear assemblies - Part 4: Particular requirements for assemblies for construction sites (ACS)
EN 61439-5	Low-voltage switchgear and controlgear assemblies - Part 5: Assemblies for power distribution in public networks
EN 61439-6	Low-voltage switchgear and controlgear assemblies - Part 6: Busbar trunking systems (busways)
EN 61439-7	Low-voltage switchgear and controlgear assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electrical vehicle charging stations

### Supplements for parts of the EN 61439 standard

Part of European standard	Contents
EN 61439-1 Supplement 1	General rules: Guidelines for the specification of switchgear and controlgear assemblies
EN 61439-1 Supplement 2	General rules: A method of temperature-rise verification of low-voltage switchgear and controlgear assemblies by calculation
EN 61439-2 Supplement 1	Power switchgear and controlgear assemblies: Guidelines for testing under conditions of arcing due to internal fault

### Rated diversity factor RDF

As the characteristic property of the switchgear and controlgear assembly, the rated diversity factor (RDF) is particularly important for the safe operation of a switchgear and controlgear assembly. The rated diversity factor is the share of the respective rated currents that any possible combination of outgoing current circuits can simultaneously and permanently carry without the switchgear and controlgear assembly overloading. An essential prerequisite here is that the load of the feeding unit must not exceed the rated current of the feeding unit.

In accordance with EN 61439-6, 5.4, a rated diversity factor of 1 is assumed for the entire busbar trunking system BTS. A reduction factor ( $\times 0.9$ ) is required (see page 88) for the transport of energy for the "housing upright, conductor flat" installation position. All tap-off boxes may be permanently and simultaneously loaded with their rated current for this, details are provided in the rated current tables (see page 141). At the same time, the limits for the busbar trunking runs and the supply unit(s) must be observed. The mutual interference between tap-off boxes is considered to be negligible. The number of main circuits in particular must be taken into account for the respective rated diversity factor for tap-off boxes with more than one outlet-side main circuit (details in EN 61439-6, 5.4).

### User group of the busbar trunking system BTS

The unibar M Busbar Trunking System is set up to establish busbar trunking systems BTS according to the series of standards EN 61439 Part 1 and Part 6. The following responsibilities apply according to EN 61439-1:

Project participants	Responsibilities according to EN 61439: Overview
<b>Planner</b>	Specifies a requirement profile for a busbar trunking system BTS according to the black box principle <ul style="list-style-type: none"> <li>– Connection to the mains</li> <li>– Circuits and consumers</li> <li>– Installation and ambient conditions</li> <li>– Operating and maintenance/servicing.</li> </ul> Planning is carried out by Hager in cooperation with the user (agreements, conditions on site)
<b>Original manufacturer</b>	Is responsible for verifying the design by means of verification tests, calculations or the design rules according to EN 61439-1/-6 Hager is the original manufacturer of the unibar M Busbar Trunking System.

Project participants	Responsibilities according to EN 61439: Overview
<b>Manufacturer</b>	Builds the finished busbar trunking system BTS and is responsible for, among other things: <ul style="list-style-type: none"> <li>- Sizing the busbar BTS according to the planner data</li> <li>- Compliance with the design verification of the original manufacturer</li> <li>- Identification of the system and documentation</li> <li>- Performance of the routine verification</li> <li>- Declaration of conformity.</li> </ul>
<b>Operator</b>	<ul style="list-style-type: none"> <li>- Receives a busbar trunking system BTS conforming to EN 61439 and the necessary certificates for verifying the conformity</li> <li>- Commissions the plant manager</li> <li>- Instructs the personnel</li> <li>- Develops a safety concept/risk assessments</li> <li>- Arranges suitable safety measures.</li> </ul>

### User

According to EN 61439, the user is an involved party who specifies, purchases, uses and/or operates the switchgear and controlgear assembly. The user may also be someone who acts in the name of the involved party.

### Operator

The responsible operator of an electrical system as an owner, leaseholder or lessee. The term working proprietor or proprietor [Betriebsinhaber] is used in Switzerland.

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